



EU AGRICULTURE, FISHERIES, ENVIRONMENT AND ENERGY SUB-COMMITTEE

EU energy: decarbonisation and economic competitiveness

Oral and written evidence

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ABB Limited—Written evidence

Summary

- ABB is a global leader in power and automation technology, providing products and systems across the energy, transport and manufacturing sectors to support decarbonisation of the global economy.
- The Committee on Climate Change has highlighted that decarbonising energy by 2030 is critical to achieving the EU's ambitious targets for reductions in greenhouse gas emissions.
- A robust, long term policy framework is needed to support the required investment in low carbon technologies.
- We support a longer term energy strategy to provide greater certainty to investors, deliver jobs and growth.
- We believe that Governments should more proactively encourage energy efficiency for large industrial businesses.

Introduction

1. ABB is a global leader in power and automation technologies. We provide a number of products, systems and solutions across the energy, transport and manufacturing sectors. Much of our business is focused on the twin challenges of improving energy efficiency and facilitating the development of a sustainable low carbon energy system.
2. We have committed to an ongoing programme of investments to support the growing demand for low carbon energy. The ABB Group of companies operates in around 100 countries and employs about 145,000 people worldwide. In the UK and Ireland, ABB now employs around 3,000 people and continues to invest in jobs, training and facilities to support the development of a sustainable UK economy.
3. We welcome the opportunity to provide evidence to this inquiry.

Energy's contribution to economic growth

4. The EU has set itself challenging targets to substantially reduce greenhouse gas emissions by 2050 (an 80-95% reduction over 1990 levels). Decarbonisation of energy, transport and heat will be necessary if these targets are to be met. Moreover, decarbonisation of transport and heat will be reliant on a decarbonised energy system as an alternative to the existing carbon intensive fuels.
5. In the UK, the Committee on Climate Change (CCC) has set out that it is 'crucial in the context of economy-wide decarbonisation that the power sector is almost fully decarbonised by 2030'. The CCC has cited the constraints to rapid decarbonisation of the economy and note that beyond 2030 the opportunities for large scale deployment of low carbon technologies are limited. Within this context, large scale investment in the energy system will be needed over the coming two decades.
6. Decarbonisation of the global economy will provide opportunities for jobs, growth and economic prosperity. A recent study by the Renewable Energy Association sets out that the UK renewable energy sector currently supports 110,000 jobs throughout the supply

chain and is expected to support more than 400,000 jobs by 2020.¹ The study also predicts that the value of the UK renewable energy industry will reach £60bn by 2020. Similar studies have highlighted significant potential economic benefits of decarbonisation across the global economy. However, these benefits will only be realised with the support of robust, long term policy frameworks to support the investment requirement.

7. A number of nuclear and fossil fuel stations are reaching end of life or closing in line with the Large Combustion Plant Directive. The construction of new generating plant will inject further investment into the UK economy and support growth. However, continued policy and economic uncertainty is likely to stifle efficient investment, increase security of supply risks and impose additional costs.
8. Investment expenditure is one of two ways that energy can contribute to economic growth. The other is the availability of low cost energy, increasing competitiveness across the economy. Policy should provide long-term certainty that encourages development of the right mix of energy efficiency investment and generation mix to deliver the desired blend of carbon intensity, security of supply and energy affordability. We provide further comment on this aspect of energy below but fundamental is long term certainty of policy direction coupled with appropriate levels of risk protection to enable the private to take the investment decisions required.
9. The European Commission has highlighted the merit of a long term strategy for meeting the EU's climate change objectives. The European Commission cite the fragile economic environment and its threat to the development of the low carbon economy as a reason for providing long term certainty to investors. ABB considers that the development of a comprehensive energy strategy for the period 2020-30 will maximise the economic benefits of decarbonisation to the UK economy.
10. Measures to support Industrial energy efficiency and electrification of the transport system, offer significant opportunities to improve productivity, reliability and profitability in the economy, while delivering reductions greenhouse gas emissions. We consider that the policy framework needs to proactively encourage investment in these areas rather than relying upon uncertain commercial incentives.
11. The lack of clarity and certainty around the UK energy policy framework has already had an adverse impact on investment in the low carbon economy. We note that several major offshore wind developers have stated that they will delay investment decisions due to the lack of clarity over the details of Electricity Market reforms. The ongoing uncertainty in the UK market was also cited as a major contributing factor underpinning Doosan's recent decision not to invest in Scotland. We believe that too little has been done to send the right signals to the industry to enable them to secure the investment that will ultimately be required.

The Internal Market in Energy

12. Greater levels of competition across the energy system have the potential to reduce the energy price to the consumer and increase competitiveness amongst energy-consuming sectors of the economy. Nevertheless, increased price competition is likely to have the

¹ Renewable Energy: Made in Britain, Renewable Energy Association and Innovas, April 2012

effect of reducing the profitability in areas of the value chain which will, in turn, stifle major, long-term investment programmes. It is important that the pursuit of low-cost energy supplies does not undermine investment, particularly where it has the potential to undermine security of supply.

Reducing the costs of energy for business and consumers

- I3. We recognise that Governments face the trilemma of balancing climate change commitments with the need to maintain security of supply whilst ensuring that energy remains affordable to consumers. We believe that it is unrealistic to expect the overall level of energy prices to fall in the short to medium term, given the rapid growth in demand and the unprecedented level of investment that is anticipated.
- I4. In the short to medium term, investment in renewable energy technologies offers the potential to stabilise energy prices and reduce reliance on energy imports. Moreover, businesses and consumers can achieve significant financial savings through energy efficiency measures. We support UK Government initiatives to incentivise investment to improve energy efficiency. Nevertheless, we consider that more could be done to incentivise business users to improve energy efficiency.
- I5. In a number of countries, businesses are encouraged to invest in energy efficiency measures. As a global technology provider, we are exposed to many policy frameworks and initiatives. We already see that many countries offer direct financial incentives to support investment in energy efficiency – either as a financial reward or as a penalty for failing to save energy. Nevertheless, there are several initiatives that also focus on reducing the risks to businesses of investing in new technology.
- I6. The UK has a number of overlapping schemes that, indirectly, incentivise industrial energy efficiency. The complexity of multiple overlapping schemes (EU ETS, CCL & CCAs and CRC) causes confusion amongst the organisations affected and each scheme, on its own, does not necessarily provide sufficient incentive to catalyse energy efficiency investments. We recommend that a simplified package of measures that delivers a transparent cost driver for industrial energy efficiency.
- I7. We also strongly believe that the cost of energy is not the sole reason for inaction in the adoption of industrial energy efficiency measures. We consider that a policy framework that removes the other barriers to industrial energy efficiency would be welcome. These barriers includes risk aversion to unfamiliar technology (with a solution being a mechanism to facilitate the underwriting of technology performance risk by the party best placed to assume that risk – the solution and/or technology provider) and biased capital allocation (with a solution being ring-fenced medium-term (5-8 year) financing for industrial energy efficiency to encourage energy performance contracting).

Research and innovation

- I8. ABB invests approximately \$1.5bn per annum in research and development to deliver the next generation of power and automation technologies. This investment is enabling businesses and customers to improve efficiency and consume energy in a climate responsible manner. We are able to invest in developing new technologies where we have sufficient certainty that it will provide sustainable growth to our business. ABB has

a long standing reputation of delivering “world’s first” technologies which have delivered wide ranging economic benefits.

19. ABB has pioneered some major technologies, such as HV Direct Current technology. We developed the world’s first HVDC transmission link more than 50 years ago. This technology has been refined and is now being used for other applications. We recently completed the East-West interconnector project, which will enable the transfer of power between the UK and Ireland. The interconnector is the first project in the UK to use the innovative HVDC light technology to transfer large amounts of power at low loss levels. In the UK, ABB has also developed and delivered the first battery energy storage device which is connected to a local distribution network. This allows the network to manage power flows and voltage levels on part of the system.
20. The UK is currently the world leader in Marine technology research and development. ABB is supporting the development of the UK wave and tidal sector by providing leading edge components, systems and expertise. Moreover, we have made a major investment in a leading wave technology developer, Aquamarine power, to support the development of this new technology area.
21. Investment in renewable energy technologies combined with focus on other decarbonisation initiatives such as energy efficiency, transport technology and refurbishment can have a dramatic effect on the UK and European economies. More certainty from leaders on the direction of energy policy is needed so that investors can begin to more comfortably make the substantial investments needed to create a sustainable energy market.

3 October 2012

**Peter Atherton and Bloomberg New Energy Finance—Oral evidence
(QQ 171-185)**

Evidence Session No. 8

Heard in Public

Questions 171 - 185

WEDNESDAY 19 DECEMBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
The Earl of Courtown
Lord Giddens
Lord MacLennan of Rogart
Lord Lewis of Newnham
Baroness Parminter
Lord Plumb
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Angus McCrone, Chief Editor, Bloomberg New Energy Finance, and **Peter Atherton**, Independent Equity Analyst

Q171 The Chairman: Mr Atherton and Mr McCrone, thank you very much for coming to see us today. We are very much looking forward to hearing what you have to tell us. We think we have your for an hour, so we will try to keep to the timetable. I think it would be helpful to have perhaps a couple of minutes from each of you and perhaps a little bit of background, Mr McCrone, on Bloomberg and anything else you would like to include in the opening remarks.

I should deal with formalities. First of all, you have a list of interests that have been declared by Committee Members. They should be in front of you there. This is a formal evidence-taking session of our Committee. Full shorthand notes are being taken. Of course, they will go on the public record in printed form and on the parliamentary website. You will be sent a copy of the transcript and you will be able to revise it in terms of any minor errors. The session is on the record. It is being webcast live and will be subsequently accessible via the parliamentary website.

Angus McCrone: Thanks very much, Chairman. I am Angus McCrone, Chief Editor of Bloomberg New Energy Finance. New Energy Finance was a British start-up in 2004, the aim of which was to be the best information provider and research house on clean energies and carbon worldwide. We grew very quickly and we were taken over by Bloomberg in 2009. We now have about 200 people including 80 specialist analysts covering all the different sectors: carbon, wind, solar, biofuels. We are also moving increasingly into conventional power and gas as well. We are not a lobby firm, obviously. We are a private business doing our best to make a return, so we do not have an axe to grind. We try to tell it as it is.

I just wanted to throw a couple of numbers at you and also make some remarks about the Dieter Helm testimony that I was reading. It was very interesting and certainly worthy of some comment. Just to give you a worldwide picture: global investment in clean energy worldwide has increased from about \$54 billion in 2004 to \$280 billion in 2011. The two largest parts are utility-scale investment in projects like wind farms and solar parks, biofuels plants and so on, and then there is another big piece that is small-scale, particularly rooftop solar, which has seen enormous growth in the last few years. Then you have a lot of early-stage stuff: venture capital, private equity and so on, and money raised through public markets.

The biggest two countries in the world investing in clean energy in 2011 were the US and China, both at just over \$50 billion. Germany and Italy were third and fourth at around \$30 billion each and the UK came in sixth at \$9 billion, with part of that being utility-scale and part of that being small-scale solar. If you compare renewables with fossil fuels, we reckon that there was 82 GW of new renewable capacity put in in 2011 worldwide, plus 15 of large hydro, making 97 GW worldwide, and that compares to 106 GW of fossil fuel power excluding replacement. There was some stuff going out and some stuff coming in, but the net addition was 106 GW. The two numbers are not that different. In 2011 there was almost as much renewable capacity put in worldwide as there was fossil fuel.

I know this is the EU Committee, but the EU trend on investment rose very sharply from \$15 billion in 2004 to a record \$94 billion in 2011. It looks as if it is going to be down this year. The first three quarters produced around \$50 billion. A lot of that has to do with policy uncertainties, but there are other factors we can go into. In the UK there are also strong rising trends: \$0.7 billion in 2004, \$10.7 billion in 2009. Since then we have been around the \$8 billion mark, and it looks as if we will probably hit around that in 2012. Again, that is a mixture of the large-scale stuff and small-scale solar.

Just on the Dieter Helm testimony, we certainly agree with him on the severity of the climate change threat. I thought he was very eloquent on that and the concern about coal use worldwide, but we disagree on his vision on the energy mix. Gas is the most volatile commodity price that there is. The US Energy Information Administration has said that quite strikingly and it would be a mistake to put all of our eggs into the gas basket, just as it would be a mistake for any of us to put all our investments into one part of the world or one type of investment. There has to be a balanced approach. We disagree about putting most of the money into R&D. There should be lots of money going into R&D, but renewable energy costs have come down massively in the last three years. Take for instance the different solar PV technologies: levelised costs have improved by about 50% in three years and that would not have happened if we had not gone to scale and got all the manufacturing economies and the improved know-how and so on. Even onshore wind, which is a more mature technology, has seen a levelised cost improvement of 15% in three years.

We agree that shale gas should be developed, but we wonder just how much scope there will be in the UK given the high population density and the likelihood of local objections.

There is a worry that too much of a dash for gas will make us heavily dependent on imports, because the UK Continental Shelf production is in heavy retreat and you would need an awful lot of shale gas to make up the difference on that, plus whatever extra capacity we put in.

Lord Giddens: Can I just ask a point of information? Do you have the latest data on the proportion of total energy across the world delivered by renewables if you exclude hydro?

Angus McCrone: Yes, fortunately I do. Excluding large hydro, so including hydro up to 50 MW, 6% of total power worldwide in 2011, up from 5.1%.

Lord Giddens: Still tiny but risen quite a lot would be the situation then?

Angus McCrone: Yes, that is right.

Q172 The Chairman: Thank you. Mr Atherton.

Peter Atherton: Chair, thank you. I am Peter Atherton. I have been an equity analyst covering the European Union sector for 16 years, the last 12 years at Citigroup where I headed up the Pan-European Utilities team. I left Citigroup in September. Before that I spent four years at Kleinwort Benson and before that I worked in the industry. I started my career at the old Central Electricity Generating Board. I joined in the late 1980s and worked on the Internal Privatisation team for three years. Once that had been completed I joined National Grid where I worked on the first dash for gas, on the connection of the new gas-fired power stations to the grid system, and then latterly was part of the corporate strategy team looking at the future of the transmission system and how you could make money out of transmission networks long-term.

I look at this whole issue very much obviously as an equity analyst. Just to give you a feel for what happened to the European utilities sector: if we go back to 2007-08, the European utilities sector was the fourth-largest sector in the European marks with a free-float market cap of around €480 billion to €490 billion. Since then, unfortunately the sector has been the worst-performing sector, ex-banks, ever since 2009 and, in fact, has only outperformed banks by around 9% since 2009. The market cap of the sector now comes in around €280 billion. That is a unique European thing in a world that is very difficult. In a world that is looking for yield, you would expect the utilities sector to do well because there is that sort of safe haven-type sector. In fact, if you look at the sector, even accounting for the impact of Fukushima, the Asia utilities sector has done very well relative to local markets, as it has in the US and in Latin America. Europe is unique to see its share prices trashed.

I will give you a sense of some of the movements. In 2008 the market cap of EDF was north of €150 billion. Today it is around €26 billion. E.ON's market cap breached €100 billion in 2007-08. Today it is just on €30 billion. There has been a tremendous contraction in equity value in the sector. There are many reasons for that but undoubtedly part of it, and a big driver of it, has been European energy policy and the exposure that these companies have to those policies. In fact, on the other side of the coin for investors in the whole energy policy space which is investing directly in renewable companies or the manufacture of renewables, I am afraid that the position there is even worse than putting your money in the utilities who are building renewables. If you had invested in Vestas, for example, its share price peaked at around 720 krona in 2008. Today it trades at 30 krona and it is only trading at 30 krona because the Chinese are likely to buy it. The vast bulk of the German solar sector has been wiped out in terms of manufacturers. They have pretty much all gone bust and the market cap has pretty much disappeared.

This is not giving a complete picture but just to give you a feel for it. The stock in the quoted European renewable manufacturing companies, the combined market cap in 2002 was €4 billion. It reached a peak of about €70 billion in 2007 and today it is back to about €3.5 billion. The market cap of all the listed renewable manufacturing companies in Europe today is only about €3.5 billion. Some of that, of course, has been cannibalised by the large engineering companies who have built up renewable businesses and hard-shouldered some of the smaller manufacturers, but, generally speaking, you can see that from an equity market perspective, the investment story over the last four or five years around the EU energy policy direction has been one of complete and utter loss of value. Therefore, needless to say, investors are, as a group—the investment community is an extremely wide group, so you can always find exceptions and you can see this via share prices—are extremely wary of the sort of discussions that we have within the UK and elsewhere about substantial increases in investments.

Q173 Lord Renton of Mount Harry: I listened to what you have just been saying, which is very interesting. But on engineering companies, I noticed the other day that Siemens, for example, which is a German company of course, is at a price ratio of something like 50 P/E. That is very large indeed and it is obviously a very big company, much involved in what we are talking about.

Peter Atherton: I do not know Siemens' numbers but I cannot imagine that is a forward-looking P/E. I suspect it is a backwards-looking one where they took some big hits on last year's numbers. They would have taken one-offs, for example, so it would be, I suspect, a trailing P/E number. They will have taken one-off hits to their profits, because the average large engineering company trades at nine to 10 P/E. We would need to check on Siemens individually. Facebook trades at around 50. I think it is unlikely that Siemens does.

Q174 The Chairman: The points you both made lead us to the first question, which I suspect you answered, Mr Atherton. It is this question of EU policy and whether it helps or hinders investment in the sector and whether the policy has helped the low-carbon sector. From what you say about the share price, it probably has not, due to the uncertainty. Looking forward, what should the energy policy be to encourage investment? How would this occur? What are the factors that both of you would identify and what should the emphasis be? Should it be green or just to drive costs down to get us through this recession and hopefully buy a bit of time for a bridge across to a more sustainable policy? What might investors expect as payback times? What is the lifespan of these things? Mr McCrone, would you like to go first?

Angus McCrone: Yes, thank you. Perhaps I can just build something on to what Peter has said. There was an investor misunderstanding of the renewable sector that this was the next internet and share prices got a bit carried away in 2007-08, but a lot of the reason for the loss of value of companies like Vestas is that the sector became incredibly competitive. There was huge overcapacity. The Chinese moved in in scale in both wind and solar and you got to the point where nobody could make any money. It is not that there is no business being done. There is a lot of business being done, but it is just that everybody is struggling to make a profit and that is particularly true in solar PV where people are selling panels at a loss and so on.

In terms of EU policy and setting an investment framework, we think that the EU's 20-20-20 targets have provided a lot of investment certainty and they have generated a great deal of investment. What the EU has done is it has set overall targets and then it has been up to national governments to operate within that and choose what their priorities are going to

be. For instance in the case of the Netherlands, they have taken the decision, “We will go for the cheaper technologies at the moment and we will go for offshore wind later, rather than going for offshore wind now when it is still quite expensive”.

In the case of Ireland, they have gone for onshore wind now and offshore wind probably sometime in the future, again to do with cost. In Germany and the UK there is a different set of criteria. They are both heavily-populated countries. There is a limit to how much onshore wind you can do. Also, they want the industrial policy benefits of being the centre of the offshore industry, get that kick-back, and so they have gone more heavily into offshore wind. France is a bit of a mixed case. It is saying, “Offshore wind at the end of this decade, but we will insist we will get local content in all the projects”.

There is that discretion to fashion it how you want, but there has to be a lot more investment to meet the targets. We reckon €465 billion between 2011 and 2020 to meet the renewable energy target in the EU, and the UK figure within that is €73 billion. Policy has to be set to encourage investment because we do need a lot of replacement plant and we do need to be able to supply electricity to the end of the decade. We think the overall framework is doing that and governments have become better at showing some wisdom in how to finesse policy so it does not cost too much. Initially feed-in tariffs were incredibly expensive because they were set too high, and there was a sort of field day for all the developers to come in and make tonnes of money. You saw that with the UK feed-in tariff where it was adjusted a lot later than it should have been. Governments have become much better at adjusting quickly and trading off the amount that is built with the amount of subsidy they are giving and they are increasingly moving to competitive auctioning and so on.

You mentioned pay-back times. In renewable energy, because you have that certainty brought by the incentive schemes and the targets, pay-back times are possibly less relevant there, but it is very relevant in the area of energy efficiency and small-scale renewables for households and businesses. Very often households and businesses do not take decisions on buying insulation or buying a solar panel because they are not quite sure whether they are going to be there in more than two years’ time. That is a very important disconnect, and we are still grappling with how to solve it.

Lord Renton of Mount Harry: I should have thought people would think it wise that you should you have solar panels on your house when, if you do move from the house and sell it, you are going to get a bit more money because of the solar panel.

Angus McCrone: That is the way the market should work, but I think the perception at the moment, rightly or wrongly, is that they are not quite sure about whether it does put that amount on. It should do, but the householder or the business has to have 100% confidence that it will do before they make the investment.

Q175 The Chairman: Mr Atherton, we probably have to keep this moving.

Peter Atherton: Yes, we could probably spend two hours discussing half of those questions. There is no question but that when the EU adopted the greenhouse gas reduction directive in 2002 that galvanised a tremendous amount of investment. If you suddenly start handing out billions of pounds worth of new subsidies to any industry or any section of society, you will find people will rush in to grab their share of that. We are talking now of a subsidy stream within the EU of well over €50 billion a year. Of course, that causes people to go in and be attracted. Where we made a big mistake is in adopting the renewable directive because the original aim was to say, “Okay, we are going to reduce greenhouse gas emissions by a certain amount by 2020 and then 2030”. They placed that burden

overwhelmingly on one sector—which is problem number one—the electricity sector; and then they decided in 2006 that the route to meeting those targets would be overwhelmingly met via renewables.

I and many other commentators on this think that was a very big mistake, particularly for the UK because it locked us in to adopting a set of technologies that were very immature, very technically uncertain and very expensive, namely offshore wind. I did see the Prime Minister boasting in a Committee recently that we lead the world in offshore wind roll-out and my thought when I saw that was, “Well, because nobody else is dumb enough to deploy it at £160 per MW hour”. The problem with targets and policies is that they can have an initial beneficial effect to galvanise something, but one of the very interesting things about that as we are sitting here at the end of 2012 is this is probably one of the very few major economic policy areas that has remained absolutely intact since 2002. If you think about everything that has happened since 2002 when we embarked upon this new energy policy for Europe—the financial crisis, Fukushima, the arrival of nonconventional gas and technologies in the States and things—there have been many very substantial things and yet the policy has not changed by one comma via the Climate Change Act or via the carbon budgets. That policy being locked, like the euro, into its own internal logic is, in my view, very disconcerting to investors, because the—

The Chairman: That is very helpful. It is probably a good point for Lord Giddens to ask his question, because I think that probably speaks to that point.

Q176 Lord Giddens: There are two questions I want to ask you. They are fairly brief but quite difficult, I think. Do you think large-scale investment in energy infrastructure in the EU, given the economic travails of especially the eurozone at the moment, can help promote new growth and do you think it can lead to net new job creation? Second, is the lowering of gas prices in the US likely to have an inhibiting effect on the competitiveness of Europe given that one of the things that everyone in my area is discussing is the potential reindustrialisation of western countries, which is being discussed against the background of the lowering of energy prices in the US but has much broader implications and drivers, I think? I would be glad of any comments that you have to make on either of those, although we are quite limited for time. Incisive and decisive comments would be good.

Angus McCrone: Shall I make those first incisive comments? I think the green jobs argument can be overdone. The US Administration talked of 5 million green jobs some years ago, and I do not think there is any evidence that we are anywhere near that.

Lord Giddens: The important thing is net new jobs anyway.

Angus McCrone: Yes, that is right. They do generate some jobs, and one of the differences is, certainly in the case of both wind and solar, almost all the cost is upfront. The jobs are being generated upfront rather than during the time of the operation of—

Lord Giddens: I was not just thinking investment in renewables but overall energy investment, including in infrastructure, construction of a better European grid and so forth.

Angus McCrone: Yes. It is an important way of stimulating economic activity, particularly at a time where it is generally possible for governments and large corporations to borrow at fairly cheap rates, but if you are looking at areas where it can stimulate a particularly large number of jobs, then there are a few—one being energy efficiency where a lot of that is small-scale: people going into houses and putting in insulation and smart meters and solar panels. There are one or two areas within renewables that generate a lot of ongoing jobs. One of those is biomass, handling and transporting biomass backwards and forwards, and

processing it and so on. There are some more labour-intensive areas, but generally energy investment is capital-intensive.

You mentioned shale gas and obviously the price in gas in the US has come down very sharply. There has been a supply shock, if you like, and the price that we have at the moment is almost certainly not the equilibrium price of gas for the US for the next decade. On our forecast it will probably head back up from \$3-something to about \$6 per MMBtu over the next three years or so. There will be some advantage to the US from shale gas, certainly, and that will help some energy—

Lord Giddens: Also, they will be producing it themselves rather than importing it.

Angus McCrone: That is right, yes. The transport costs will be reduced and they will have more security.

Lord Giddens: All those things can help re-stimulate industrial location.

Angus McCrone: That will help the US. With Europe, there will be some shale gas as well, but there is more of an energy security concern because there is unlikely to be enough shale gas to make Europe self-sufficient in it. We will still be dependent on importing gas from Russia and Qatar and so on if it increases its use of gas considerably.

Peter Atherton: On green jobs, there is no doubt that the subsidy streams that have been created over the last decade in Europe have made some people staggeringly rich. I am not sure it has created many jobs on a net basis and one thing that I am always stunned about is the lack of cost-benefit analysis that ever gets done on these costs in terms of the job implications. You are taxing society as a whole and particular industries very heavily to provide a subsidy for another industry and that other industry happens to be very capital intensive. Naturally, it will never create many jobs even if you build everything in the UK, which we do not. SSE will tell us, for example, that in the value of Greater Gabbard, their large offshore wind farm they built with RWE, about 15% was UK spend. Centrica tell me that the very best they can ever imagine getting offshore wind to is local content of about 35-40% UK.

Even of the money you are spending on these incredibly high capital costs, the vast bulk of it—particularly if you move to offshore wind, and onshore wind to a lesser extent but with similar numbers—will go overseas anyway. The Government have said that in 2019 the levy cap will be £7.6 billion in today's money; so in the money of the day that will be £9.5 billion roughly speaking, if you assume 2% to 2.5% inflation between now and then. That is £9.5 billion, half of which will come from consumers or residential. That is £4.5 billion from consumers, which is a penny and a half on income tax, and £4.5 billion to business, which is 5% of corporation tax-type numbers. Where is the cost benefit that says, "If you did not do that and, by the way, you gave everybody relatively competitive energy at the same time, where would employment be compared to the jobs that are going to be created in this sector by those subsidiaries?" That work never gets carried out because I suspect the people in charge of carrying out the work know that the answer will be very negative for the policy. That does not mean you do not do it, because obviously what you are trying to do here is tackle climate change, but arguing that you are doing this and there is going to be some great jobs and economic benefit seems to me extremely dubious.

On the general point of whether investment in energy can spark the EU economy, the answer is no. The wider argument is around infrastructure. The EU economy is not weak because we like infrastructure. Europe has the best infrastructure in the world, pretty much,

but the economy is weak. Adding 0.5% to the base of the infrastructure stock of Europe is not going to solve Europe's economic problems.

Lord Giddens: Perhaps I can just say that I think it is completely right that you have to have a macroeconomic analysis of the implications of the investment. You normally do not have that, but we want to take that as a serious issue.

Q177 Lord Renton of Mount Harry: I find what you are telling us absolutely fascinating because I would have thought EDF, who is my supplier at home, are doing very nicely. I would have thought that the stock exchange price of those companies is very high at the moment. You are saying absolutely the opposite.

Peter Atherton: Yes. There are a number of reasons for that, not just that they are exposed to the energy policy. Their market caps have been halved and they are running at about 20%.

Q178 Lord Renton of Mount Harry: Leading on from this, I want to go back to your figures and the question of financing investment over the next decade. We are a European Union body; we look at what the European Union is doing. I have here a figure from the European Commission estimating that capital expenditure in the EU's energy sector over the next decade will need to be in the order of €1 trillion. I am pretty bad at budgeting, but I think €1 trillion means 1,000 billion. Do you agree with that? Does that make sense?

Peter Atherton: Yes. In fact we published a note back in 2009 called the *Trillion-Euro Decade*. What we did was we looked at the total capex required of the gas, water and electricity sectors at the utility level—this is not including upstream E&P companies: Shell, Esso, BP—just to meet replacement of assets, what generally is required under environmental legislation and these aggressive targets on CO₂ reductions and renewables. Yes, if you add up the EU 27, €1 trillion is easily a number you come to. In fact, that does not include energy efficiency because the EU number does not include the energy efficiency directive, to which they have put a price tag of somewhere around €500 billion to €800 billion. If you added up what is required to be spent across the utility sectors—gas, water, electricity—and add energy efficiency on to it, you would be north of €1.5 trillion.

Lord Renton of Mount Harry: Mr McCrone, do you agree with that?

Angus McCrone: Yes. It could be higher. I mentioned a figure of €465 billion—

Lord Renton of Mount Harry: You did, yes.

Angus McCrone: —to meet the renewable energy targets. Obviously in addition to that there is balancing capacity, interconnectors, grid works and all the rest of it. Yes, the number seems very credible.

Q179 Lord Renton of Mount Harry: Who is going to have to pay? Who is going to be made uncomfortable by this? Do you think the private sector is going to be able to make a lot of this capital available without great difficulty and without placing unrealistic burdens on households?

Angus McCrone: There is plenty of availability of private sector money and I think you saw from the figures I introduced at the beginning that the private sector has pulled its hand out of its pocket with a lot of money and invested in the clean energy sector very heavily over the last few years. Typically, if you are talking about a project, you would have an 80/20 split between debt and equity or possibly a bit lower depending on the technology.

Lord Renton of Mount Harry: 80/20 would be reasonable, you think?

Angus McCrone: Yes, certainly for wind or solar or some of the fossil fuel technologies. In 2011 about 60% of the money came from utilities on balance sheet and about 40% through project finance, non-recourse from banks directly to projects, and there was a small amount of bonds. I think one of the things that is quite interesting is that, although the private sector has done very well at financing energy investments, there is a bit of a danger that some of the regulatory moves on the banking system will make things a bit more difficult. For instance, the Basel III rules that are coming in for banks over the few years, there is something called the liquidity coverage ratio, something called the net stable funding rule, and they will force banks to match the duration of their own fundraising with their own loans to a much larger extent and that may push up the price and restrict the amount of long-term finance that is available.

Lord Renton of Mount Harry: On the ground simply that this is all still another five years ahead or whatever and therefore querying whether it would all be repaid in due course.

Angus McCrone: It is a non-deliberate thing. The banks are being hit with regulatory changes because of what happened in the financial crisis, which has very little, if anything, to do with the energy sector. But the restrictions that are being put on them will impact the energy sector.

Peter Atherton: I completely agree with Angus. Project finance, as I understand it, is now basically dead. You cannot get project finance into these things, so you are going to have to rely very much on the balance sheets of large corporates and on the bond market. The bond market is extremely sceptical of providing large-scale finance against particularly immature technologies like offshore wind. It is very nervous around nuclear. The balance sheets of the major utility companies, not least because their share prices are so low, are in extremely bad shape; so what they have been doing is slashing their capex over the next few years. If you take E.ON as a good example, their peak capex was €11 billion in 2008-09, that sort of year. Going forward, they have committed to spend no more than about €5 billion out through to 2015.

If you look at the capex plans of all the major utilities, which have now basically been set out to 2015—and I was saying this to the Economy, Energy and Tourism Committee the other day—if you take our friends Scottish and Southern Energy as a good example, they have set out a capex programme running to 2015 of £1.5 billion a year. If they were doing their share of the UK 2020 target, their capex would need to be running at £4 billion to £5 billion a year. Now, is it possible that post-2015 they are going to increase their capex by many-fold to catch up? The answer is to that is: extraordinarily unlikely. Could they get a rights issue away today to bolster their balance sheet to ramp up their capex? No, the cost would be extraordinarily prohibitive.

Of course, the Energy Bill is designed to try to deal with some of these issues. The Energy Bill, with the Contract for Difference arrangements, is designed to transfer a risk. The whole point of the Energy Bill is to transfer price risk from the developer to the consumer, thereby substantially reducing the risk faced by the developer. That would allow traditional investors like utilities to invest more than they otherwise would have done and to attract in new pools of capital, particularly, famously, as we keep hearing from sovereign wealth funds and other people from the Middle East. There might be a degree of success in that. Can it bridge the gap? I think it is extremely unlikely within the timeframe. Can we hit the 2020 renewable target, let us say, by 2024-25? Yes, possibly. Can we hit it by 2020? Extraordinarily unlikely.

Q180 Lord Renton of Mount Harry: Do you see that there is anything that Government should be doing to help in this that they are not doing? Is there anything that you would recommend to them that is not yet being done?

Peter Atherton: Yes, change the targets. From the equity market's perspective—and, again, I hesitate to speak of the equity market because it is full of different investors, but certainly everybody I know in the equity market and what they show via their share buying and selling actions—the policy is unbelievable and, therefore, just reinforcing the policy with new and even more complicated and more interventionist mechanisms does not make the policy more believable. It just creates more complexity and therefore more disbelief.

Q181 The Chairman: Mr Atherton, why should the targets be there?

Peter Atherton: You can keep the targets; just push them back five years.

The Chairman: Just push them back? That would bring forth investment, you believe?

Peter Atherton: Ideally 10 years. What would it allow? It would allow a much more sensible roll-out of offshore wind with technology that is more mature and more proven. Never in the history of UK industry have we ever taken a technology like offshore wind and gone from prototypes or very small-scale development, none of which worked—none of them worked—and then decided to mass roll it out and spend £100 billion rolling it out in a very short period of time. For what benefit? And we have a very arbitrarily set target of 2020. It is a very odd thing to do.

Q182 Lord Lewis of Newnham: Comments have been made that we issued targets for 2020 and not looked at 2030, although at one stage that was being actively considered. You are saying that it is investment in development and that the 2020 dates were unrealistic to start with?

Peter Atherton: They should never have been signed up to. The UK should never in a million years have signed up to the renewable target for 2020. It was a very bad decision.

Lord Lewis of Newnham: The 2030 date is something you can just forget?

Peter Atherton: There are layers here, are there not? The carbon budgets work back from the 2030 target. Stuck in the middle of the 2030 target is this very arbitrary 2020 target for renewables. Do not forget, renewables are meant to be a means to an end, i.e. the aim is to hit a 2020 greenhouse gas reduction target and then a 2030 and then a 2050 greenhouse gas reduction target. What we signed up to in 2007 was a mechanism to help achieve that, which was renewables, which, for the UK certainly, was the wrong mechanism.

Angus McCrone: Can I just come back on a couple of those things?

Lord Lewis of Newnham: Please, yes.

Angus McCrone: You are probably not surprised to hear I am more optimistic than Peter. First of all on the financing thing, there are challenges on financing but we think the money is there. It is just a matter of making sure that it makes itself available at the right point. For instance, on the banking side, the priority is to make sure that these regulatory changes do not have unintended consequences for the availability of finance.

Pension funds are a tremendous potential source of money for energy projects and pension funds are desperate to get hold of something yielding more than 1.5% for a 10-year UK Government bond. Very often these energy projects are offering a very stable credible yield, much higher than that, but the pension funds either do not have the knowledge or they do

not have the pooled low-risk arrangement that will get them in there. A lot of work needs to be done and policy makers can make it easier for the industry to construct bonds and pooled investments that will enable them to come in.

On the 2020 targets, I think I said earlier different countries were doing it in different ways; choosing different technologies. You can have an argument about whether we should have less offshore wind and more of something else or whatever, but I think the EU as a whole is on track to meet its 20% renewable energy target. The UK's one is slightly lower than the EU average. I think the UK can also do it, although there are some questions about whether it can achieve it on the heat side. It is very early in the day, but I think the targets are doable.

Q183 Lord Lewis of Newnham: Do you think that the determination of a 2030 target would help with investment or not?

Angus McCrone: I think it should be clear that there will be a 2030 target, but I think setting the 2030 target at this point in 2012 would be a mistake because 18 years is a massive amount of time in the energy industry. Technologies change. Economic growth—who knows what is going to happen to that over the next 18 years? What about storage technology? I think we need to prepare ourselves probably to set a 2030 target around the end of this decade. We certainly should not set one now.

Lord Lewis of Newnham: But therein lies the dilemma, does it not, inasmuch as vast amounts of money are being invested? They want security over a given period of time as opposed to the potential technology changes that can occur, which is going to make certain things not out of date but certainly less desirable.

Angus McCrone: If you invest now it will be in projects that will be going towards that 2020 target rather than 2030, but I take your point. Yes, you do need to come in at a suitable moment and create the next stage of certainty for investors.

Peter Atherton: Imagine that I am wrong and the investment is there and it all gets built, so we do invest the famous £110 billion between now and 2020. Obviously lots of other things need to get invested in. There will be £40 billion spent on the water infrastructure. The gas networks and the electricity networks will be built out as well, and we will have to build a lot of gas-fired power stations to act as back up. That all adds up to north of £200 billion in our numbers, probably around £240 billion, by 2020; so there will be all those new assets sitting on our utility networks in 2020. As politicians, how are you going to explain to the consumers that their utility bills will be substantially higher than they are today and, secondly, how are you going to explain to them that the profits of the utility companies are also going to be very much higher than they are today?

The return on capital might not be going up because they are putting a lot of new assets on the ground, but their reported profits will be extremely high because they will be reporting profits on brand spanking-new assets. The health test that I often discuss with equity investors is: how believable is all this, if it all happens? The question is: sitting in 2018-19, do we believe that the Ministers of the day are going to go on “Newsnight” and defend the 10-15% increase that has just happened on energy bills and the 10-15% profit rise that has just been reported by Centrica and SSE and RWE and EDF and the others? The two things go together: very much higher profits and very much higher prices.

The question for investors is: do I believe that the government of the day—not the government of today, but the government of the day—is going to stand behind these mechanisms and those profits. The evidence from the last three or four years on continental Europe is that, when governments are faced with the embarrassment of rising prices and

rising profits, what do they do? They do not defend it to the consumers. What they do is get rid of the profits.

The Chairman: It seems to me like you are advocating the bond market and not equities. But, anyway, I think that is a very good guiding point. Just to manage this, we probably have 25 minutes more and six questions to go and we would like to get your views on these. I am going to be pretty arbitrary in asking you to belt through this if we can, because we want to know the answers. If we could go to Lord Plumb's question and then we can go on. If I may, I will just put my hand up and ask people to stop and we can go to the next question. Is that okay?

Q184 Lord Plumb: I think you answered the next question because you were telling us the major part of the €1 trillion is going to be spent on research, development and innovation. The question is: how much of that is going to be investment from the private sector, which is obviously an important sector, and are they prepared to invest or be encouraged to invest in carbon capture and storage? That is an area of considerable importance. There is one question I would like to just add to that. I am hearing at the moment that the solar companies are offering huge sums of money for land in certain areas, which is of concern at the moment because they are taking over or offering to take over some pretty substantial areas. That, to me as a farmer, is a bit worrying because nobody is going to say, if they own that land, "Well, we are not interested", because it is a substantial amount. How do we get this balance right and why are they offering that sort of money—because that is for research and development?

Angus McCrone: I think what you are referring to there is utility-scale solar in the UK. Last night the Government announced the renewable energy certificate arrangements for utility-scale solar and there will be some built in the UK. Whether we want that, given the fact we are in a crowded country and we are not a particularly sunny country, I think is another matter. Possibly we do not, but that is the explanation for why that is happening.

On the CCS side, it has been quite disappointing that things have moved slowly. Take for instance the NER 300 programme from the EU. It is not giving any money, as it turns out, to carbon capture and storage in the EU because none of the projects are far enough advanced. It does look as though there is going to be no alternative, if we want to be serious about CCS, to Governments bridging quite a bit of the early-stage demonstration project money, which is obviously going to cost, because these things are large and expensive. The technology is very immature. But it looks as if there is going to be no alternative to that.

Peter Atherton: Just on the last point, if you are trying to take a technology which at the moment is at the lab stage and move it to large-scale industrial application tomorrow, then the financing for that has to come from the state because obviously the private sector would never finance it in that way. It would take many stages of development and take many decades for a technology like CCS to come to the market. What we are trying to do is shorten that process by probably 10, 15, 20 years and that will require gigantic costs if it is achievable, which is probably unlikely, and that will have to be met by the state.

Q185 Lord Plumb: How do we fare in this country compared with other European countries?

Angus McCrone: In terms of CCS?

Lord Plumb: Yes.

Angus McCrone: I think all European countries are somewhat in the same boat in that they have some demonstration projects that they want to get done but it is all taking a lot of time to get them to the starting line. We predict that by 2020 there will be only 1.5 GW of CCS worldwide and most of that will be in North America and the UK and European segment of that will be very small. I think there are challenges in terms of the economics. For instance, in the UK you would have to put the carbon dioxide under the North Sea, which adds cost, whereas in the US you might be able to use it for enhanced oil recovery. So they might start off with the economic advantage.

Peter Atherton: Do not forget UK energy policy. One of the key assumption is that CCS technology will be available at the industrial scale for roll-out at a reasonable cost very early in the next decade. In other words, you have to crack the technology within the next three or four years at the very latest.

Q186 Lord Lewis of Newnham: But is not one of the real problems with CCS that it is a unique technology and that each individual situation requires its own special treatment associated with it? All right, you have the disposal, which is one factor that is common and will govern why, for instance, Germany is against it as opposed to the UK being for it because of the availability of the North Sea as opposed to the Baltic storage, as it were. General technology is not uniform by any means.

Angus McCrone: There are three main technologies and, certainly with the CFD programme that is proposed in the UK, they would be initially allocating different levels of CFD support to different projects, which is a challenge obviously for the Government to get that right without sort of picking winners and ending up picking the wrong one.

Q187 The Earl of Courtown: I am looking at global comparisons. How attractive is the EU compared to the rest of the world as far as investment regarding basic research, applied research and commercialisation? How attractive is the EU compared to other parts of the world for investment in these areas?

Angus McCrone: The EU has been one of the pioneering parts of the world in clean energy. The region of Europe, the Middle East and Africa has been the largest for investment in clean energy worldwide every year since 2004. Asia has grown, but Europe, the Middle East and Africa has stayed ahead. It has a stable policy framework—the politics have been generally supportive of clean energy—good intellectual capital and heavyweight engineering companies, which we have hearing about, to partner with. If you look at one particular technology, which is marine energy, eight of the leading 12 companies worldwide are European and a lot of those are now backed by big European engineering companies, people like ABB and DCNS, and Siemens, Andritz and Alstom have all partnered. It is quite an attractive part of the world for investment, but there is a lot of competition coming.

We have talked about the Chinese and getting involved in wind supply and solar and so on. The Japanese as well are going to be involved in offshore wind. The Australians are getting involved in marine energy and the Koreans have become quite an important player in both onshore and offshore wind. Yes, it is attractive, but Asia is rising.

The Earl of Courtown: As far as marine energy is concerned, can you just quickly say what areas this covers? Is this tidal, turbines, wind?

Angus McCrone: No.

The Earl of Courtown: No? Offshore wind?

Angus McCrone: No, I mean tidal stream and wave in that marine energy heading.

Peter Atherton: Europe has been the centre of this because Europe has decided to open a massive tap of subsidy that has been flowing through the system for a decade or so, so obviously things have happened here. Going forward there are two headwinds, are there not? One is the idea that we are creating new industries that are highly capital-intensive, highly energy-intensive manufacturing industries. At the same time we have a deliberate policy to make energy very expensive. Where you already have a competitive advantage in engineering, like the Germans do, you are going to grab a slice of that. In a country like the UK, we have no particularly great competitive advantage in heavy engineering anymore; although obviously we do have some very high-tech manufacturing sectors. Generally speaking, I cannot see why the UK would have any great advantage out of it.

Q188 The Chairman: Mr Atherton, where would the smart equity investor put their money if they wanted to be in energy somewhere in the world?

Peter Atherton: You would not have been putting in it in utilities or renewable manufacturing.

The Chairman: You would not have done historically, that is for sure. Where would you go now?

Peter Atherton: From 2003 to 2008 you would have made a tonne of money and then you would have got out, hopefully. If you were a classic utility investor you would have put your money in the US, which has done very well in the utility world, or in Asia. One of the shocking statistics is that the Asian utility sector has outperformed Europe despite the fact that they had Fukushima, which basically wiped out the market cap of all the Japanese utilities. It still outperformed Europe. The scale of the impact on Europe has just been huge.

Where would you put your money today? You would look at anybody who can crack energy storage. That is obviously going to be a great—

The Chairman: Lord Courtown's question was: is Europe is attractive? You were not too certain about Europe apart from technologies. People who need to have energy in their portfolio, where would they go?

Peter Atherton: It depends what you mean by energy. Obviously energy would also mean upstream—

The Chairman: Power generation and all those things, I guess.

Peter Atherton: Power generation: certainly the American power generation utilities have had a decent run recently because they are switching from coal to gas. The expectations that they would all have to invest staggering amounts of money over the coming decades in renewables have gone away completely. Their business model has been greatly helped by it.

The Chairman: That is just the insight. That is great. That is very helpful.

Q189 The Earl of Caithness: How important is certainty or at least credibility or clarity in public commitments and how good are the EU and the UK at doing that?

Angus McCrone: This is in relation to the EU ETS and so on?

The Earl of Caithness: In investment and in broad terms.

Angus McCrone: Certainty is vital and there have been a couple of occasions where countries have failed to provide certainty and, in fact, have produced the complete opposite; Spain being an example where it effectively guaranteed returns for solar developers and then there was a boom and it decided it was going to go back on that and would not provide

people with what they had been promised. There has been something of the same happening in Bulgaria where a sort of retroactive tax has been slapped on solar developers there. Certainty is vital. You will not get the investment flows unless you provide it.

I was just going to mention that, on the EU ETS, obviously the price of carbon has been very low so it has not been sending a powerful signal. I suppose if it has achieved anything tangible it is that it has made it a bit more problematic and expensive to build high-carbon energy. Coal-fired power stations have become less of an attractive bet to build because of the existence of the EU ETS.

The Earl of Caithness: That is Germany.

Angus McCrone: The Germans have done a bit but, in general, if it had not existed there probably would have been more.

Peter Atherton: Any company that invests in anything, and anybody that invests in any company, would always ask for certainty from their customers or from whomever. Of course they would. Why would you not? If your asset lasts 10 years then you are going to ask for certainty of being paid a decent return on that asset for 10 years. Quite why, as policy-makers, you want to give companies that degree of certainty, I do not know. What does giving certainty entail? It is transferring risk. All you are doing is saying the uncertain risk around revenue is going to be transferred from the companies who built the assets, and are probably best placed to take that risk, and transfer it to somebody else.

In the Energy Bill's case, that risk is transferred to the electricity consumer. The uncertainty equals risk and it is just where we are allocating those risks. If a company says to you, "I am willing to invest in an offshore wind farm but I need an absolute guarantee for 15 years that I am going to be paid X amount and earn Y amount in return", then perhaps you should be asking yourselves, "Should that asset ever get built?" That is a hell of a commitment on behalf of the consumer to take and businesses should be willing, at the end of the day—we all live in a capitalist society—to take a very big chunk of that risk. Every other business does.

With certainty, I come back to the point that this is a policy area where nothing has changed since 2002.

Q190 Baroness Parminter: Dieter Helm, when he was giving his evidence last week, argued for a carbon consumption tax as a mechanism to support low-carbon investment. Do you support that approach?

Angus McCrone: I support it as an idea. Whether it is practicable or not, I do not know. The danger is to say, "Right, we will throw out everything we have now and then we will put something else in", but then, if that something else is not practicable, all you are doing is creating a lot of uncertainty and stuff will not get done in the meantime. That is the problem that I have with it.

Peter Atherton: But there was a huge debate around, "Should we go for carbon tax or should we set up a carbon trading scheme", when they obviously decided to set up the carbon trading scheme. The carbon tax was just viewed as politically undoable and it was much easier to set up a carbon trading scheme that applied to certain industries, so the cost was hidden from Joe Public. The problem with a consumption tax is that it is very open to Joe Public, and Joe Public may turn round and say, "I do not want to support this". One of the recurring themes among the supporters of all these mechanisms and costs and policy matrices, and one of the things that has always led me to be somewhat suspicious of it all, is that they have always been very intent on hiding the cost from the public.

Q191 The Earl of Caithness: I just want to go on to ETS and whether you think that it has had any impact on investment, and whether you think that the proposed reforms by the EU will make investment greater in the future?

Peter Atherton: The EU's ETS has been a terribly badly designed market mechanism, which is not surprising because carbon obviously does not have a cost and, therefore, when you create a new market it gives it a cost. If that market is designed by bureaucrats in Brussels you are likely to end up with a very badly designed market, which we did and the market has suffered. It has basically made a lot of people very wealthy, particularly big polluters ironically enough. Virtually all of the EU's ETS revenue streams has gone to big polluters. It is one of the ironies of life. Has it had an impact on carbon reduction? Well, it had some impact. The reason it gets a lot of criticism today is its low price. Actually that is not fair. The price is reflective of the fact that the EU is on track to meet its 2020 greenhouse gas reduction targets. The EU's ETS was never designed to support renewables. What people complain about is that the price is too low to support renewables. It was never designed to do that. It was designed to provide a price signal to hit the 2020 greenhouse gas reduction targets. The EU is on track to meet that. That may be largely due to the recession and other things, but nevertheless we are on track. Therefore, the price should be low. The price mechanism oddly works today, albeit the mechanism of the market has been a dog's dinner since the day it was invented.

Angus McCrone: I sort of agree with the second half of Peter's argument. There are failings in the design of the thing, but the biggest reason why the price is so low is that we got hit with the worst recession for 80 years or whatever, and therefore economic activity and emissions were much lower than anybody had previously thought.

Peter Atherton: But that means that we are on track to meet the 2020 targets. It is a slightly odd thing to say that hitting the targets one way is a good thing, i.e. we build a lot of expensive renewables, and hitting it another way, i.e. the economy just has not gone very well, is a bad thing. Obviously that is a bad thing, but the point is that you are on target to hit the targets. Therefore, the price should be low and it is low.

Q192 The Earl of Caithness: Could you write to us on this question: what is your blueprint for the EU? We are an EU Committee. We have concentrated on the UK. Could you write to us what you think the EU policy ought to be on energy and whether what you have said about finances applies to the rest of the countries in the EU? That is the bit I would like to continue. I would be grateful if you could write to us as we do not have time to do it now.

Peter Atherton: I could write to you. There was a question that I did not pick up a bit before, which is the impact of the US energy revolution. We know it is more than gas. It is about tight oil and other things. I am often asked as an analyst from investors, "What will change all this?" I come back to this point about the EU. When all this happened in 2002 and despite everything that has happened, not a single comma of that path has been changed. The mechanisms have evolved but we are just carrying on down this path. It just strikes me that the energy revolution in the States is the one thing that could force policy-makers in Europe to make substantial changes and the reason is very simple. This whole policy is based upon two assumptions. First, obviously climate change is a major threat, fair enough; but the second assumption is that fossil fuels are scarce and therefore expensive, and are going to become increasingly scarce and therefore increasingly expensive. Therefore, you get a tremendous economic benefit from being a first mover away from fossil fuels. If that argument turns out to be hokum, i.e. fossil fuels are abundant and relatively cheap, then I

think it is going to be hard for policy-makers in Europe to stick to their current path when the public can see that the main economic rationale on which this has been sold to them is a load of nonsense. We are not in that position yet. We cannot look forward in 10 years' time and say with certainty that, "The opportunistic assumptions around gas and oil in States are definitely going to be proven true and China will develop them as well", and things like that. But if it is true I think it would be incredibly difficult for Europe to stay on the path that it has gone down because the public will see that the economic benefits are not there, and indeed there is a tremendous economic cost, and the question is: are the public willing to pay that cost to hit some climate change target?

The Chairman: That is very interesting. If you could send us a note expanding that a bit further it would be very helpful. Lord Lewis, I do not know how much of your question has been covered already.

Q193 Lord Lewis of Newnham: Lord Chairman, the bulk of it has been answered. I think we have already discussed the 2030 renewable targets. Certainly Mr McCrone discussed with us the position of the Helm's discussion on renewable energy and embryonic technology.

Perhaps we can deal a little with shale gas. I am a little concerned about shale gas because it seems to me that we are dealing there with something relatively unknown. We are talking about shale gas as though it is a unique product. It is not. It is going to vary, very much depending on the part of the world you are referring to, and each will divide into a different set of problems. How much is known about the shale gas situation, for instance, within Europe? I know we have at the moment major deposits in Poland and, I think, in France—the two major sectors—whereas the UK does have some but, as I think you were saying earlier, the real problem is that it is in populated areas and it may not be very popular to the public to extract it. But there is the additional factor that the composition of the gas itself is going to vary very much depending upon the geology of the situation. Do we know anything at all about that particular side of the situation?

Q194 The Chairman: And is it a long-term solution?

Angus McCrone: On that specific point my answer is no, I do not. I think the general argument you are putting forward is a very good one: that there are a lot of ifs surrounding shale gas, and that is relevant to what Peter was saying. I would definitely be in the camp that would argue for a balanced energy policy; so we do some shale gas, do a bit of nuclear, do the renewables. Do all those things and do as much as you can to counter climate change. How will it look in a decade's time? There are all these ifs. Who knows what that situation is going to be, but the best thing we can do is to have a balanced approach at the moment.

When it comes to the consumer electricity bill thing at the end of this decade, to me that is looking in the wrong end of the telescope because what we should be doing is sorting our economies out. If our economies are doing well then people will be a lot less upset by the fact that their electricity bills have gone up a bit over the decade. That is what we should be doing and there is nothing that says that electricity bills should never go up. There are good reasons, to do with climate change and combatting it, why they should go up.

The Chairman: This has been extremely stimulating. I think I speak for everybody when I say that you have given us another perspective on this and, given that none of this will happen without investment, we will certainly—and I count myself in this—have to go back to the drawing board and have a bit of a rethink about some of this. It has been most helpful. Perhaps I can say how grateful we are to both of you. Thank you.

Bloomberg New Energy Finance and Peter Atherton—Oral evidence (QQ 171-185)

**Bloomberg New Energy Finance and Peter Atherton—Oral evidence
(QQ 171-185)**

[Transcript to be found under Peter Atherton and Bloomberg New Energy Finance](#)

Professor Peter Cameron—Oral evidence (QQ 81-92)

Evidence Session No. 4

Heard in Public

Questions 81 - 92

WEDNESDAY 28 NOVEMBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
The Earl of Courtown
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Plumb
Lord Renton of Mount Harry
Lord Whitty

Examination of Witness

Professor Peter Cameron, Director, Centre for Energy, Petroleum and Mineral Law and Policy and Professor of International Energy Law and Policy, University of Dundee

Q81 The Chairman: Professor Cameron, good morning. You are very welcome. The Committee noted that it was grateful for your smiling face on your biography that you sent us. As one Committee Member noted, it was nice to see someone with such a positive view. If I may, I shall deal with the formalities first. You should have in front of you a list of interests that have been declared by Committee Members. This is a formal evidence-taking session of the Committee. Full shorthand notes will be taken. Obviously, they will go on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript so that you can comment on any minor errors. The session is on the record. It is being webcast live, and will subsequently be available on the parliamentary website.

Professor Peter Cameron: I understand.

The Chairman: I think you received the questions in advance. I do not know whether you would like to start with any framing comments or go straight to the questions. Which would you prefer?

Professor Peter Cameron: I would not mind making a few comments. They will be very brief. My own expertise on EU energy law and policy rests on a number of books and some years that I spent as a professor at the European University Institute in Florence, Italy, which

has an extensive programme on energy studies. During the past couple of decades, the UK has played a crucial role in promoting the EU internal energy market. Against the current, it has advocated liberalisation and competition in energy markets. That is an important record to note. Recently, the direction of UK energy policy has changed, with a greater concern for future investment. In my view, there is a real risk that this guiding assumption at the present time will lead to a more intrusive role for the state in energy markets. There is a risk that in trying to deal with this so-called investment problem, market mechanisms will take second place to a form of essentially centralised state planning. Yet the risks in trying to pick winners and losers in energy markets are readily apparent. We are seeing how the entirely unexpected revolution in shale gas is upsetting most calculations about gas pricing around the world, and energy continues to surprise us and is likely to continue doing so for policymakers who become very involved in this sector. Also, for me, it is rather important that the UK does not abandon its leadership role in the EU and become as inward looking as quite a number of other Member States have tended to be in the past. That would be very regrettable for all of us.

The Chairman: That is very helpful, because it leads into the first question about EU policy being relatively short-term. However, as you observed, the UK moving towards a more long-term view of these things on the necessary investment really brings us to the question of the form of contract that you think would be most beneficial in the sense of driving these reforms. Do you have any comments on the length of contracts, in particular?

Professor Peter Cameron: There are quite a number of choices on the table, and we have heard a great deal about the relationship of these contracts to feed-in tariffs, for which there is quite a lot of experience in the European Union. I would, however, like to say that the duration of these contracts is something that is rather important. You mentioned cheapness in one of your questions, which is a worthwhile point to make, but the low cost has to be seen in relation to annual price and the total contract price. We have been seeing something of this in the PFI. It is very important to get this balance right. What looks cheap in the short term might prove to be very expensive in the long term. However, more broadly, I worry that this shortage of generating capacity that we are told is going to happen is assuming closures of plants rather than, say, mothballing or running them at low capacity. That may not happen—or at least the closures might not happen. I also think that it assumes a revival of demand, which may never occur, perhaps due to a combination of energy efficiency and other measures. I do not think that is necessarily negative. In that context, you start to ask, “What should government be doing?”. As a lawyer, I am rather keen that the parties should decide themselves which contracts they find appropriate, conclude them and take risks. However, I accept that in many areas it is important for the state to be involved, and when it comes to, say, nuclear, there is really no choice. It is the norm for the state to play a heavy role. In EU law, the energy mix is very much a matter for the Member States, so if the UK decides that it wants a considerable, or even a small, role for nuclear, it would be quite natural for the state to take a significant role in designing those contracts.

The Chairman: Just to summarise, you are saying that in the case of nuclear, the state could or should intervene and provide long contracts to support the cost recovery of the large investment required, but everything else should be a matter of ordinary commercial contracting.

Professor Peter Cameron: You hit the nail on the head when you talked about large investments. We are talking about very large investment and possibly significant cost overruns. It has just been normal practice that the state has been heavily involved in just about every country. It is not embarrassing that that should be the case also in the United

Kingdom. That is the one caveat to what I have been saying about the importance of market mechanisms.

The Chairman: Just leave the rest to the market?

Professor Peter Cameron: Yes.

Q82 Lord Lewis of Newnham: Can I return to your first remarks. What I am not clear about is: where do you see the main emphasis being—on energy security or on climate change problems? Both are factors that are being addressed, but in some ways they can be in contention. You remarked at the start that you can get individual states making policy, and then that that may depend more upon energy security than on climate change.

Professor Peter Cameron: Ideally, we want a Europe-wide initiative on climate change, and to some extent we have that already with the ETS; but everyone knows that that regime needs reform, including the Commission, which has come forward with proposals. I tend to think that, when it comes to security, the market tends to deliver fairly well. I do not have many worries about that. I do not think there is a contradiction between the two—between security and what you might call sustainability, climate change and low carbonisation.

Q83 Lord Cameron of Dillington: Good morning, Professor. It is nice to see a fellow clansman. I was going to take the contract argument to external contracts—bearing in mind the Russian-Bulgarian long-term contract for gas, based on oil prices. Also there is the fact you were talking earlier about the surprises that the energy market has, with cheap gas in the States and so on. The whole world energy market must be changing. I just wondered how you saw the evolution of the nature of contracts between third-country suppliers and EU Member States, which would obviously include the UK. What implications do they have for energy pricing and energy security?

Professor Peter Cameron: I noticed that Bulgaria was mentioned in your second question, and I thought that was a surprising choice of country to mention, because it is 100% dependent on Russia. It is hard to think of another country in the European Union that is more dependent on a neighbour such as Russia. There is absolutely no competitive market in Bulgaria at the present time. The country is very much out on a limb. Clearly, a deal has been done between the Government and the Russians with respect to this particular contract, but in other Member States it is clear that renegotiation is taking place at present. It is possible that there is a discrepancy between the statements that you would hear from the gas industry and the reality, in the sense that a great deal of renegotiation is taking place, and the gas-oil linkage is breaking down. I cannot see any reason why gas and oil should track each other in a contract. That was the case in the past, but there is no reason why historical precedent should guide the present evolution of contracts. I think we are going to see a change in the price linkages, whereby there will be a movement away from the oil linkage to some kind of electricity basket. You are probably going to see more involvement of gas producers in taking risk. As long as prices are going to go up, they should not be worried about that. However, another feature that we are seeing is that the mix, or rather the divergence, between the spot market and the price in those contracts has become too great, which is why we have had the renegotiation. That role of the spot market in the future is likely to continue, so we are going to see an interplay between the contracts and the spot market—all of which, it seems to me, will be healthy and not worrying in any way. With respect to security, as long as the markets are giving out efficient signals, the investment should be there for security, and energy pricing should become more efficient as

well—more linked to gas-to-gas competition, for example. I am therefore fairly optimistic about the way that things are going at the present time.

Lord Cameron of Dillington: So, with America effectively going out of the energy market on this, that will have a big effect on prices. As regards your observations about the spot market and the forward market, do you see more contracts being done on the spot market? Is that what you are implying? It depends whether there is a rising or falling market.

Professor Peter Cameron: When it comes to gas, I am very hesitant about prediction.

Lord Cameron of Dillington: Quite.

Professor Peter Cameron: There is an army of experts out there—some of them, maybe many of them, more clever than I am—who have all got it wrong in the past 10 years, because nobody expected this to happen. Personally, I think this is a marvellous development. You have the application of technology, much of it existing technology, which has been synthesised and put together; and a great many individuals have been prepared to take risks and gone ahead to develop this in a way that is extremely positive for the host country, the United States. This has had generally favourable implications for the rest of the world so far. However, I am putting in brackets the questions about the environmental aspects of shale, which you have not asked me about.

Q84 Lord Renton of Mount Harry: Professor Cameron, I would like to go back to your early remarks. I know that you have worked a good deal on competition in the EU energy markets. We would be very interested to know whether you feel that there is enough competition or not. We have heard the view that EU energy markets are competitive. Are they sufficiently competitive to provide a good deal to EU consumers, or not? On the other hand, you get the Commission actually getting worried and saying that people are not doing what it would like them to do and that they are inward-looking, nationally inspired and so on. Are the new entrants to the EU playing in this game?

Professor Peter Cameron: There are two parts to that question, your Lordship. First, as regards competition in general in the EU at the present time, the European Commission's recent communication on the internal energy market is, on the whole, quite positive about this. One can always be somewhat sceptical, given that it is the author, the European Commission itself, making these statements, but there are country reports annexed to that and there is a lot of supporting information. It does seem to me that the Commission has reason for optimism with respect to many Member States, but not all. That takes me to the second part to your question. To add to that first part, even in Germany, with its extraordinary challenges in energy policy at the present time, it is remarkable how it has moved towards competition and seems to be—

Lord Renton of Mount Harry: It really has, has it?

Professor Peter Cameron: Yes, in ways that Britain should find encouraging. I would certainly not be negative about the northern part of the European Union. There is a lot going on that may not be dramatic, but it indicates a positive evolution towards greater competition. The second part of your question is more complicated, however, and rather ties in with another of your questions about enlargement. Here, I do not think there is any doubt that some countries have been admitted to the EU that have not engaged in the kind of liberalisation that they had been required to engage in. We might as well be specific: Romania and Bulgaria are the two worst culprits in all this. They have probably been admitted too early; whatever discipline they were subjected to has not been rigorously enforced and, arguably, as a lawyer, I would say that designing a legally perfect system for

liberalisation and competition is not at all adequate for countries that have come from a former Communist environment. There is much about how you organise markets that those people do not understand. They need help and I do not think there is anything bad about that. The Commission should have done more to assist those countries. It is easy now to blame them, but organising markets in a competitive way is not, as we know, an easy matter. It would appear that some of those countries have genuinely tried to do so, but they have not done very well. If I may go a little further along this line, looking at the enlargement process and, let us say, failures, Greece is an example of the process going badly wrong.

Lord Renton of Mount Harry: Greece is?

Professor Peter Cameron: Yes. I know that that country is not part of a recent enlargement, but there you have had a system of liberalisation, especially in electricity, that has been very disappointing in the way that it has worked. It has protected the incumbents. It has not assisted foreign investors, such as European companies, in coming in. It has resulted in capacity payments being made to those incumbents because generators were built, some of which are not running. They are not running because the prices were wrong and the market is not competitive. There you have an example of the differences we have within the present European Union, and it is not a matter of just the recent entrants to the Union. It is a previous enlargement that has been rather badly managed, I am afraid.

Lord Renton of Mount Harry: Could I just for a moment go back to Romania and Bulgaria. Years ago, I used to do a lot of business with both those countries and it was not easy. I was never quite certain what was going to happen. What are they actually doing at the moment that is breaking the rules, as you might say?

Professor Peter Cameron: There is not competition. That is the outcome. What I am trying to say is that there is a difference between a process and structure, particularly the legal processes and structures, and the outcomes, and that a more assertive monitoring of these processes by the Commission should be done, even when it comes to something like capacity-building, helping them to develop an independent regulator, for example. In many of these countries, the idea of an independent regulator, relatively free from political interference, is a bit of a challenging concept for them. Romania is not the only one in that case. Spain could be in that category as well. So you find that independent regulation of the transmission and pipeline network is essentially absent. The regulator is directly responsible to the head of state—that kind of thing. I should add, however, seeing as I have been a little bit critical of the European Commission, that it is important to keep in mind that European institutions did not go into this without planning. They have a treaty called the energy community treaty, which in a way is a successor to the energy charter treaty—the energy charter being focused on Russia, primarily, and the former Soviet Union. The energy community treaty is largely focused on the south-eastern part of Europe and the Balkans. The idea is to promote through this vehicle energy market reform and the adoption of norms that are accepted in the European Union. That treaty has been a vehicle for the training of officials in a number of countries, and I think that the Commission has become much more assertive in using that treaty as a training vehicle in the past two or three years, probably noting its failures in Romania and Bulgaria. Therefore, I would be more optimistic about what we might see with Serbia, Montenegro and Croatia. However, in all these discussions one has to note that energy policy is one of the variables in a bigger equation, and there are other considerations in all these discussions about accession.

Q85 The Earl of Caithness: Just to follow up Lord Renton's point, you almost got on to talking about competition in the EU market at the end of what you have just said. What

should the EU be doing to promote more competition within the EU energy market? With your legal knowledge of this, what can the EU do, as opposed to allowing the Member States to do it?

Professor Peter Cameron: Again, it is a two-part question. The first part is an opportunity for me to say something about interconnections. The European element in interconnections is quite considerable. If European institutions cannot facilitate interconnections, one wonders, what can they facilitate? There, it seems to me that recently the Commission has been shooting at the wrong target. In its recent budget, which has been a very large budget, many millions of euros have been allocated to support interconnections. I am really not sure that it is terribly sensible for the EU to be allocating funds in that way, because it is not clear that those interconnections will be necessary. Many of the existing interconnections actually work quite well. Furthermore, when they do not work well, it is often the result of transmission system operators, TSOs, blocking the transmission. That could be dealt with through competition law—you do not have to throw money at them. Another source of problems is the way that renewable energy is currently being managed. That is very much nationally driven, and giving a priority dispatch to renewable energy can cause those interconnections considerable difficulty. I do not mean that one does not necessarily allocate such dispatch, but having nationally driven systems is certainly causing problems at the moment. As to the next part of the question—what should they be doing?—much of what they are doing, to the extent that it does not involve spending a great deal of money, could be useful in: promoting the cross-border dimension of the energy market, trying to bring those Member States that are currently behind up to an acceptable level, and enforcing the rules that they currently have. For example, they have had three energy packages. It is important that they keep enforcing these rules because, if they do not do so, we will just drift and see some Member States not following the rules. We have got many, many outstanding cases of infringement procedures against Member States. The competition laws are a very good enforcement mechanism, and the Commission is doing a good job in using that from time to time.

The Chairman: Although you have touched on interconnection and enlargement, we have you here for only another half an hour and we have four more questions.

Q86 The Earl of Courtown: You touched on interconnections and my question concerns that, although you have answered it quite a lot already. We have heard from previous witnesses about our interconnections and that they still remain insufficient. You touched on that earlier, but could you tell the Committee what legal barriers there are to improving these connections? I do not think that you quite covered that in your last answer.

Professor Peter Cameron: Absolutely not, I did not cover that, and I was holding my fire. It is a very good point to raise. I have thought about it and talked to my colleagues about it. I asked them, “What did you think?”, and we all agreed that there are very few legal barriers remaining, but—and the but is important—there are significant de facto barriers. Now, you may say, “What is the difference?”. There is quite a big difference. “Permitting” is the key word here—permitting, licensing, and obtaining the licences that are required to construct these transmission lines and pipelines. This is a major problem in just about every country in the European Union. Personally, I tend to think it has a lot to do with democracy. In our society, you have many people at a local level who think local, and they have every right to do that and to want to press their local interests. However, when it comes to large projects, these local concerns, as we know in the United Kingdom, can lead to continued appeals against a particular proposal. The problems that we have in the United Kingdom in this respect are not unusual. They may not be as bad as, say, in Italy. Belgium is quite bad as well.

There are many countries in which we are talking about literally years and years that have to pass before you can obtain a satisfactory number of permits or licences to engage in the investment. This has been a constant problem for the EU for at least 20 years. It has introduced one infrastructure package after another, or one trans-European networks proposal after another, and they always keep coming back to this problem about what you might call authorisation of pipelines and grids.

The Earl of Courtown: You are not talking about protectionism in Member States, but about the problem with the voter who does not want a pipeline going through his back garden.

Professor Peter Cameron: I would say it is as elementary as that. I have never heard that protectionism is a significant issue in this respect.

Q87 Lord Whitty: Almost every one of our witnesses tells us that we need huge amounts of money to invest in the European infrastructure—up to between €2 trillion and €3 trillion. First, in view of what you said about uncertainty, do you agree with that figure? Secondly, where is the money coming from? Although you have clear predilections for private sector, rather than state, investment, there remains the question as how it is to be generated. Do you see the trading system having an effect, and what other measures are needed to ensure that that money is there? The associated question is, given that those decisions are being taken, by and large, on a national basis in terms of national preferences for type of contract, do you think that that leads to a sub-optimal situation across Europe as a whole?

Professor Peter Cameron: I will start in reverse and go the other way round. National decision-making is a real problem. On the one hand, it is very clear from the legal structure of the European Union that many decisions about energy will always be taken at the national level, and there is nothing bad about that. When it comes to renewables, which I think most of us are enthusiastic about, although not necessarily to the same extent, there is a problem because much of what is happening about renewable energy is driven by national priorities. The investment required is often alleged to be large, but large within a national framework. You will therefore have plans to invest large amounts in order to construct wind capacity in the north of Denmark or the north of Germany in order to transfer that to serve power stations in the south of those countries. It might be more logical if you went to parts of the European Union that were abundant in wind power or solar energy and constructed the power stations there, with a view to serving markets in other parts of the European Union, but not necessarily in the same Member State. We just do not see that at the moment. We do not see Scottish onshore wind being used for German markets or even necessarily for markets in the south of England at the present time. I am not trying to make a nationalist point here. There is this mismatch and perhaps a lack of vision about the potential centres of production for renewables and the markets, so that these urgently-needed investments that one hears about are often urgently needed within uncoordinated national frameworks. To the extent that you take off your national blinkers, and assume a truly European market in renewable energy, you might very well find that you are talking about lower amounts of investment which might be economically more efficient; even if in the short term they are expensive, in the long term they might make a lot more sense. So I suppose that way I am coming back to the first part of your question. I think that the amounts of investment we are hearing about are inflated, although not always for the same reasons. I do not have a sense of panic about all this investment issue.

Lord Whitty: Even if the figures are inflated, they are still huge chunks of money, even if you downgrade them a bit. Where do you think that the money is going to come from?

Professor Peter Cameron: That question is a difficult one to answer because I am not convinced that the amounts of money required will be quite as large. Even so, if the pricing is right, I do not see why the private sector should not play the leading role in this. If you make sure that the market signals are right about pricing, the investment will come. That tends to be my view. Historically, if you look at what happens when the state gets involved, often the cost to the taxpayer has been considerable because the state is having to guess how energy markets are going to work. They do tend to work with considerable cross-boundary or international effects, as we see with the shale gas phenomenon. You might very well find that you are betting on a horse that turns out to be the wrong one, with significant costs to the consumer.

Lord Whitty: That is true if the prices were right in a more ideal world. However, it is actually the Governments in some countries who directly set the prices. In others, they set the framework for the prices in the form of contracts. Even in the UK that is the case.

Professor Peter Cameron: That is a very good point, because it comes back to this point about stability. We have not had, regrettably, as much stability in policy over the past few years as investors would have liked—not by a long way, honestly. On stability, you have two aspects; you have pricing stability and source stability. On pricing stability, we have an issue in the UK with the continual changes that we have seen over, say, the past 10 years. It is quite a long time, actually. There is nothing wrong with the Government rethinking their policies.

Lord Whitty: But not every 18 months.

Professor Peter Cameron: Realistically, investors need some stability because any normal business needs to be able to predict the future up to a point, in order to engage in its planning. We have been seeing a lot of uncertainty in the UK recently. Also, in continental Europe there are some sources of uncertainty—in Germany in particular.

The Chairman: If there were stability, at what price do you think the investment would come forth? In other words, what yield are investors looking for, bearing in mind that it is probably an index yield, because they are going to move the prices up? Do you have a sense of that?

Professor Peter Cameron: I do not. What I notice is that investors themselves seem to have different points of view. A significant number of them are emphasising this need for stability and the future shortage of generating capacity. However, from looking at some of the debates on the Energy Bill at the pre-legislative phase, I have noticed that other companies take a different view, and you will not necessarily get homogeneity across the industry. However, if companies sense that they are going to get cash from the arrangements that you decide on, it is unlikely that they are going to be unhappy.

The Chairman: The question is just how much cash.

Q88 Lord MacLennan of Rogart: You have answered some of the questions about stability, but what I would like to hear from you is how that stability could be promoted, particularly at the EU level. There are areas where the EU is exercising its influence, if no more, on matters such as carbon capture and storage, emissions trading schemes and renewable energy targets. What is your own view about the interrelationship between that and all the other sources of instability that are nationally driven?

Professor Peter Cameron: It is very good that the Commission is taking the initiative to reform the ETS. This is a potentially good Europe-wide mechanism, but I do not think anyone would have any doubt that, for the future, it will have to be significantly reformed if it is to work at all. When it comes to renewable energy, the Commission needs to look at the way that it has been subsidised and dispatched, so that, for example, gas-fired generators know when they have to produce and the market sends the right signals. The Commission has a big challenge there, because the whole history of renewable energy in the European Union has been nationally driven. Some member states have taken the lead and moved faster than others but they have adopted, primarily, national action plans. That will continue to be a challenge for the European Union and a source of problems. I may not be giving you an answer, but what I am trying to say is that I think there is a divergence between the EU's internal market programme and its renewable energy programme—one being pro-competitive and the other being heavily nationally driven and state-subsidy oriented. It is a priority for the European Union to get this sorted out, and it will be under increasing pressure to do so. At the present time, as I understand it, the competition directorate is examining the state-aid issue. Remember that state aid in the renewable energy sector tends to be significantly large. It is not just that there is aid—aid is not a problem because there are plenty of mechanisms for managing it—it is the size of the aid and the frequency with which it is given that is a problem in this sector. Beyond that, as regards CCS, which you have mentioned, I have a friend and colleague at Edinburgh University who is very passionate about it. He is always telling me that it is just five years away. Every time I meet him, in whatever year—we have known each other for a number of years—it is always five years away. I hope it is nearer, but I tend to think that we have a long way to go before this technology is commercialised. I do not share the European Commission's optimism about its implementation in the near term.

Lord MacLennan of Rogart: Perhaps I may go back to renewable energy, because you said that there was a problem that needed to be sorted out between the national and European levels. What would your approach be to doing that? What is your recommendation?

Professor Peter Cameron: One should examine state-aid policies vigorously and try to harmonise the subsidies that are currently being given.

Lord MacLennan of Rogart: Would you do that across different systems? Wind is one thing.

Professor Peter Cameron: Yes, but you do not necessarily apply the same policy.

Lord MacLennan of Rogart: Would you apply different policies?

Professor Peter Cameron: You would also have to take into account the different circumstances among the Member States. However, some harmonisation would be very useful, not least because it would act as a control mechanism, if it were effective, towards limiting the subsidies and prevent the more blatant abuses. It may not be a dramatic proposal but, with so many Member States with different interests involved, in a strategic sector, one should not be too ambitious in one's proposals to an institution such as the European Commission, particularly at the present time, when renewables are increasingly linked to job creation and employment. We all know that, rightly or wrongly, a lot of the manufacturing will take place somewhere else outside Europe, and I did not even mention China. Even so, it is a very sensitive area for many national policies. Therefore, one could not sensibly advise the Commission to do much more than it is doing at present on this.

Q89 Lord Whitty: As regards your suggestion of corporate reform of the ETS, would that include an EU-wide carbon floor price?

Professor Peter Cameron: I was rather hoping that I was not going to be asked that question.

Lord Whitty: I have asked the right question, then.

Professor Peter Cameron: I think that finding a floor price will be difficult. You have the question of whether or not there should be one, but you also have the question: if there is a floor price, how do you set it? I know that BP did a study about this some time ago, in which there were a number of scenarios—if the floor price was X, then the consequences would be Y, and so on. It was quite interesting in showing that if you got the price wrong, the consequences of, say, setting it too high could be unpleasant. For us, we would also have to keep an eye on the offshore oil industry to make sure that the consequences are not damaging. This is partly because with offshore oil and gas, which is depleting, one finds over time that the technology required to extract them emits more CO₂. One therefore has to balance up the importance of continuing your offshore oil industry, at a time when fields are mature, with your emissions targets. There are a number of variables. I think it would be quite complicated. The amount of horse-trading that you would see across the European Union would be remarkable; that is, if you think a floor price should be set. Does that help you?

Lord Whitty: Sort of, yes.

The Earl of Caithness: Do you think there should be a floor price?

Professor Peter Cameron: I certainly think it should be explored.

Lord Lewis of Newnham: Should it have a figure greater than zero?

Professor Peter Cameron: Oh yes.

Q90 Baroness Parminter: Given your experience in this area, are there any significant implications in EU energy policy for further expansion in the east?

Professor Peter Cameron: I think the short answer to that question would be no. I do not think that the countries that are in line for future membership are going to present significant problems, or generate significant lessons, that would influence EU energy policy at the present time. They are small countries. Turkey would be an exception to this, and let us deal with that in a minute. It seems to me that other countries such as Serbia, Montenegro, Croatia next year, and Macedonia—there is a debate about its name—are all too small to present an issue for energy policy. Taking up what I said before, the European Union has learnt enough from the past to be able to use this energy community treaty as a vehicle to prepare those countries. There is no doubt that there are other non-energy policy-related drivers for integrating those countries into the European Union. Whether those considerations are sensible or not is debatable, but the idea was that when you have those countries in the European Union, you may get more stability in the Balkans. We tried to introduce Cyprus to the European Union; I did not see enormous positive developments there on the non-energy side. However, that is taking us out of our remit. Turkey presents different issues. I had a look into this before I came here. My impression is that, first of all, Turkey has done quite a lot to implement the second energy package with some enthusiasm, and its behaviour in terms of market reform and pro-competition actions has been rather better than that of certain Member States that are now within the European Union. As I see it, Turkey's political direction has changed in the past few years, and my impression is that it

is much less interested in moving forward its candidacy for membership of the European Union than it is for presenting itself more as a leader in the Arab world. Rightly or wrongly, that is how I sense where Turkey is going, which again is a non-energy issue, but it does suggest that energy has slipped down the priorities for the present Government in Turkey.

Q91 Lord Lewis of Newnham: Your earlier remarks concerned what I would call planning, and the fact that in many instances the institution gets bogged down by local planning problems and things of that nature. One is concerned with the European grid, which will be paramount if one has the opportunity of using energy from one end of the European continent to another. How far do you see this as being even considered in the overall views that have been taken on the European grid system? My impression would be from what you are saying that we could come to an agreement on the grid system, but its implementation could be withheld for a considerable period.

Professor Peter Cameron: In that context, it is important to note that you have a network of European energy regulators. Right across the board, you have regulatory agencies that are similar, at least formally, to the kind of institution that we have had in the United Kingdom for many years. They have a mandate to pay particular attention to interconnections, grid networks and pipelines, and ensure that they are flowing well. You also have transmission system operators that are increasingly organised on a European scale, and whose behaviour is subject to various codes of operation, which are monitored by the regulators. At the European level, you have a co-ordinating agency, ACER, which, although it is by no means a particularly powerful institution, is none the less part of this sub-structure, below the Member States, of regulators, transmission system operators in networks and very detailed rules of operation, and with which the Commission is involved. It is a rather complicated system that attempts to facilitate the operation of these networks, particularly on a European scale. Although that network of rules is complex, and a part of me is somewhat negative about it because I think we have tended to move increasingly towards a regulated market, it does seem to be necessary to have those rules to get the networks to function competitively. I would not say I was too worried about that aspect.

Q92 The Chairman: Just one final question before we end: what about things such as solar power from north Africa, about which there are issues? Do you have any views?

Professor Peter Cameron: I think that runs into the same problem that I mentioned earlier. There are parts of the European Union that are resource-abundant, and it would be quite logical to encourage those parts to attract investment to serve markets in different parts of the European Union. In a recent north African solar project, the buyers are German I believe, and this may be the start of a new trend. Otherwise, I think that this is going to have the same handicap that we are seeing elsewhere, whereby investment has a tendency to be directed to local needs, despite the economic gains that you could have by thinking on a European scale about investment.

The Chairman: On behalf of the Committee, thank you very much. It has been a most useful session.

CBI and WWF—Oral Evidence (QQ 305–338)

Evidence Session No. 16 Heard in Public Questions 305 - 338

WEDNESDAY 30 JANUARY 2013

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Plumb
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Jason Anderson, Head of European Climate and Energy Policy, European Policy Office, WWF and **Dr Matthew Brown**, Head of Energy and Climate Change, CBI

Q305 The Chairman: Mr Anderson, Dr Brown, you are very welcome. We are very much looking forward to hearing what you have to tell us. Perhaps if I could deal with the formalities first, you should have in front of you a list of interests that have been declared by the Committee Members. This is a formal evidence-taking session of the Committee. We are having a full shorthand note taken. That will go on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript so you can amend it in terms of minor errors. The session is on the record. It is being broadcast live and will be subsequently available via the parliamentary website. Now, we have you for an hour; we are grateful for that. I do not know whether either of you would like to spend two or three minutes making any general statements or whether you would like to go straight to the questions, which you have already had sight of.

Dr Brown: I will be happy to go straight to questions.

Jason Anderson: As would I.

The Chairman: Thank you. The first question falls to me and it is on this real issue that is central to what we are trying to understand—green growth. We really would like to know your views on whether investment in energy, and particularly low carbon energy, could have macroeconomic consequences for growth. Clearly, I think we are sensing the agenda, the

balance between climate change and growth, shifting back to the growth question, more in Europe anyway at the moment. We are keen to get your views. Then within those investments are certain feelings whether to invest in wind might be a better investment than gas and whether in the longer term that is really plausible. Over to you, Dr Brown.

Dr Brown: The CBI is clear that green and growth can go together if they are done in the right way and that investment in low carbon energy can be good for growth and for jobs. I suppose you can break down the rationale behind that into why investment is good, why then invest particularly in energy, and then why invest a substantial proportion of your energy investment into low carbon energy.

On the general investment front, I suppose I do not have to explain why it is good to get money into the economy, but I would just note that there is money there on private sector balance sheets and in the global financial markets. The challenge is getting it into the UK and into the EU rather than it existing at all.

On the question of why invest in energy, we have a pressing challenge in Europe to create an energy system that can meet the three key energy priorities; that is energy security, decarbonisation and keeping energy costs competitive. Meeting all of those three things is in itself good for growth because all of those three issues are preconditions for growth. By investing in energy you do not just get the general benefits of investing in the economy; you also get a more growth-positive environment in Europe.

Lastly, why then invest a substantial chunk of this in low carbon energy? Two reasons: one is that it is good for those three issues I just spoke about. Investing in low carbon energy reduces our dependence on fossil fuel imports, which can be good for energy security and for keeping costs competitive, and obviously it is good for decarbonisation. The second reason to invest in low carbon energy is there is a huge global market for green goods and services at the moment. I think the figure is something like \$3.3 trillion worldwide, the size of that market, so if we can position ourselves in the UK and Europe to sell into that market, then that is an economic advantage for us as well.

Jason Anderson: WWF certainly would concur with what Dr Brown has just said. Renewable energy industries and energy efficiency are actually strongly growing industries: 44% of the global capacity in power last year that was added was renewable energy. We are projected by Eurelectric, the industry association, to reach 31% of power generation from renewable energy sources in 2020. These are industries that, including at the manufacturing level, are growing faster than global GDP, which means that they are the growing industries that we would like to see investment in. In terms of employment, we already see over a million people employed at the EU level in renewable energy industries. That could grow to well over 2 million by 2020 and 3 million by 2030.

We have done some research indicating the differential benefits of investing in renewable energy and energy-saving technologies as opposed to some others. I could point out the report referring to the differences between offshore wind and gas in the UK, for example. In the case of offshore wind, we have a scenario that would show that GDP benefits would be 0.8% higher per year, which is £20 billion added to the UK GDP, compared to a more gas-heavy scenario in the near future. The potential here is extremely large and we again concur with what the CBI has said about trying to funnel investment into those sectors that are growing and, therefore, can actually reach those three pillars of the EU energy policy, being sustainability, competitiveness and security of supply.

Q306 The Chairman: Would both of you just like to comment on the cost of doing it and what views would you have? These things are happening at a significant cost to consumers and governments. What would your views be on that?

Dr Brown: The CBI's view would be that overall this transition to a greener economy and a more sustainable energy system can be good for growth, as I said. Overall, it can be net beneficial for the economy and, therefore, for everybody in the economy. But it is true that investments have to be paid for and that money has to come from somewhere, so we have to think carefully about the distributional impacts on where those costs come from. Clearly, it is important to think about the effect of that on consumers and deal with issues like fuel poverty. It is equally important to think about the effects on businesses, and you are probably aware from some of the written things that you have seen that the CBI believes that there is a challenge for a small minority of the most energy-intensive and trade-exposed industries in Europe that they are at risk of being driven out by international competition. The policy framework has to help those specific businesses as well as the consumers facing challenges.

Jason Anderson: I think for one thing we need to make sure that when we are looking at the fossil fuel economy we are taking into account all of the costs that that imposes on society. One of the things that is rarely considered is, for example, the air pollution associated with those facilities that also release CO₂ creates a tremendous drag on our economies. Air pollution from the 10,000 largest polluting facilities in the EU costs European citizens between €102 billion and €169 billion in the data from the EEA in 2009. It has also been shown from the EEA that, for example, the external costs of coal in Poland—coal dominates their electricity generation—are actually higher than the price of the coal power on the market, and that is currently going essentially unpriced.

The European Commission's roadmaps to 2050 for energy showed a number of scenarios. What they found—an interesting result—is that the essential system costs between not decarbonising and decarbonising through these different scenarios are roughly similar in the sense that decarbonising requires investment that then yields benefits through the reduction in fossil fuel expenditures, but alongside that you have also decarbonised. Then you have the benefit of avoiding the damages due to climate change.

Lord Cameron of Dillington: Did I hear Mr Anderson correct? Did you say that 31% of world energy generation will come from renewables by 2020?

Jason Anderson: That is EU energy.

Lord Cameron of Dillington: EU, not world?

Jason Anderson: Yes.

The Chairman: Your 44% number, what did that relate to? Is that world energy?

Jason Anderson: That was global capacity additions for power, which was renewable energy last year.

The Chairman: So additional power?

Jason Anderson: Yes.

The Chairman: Okay, thank you.

Q307 The Earl of Caithness: Looking ahead to 2030, do you think the EU ought to set renewable targets for 2030 as part of its progress towards 2050? What are the advantages or disadvantages in so doing?

Dr Brown: The CBI's position is that the most important thing that Europe needs to do is to set a carbon-target European-wide for 2030 to restore some long-term certainty to the market. We are not in favour of a renewables target for 2030. The reasoning behind that is that we think it constrains the ways in which the market and the different Member States can choose to meet an overall carbon target, which is a less efficient way of proceeding. That does not mean, of course, we do not think there should be policy support for renewables, just not in the form of a top level target.

The Earl of Caithness: Just picking up, if we could go to Mr Anderson, when you say the CBI, is that the whole of industry in Europe or is that the UK point of view? Because there are very different views over there.

Dr Brown: Of course. The CBI, as you are probably aware, represents businesses operating in the UK, which includes businesses wholly contained within the UK and also multinationals that have a presence here.

Jason Anderson: WWF believes that we need to have a policy in future that includes post-2020 renewable energy targets at EU level, which are then taken on at national level, for two reasons. One is that it will be a more effective means of reaching higher renewable energy levels and it will come at a lower price. The reason for that is the following: the emissions trading system, if it were to stand on its own, and carbon targets would need to fulfil two functions, one of which is to affect the way facilities are operated. Now we have such a low carbon price that lignite power is essentially untaxed through the carbon price. But at the same time we would have to provide a clear indication of the direction of travel for innovation into the future, which is quite a different function. Studies have shown that if you were to try to create a clear investment horizon into the decades of the future for innovative technologies, you would have to have such a high carbon price that you would create higher costs overall and an imbalance in the system. Essentially, those who need to innovate would have quite some uncertainty about the variability of that carbon price, and would price that risk into their assessment of what the carbon price has to be now to guarantee that investment into the future. Those companies and facilities that have already decarbonised would then face windfall profits as a result. So a target of renewable energy support scheme based on a target actually can reduce costs for the overall system.

We also think it is more effective certainly in European policy because history has shown that indicative targets, non-binding targets or other mechanisms imposed at the European level have been very ineffective, which we can see as a result now of the 20-20-20 package where the 20% greenhouse gas target has already been met for 2020 and the renewables target looks on track to being met, but the indicative energy efficiency target is not going to be met. We take our lessons from that.

Q308 The Earl of Caithness: Do you think there ought to be an energy efficiency target and can that realistically displace low carbon energy?

Jason Anderson: Again, referring just to the European Commission scenarios, all of those scenarios include significant amounts of energy savings regardless of the generation choice, up to 40% by 2050. Other scenarios, including work from Fraunhofer for the German Government, show that we could reach 50% energy savings by 2030. Our own scenario shows 38% energy savings with over 40% renewable energy. The benefit of energy savings redounds to any of the generation technologies that you choose by lowering costs and lowering the need for infrastructure. It is essential for any decarbonisation scenario.

Dr Brown: May I comment? Just as with renewable energy, we would strongly agree that energy efficiency is terribly important, but our question is about what is the best policy

framework to make it happen. Just as with renewable energy, we would suggest that a top-down target is not necessarily the way to actually facilitate those investments. With energy efficiency there is particularly a question about how you define the target as well. Energy efficiency is a good thing. Capping the total amount of energy used in Europe is not necessarily a good thing because the total energy used to produce GDP is not in itself a bad externality for the economy. It is very hard to define a target that actually measures energy efficiency rather than energy use.

The Earl of Caithness: Can I just follow up? I want to ask Mr Anderson about his scenario for offshore wind and renewables looking ahead to 2050. What is it going to mean in practice? You talk about it, but where are all the windmills going to go? How many are there going to be? To try to conceptualise that and put that into our report is going to be important.

Jason Anderson: I would refer to two reports from our UK office about that, which include the *Positive Energy* report and one on the economics of offshore wind and gas, which have the details that are probably what you would like. I think I would probably be most efficient just to supply that to the Sub-Committee after the hearing.

The Earl of Caithness: Is that specific about how many windmills we will need?

Jason Anderson: I believe it is, to an extent, yes.

Dr Brown: I would also refer you to the European Commission publications, the low carbon roadmap and the energy roadmap.

Q309 Baroness Parminter: Can I just follow up on what you said about not wanting energy efficiency targets? What then do the CBI see as the effective mechanism to deliver that energy efficiency instead?

Dr Brown: It needs to be policy that enables businesses to build a market in energy efficiency, which actually they are raring to do both for selling it to consumers through things like the Green Deal and other incentives to generate consumer demand and to businesses. At the EU level we did support the energy efficiency directive and were pleased that it came through, but we were more interested in the specific mechanisms within that directive such as carbon reporting from businesses to encourage awareness of the opportunities rather than having a top-level target in it.

The Chairman: Do you think the EU Member States can ever agree among themselves so that we got a policy?

Dr Brown: I think that there are examples of that happening successfully in the past, such as the 20-20-20 package that was agreed in 2008. As the CBI sees it, the next really important challenge for the Member States to try to agree on is the top-level 2030 carbon target, which is obviously going to be very politically difficult. Our call is that we want a political agreement on that target before the end of the life of the current Commission next year.

The Chairman: Do you think that is realistic given the position of some Member States?

Dr Brown: We think it is stretching but realistic. We are not talking about having a legislative proposal existing and going through the process. We are just talking about something like council conclusions, a political agreement. Clearly, some of this is bound up in other issues that will come into that political discussion, but we think it can be done if people set it as their top priority.

The Chairman: Are you as optimistic, Mr Anderson?

Jason Anderson: Well, I think it can be done. The procedure right now is that the European Commission, the College of Commissioners, will be turning their attention to this probably in February and we will see a Green Paper at the end of the spring and potentially a communication with more detail by the end of this calendar year. In our case, we would like to see that include the package of targets. But 26 Member States have called for this and, in fact, a qualified majority voting would mean that that would be more than enough to be able to pass a package of measures. We are quite optimistic that if the Commission put something adequate on the table, the benefits—for example, the €200 billion a year in net energy savings by 2020, plus the completion of the multi-annual financial framework where there are some entanglements in the negotiating positions of certain countries, and the benefits through cohesion policy and through the Horizon 2020 research and development—should potentially ease the way toward agreement.

Lord Plumb: Do you see the problem more in the East European countries than you do in the more northern areas?

Jason Anderson: Well, every Member State has its own particular situation. I do not think it is fair, actually, to characterise, although Poland has come very much in the news around this. It has a challenging situation with its energy mix, but every country will stand up for its own particular situation. We have seen Spain, along with Germany and others, arguing for the continuation of coal subsidies that were agreed a couple of years ago. The UK was not particularly positive in the negotiations on the energy efficiency directive. So it is broader than that.

Q310 Lord Whitty: Before I go into my question on the trading scheme, could I just ask a quick question on energy efficiency? In all your calculations—and this is largely in the absence of our colleague Lord Giddens, with whom I have had some arguments on this—is there a figure that you use for what he would call the rebound effect in energy efficiency? In other words, how much energy efficiency is, in fact, sustained as distinct from the gross apparent saving?

Dr Brown: Sorry, is the question—

Lord Whitty: Is there a broad figure for saying if we introduce this level of physical energy efficiency control, 60% of that will be retained or whatever?

Dr Brown: I understand the effect but I am afraid I am not enough of an expert to know what figure would be applicable in different scenarios, sorry.

Lord Whitty: Right. Has WWF got a figure of that? It would be useful for us to have what other people are thinking about.

Dr Brown: I could certainly talk to people who do know more and come back to the Committee on people to talk to.

Jason Anderson: There is some research that has come out just this week that indicates that there is a rebound effect and it depends on the nature of the particular policies and technologies in question. I would be happy to supply that again to the Sub-Committee. It can be rather large but, on the other hand, there is certainly an energy savings effect through these policies. It is one reason why we advocate energy savings targets as opposed to simply energy efficiency targets because you want to guarantee the outcome of how much you save, not simply an efficiency level.

Q311 Lord Whitty: On the ETS, clearly in a sense this is Europe's main measure so far and most people would say it has not had the desired effect. It has created a market but it is not a market that is having the behavioural effects because the price is too low. The

Commission have just come up with options for reform, which include the back-loading proposal and other forms of price management. What do you think of that? Do you have any other suggestions as to how the ETS could be reformed, improved, replaced, whatever?

Dr Brown: The CBI's view is that the Commission's carbon market report while helpful has a risk of being a bit "cart before horse". Our view is that overall a market-based system like the ETS is the right way to go about decarbonising Europe and it is worth noting that in a mechanical sense the market is still working. There is good liquidity, trades are happening. The problem is that because the market is very short-term in its time horizon—it exists only until 2020—that has exaggerated the impact of the recession on the carbon price. Because market participants cannot see beyond that 2020 point to a time when the economy may recover and the carbon targets are likely to be tighter. Our proposed solution is that the first thing we need is to know what the system looks like beyond 2020 through having a carbon target for 2030 and through committing to there being a fourth phase of the ETS. Once we then know what things look like on that longer time horizon it would make sense to think about, working backwards, is there a need to make adjustments in the shorter term to put us on the right trajectory for the longer term, but we cannot know what adjustments to make in the shorter term until we know where we are going in the longer term.

Jason Anderson: We certainly agree that there is a problem with the emissions trading system. It is not so much that there is no visibility into the future because the system does continue past 2020 with the 1.74% per annum reduction. Unfortunately, in terms of where that ends you up by 2050, it is only around 70% emissions reductions, while the road map from the Commission indicates that these covered sectors would have to cut by about 96%. It is from the beginning not conceived to be adequate to the reduction challenge.

The second problem is that we have an oversupply of credits in the short term that we need to deal with. The credit oversupply is due not just to the economic downturn, and this is where we would differ with the CBI's analysis. The majority of the credits are oversupplies due to the import of overseas offset credits, about 1.5 gigatonnes of offset credits. This was, if you will, built in from the system from the beginning to allow these offset credits to come in. We have about half a gigatonne of the impacts of the economic downturn, 1.5 from the offset credits. That is about 2 billion gigatonnes. Some changes—inclusion of aviation in the system—will bring some of that down again. What that means is that we basically have 1.4 gigatonnes of credit in the system of oversupply, which means that the system as a whole will not need to actually make real reductions until 2020 or beyond. That is paralysing confidence in the system. We have a short-term problem, which is why we agree that the back-loading that the Commission has proposed needs to go through first, but it needs to be coupled closely thereafter by removing tonnes—we advocate 2.2 billion tonnes—from the system of excess, not just moving them around from year to year, and then have a linear reduction factor not of 1.74% but 2.6% per annum, which would then align us with the roadmap to 2050.

Q312 The Chairman: How would you get the 2.2 billion tonnes out? How would that be effected?

Jason Anderson: That would have to be done by a legislative Act, which could be a single standalone legislative Act to remove those 2.2 billion tonnes after the back-loading is agreed. That would have to be done by codecision.

Q313 Lord Whitty: Do you see the politics, both the institutional politics and the business pressures on that institutional politics, likely to deliver that kind of radical revision?

Jason Anderson: In my view, first, while we fully agree with the CBI and others who say that a structural reform is really what is necessary, the politics are such that the back-loading has been proposed; unfortunately, only 900 megatonnes from the Commission, which in committee that can be increased to 1.4. If this were to fail now, this would really poison the opportunity for any structural reform afterwards, so we need to see that go through and to strengthen the hand of the reformers within the system. But we are getting support from a wide range of stakeholders, not just from NGOs but also from industry, because they recognise that without a proper reform of the system there is really no clear guidance for them in their investment decisions over the near and the medium term. We think there is quite a lot of appetite for reform. The options that the Commission laid out in their paper at the end of last year are still open, but we are quite confident that one of them can be brought through.

Q314 Lord Lewis of Newnham: I think in a related sense you are concerned with what is happening within the EU, as the questions we have been asking you, but what about carbon leakage and the problems associated with carbon leakage? I mean relocation outside the European Union. Do you anticipate or would you suggest some form of carbon tax on imports?

Dr Brown: The CBI is very concerned with the potential for carbon leakage. We do not think this applies to all businesses, but there is a subset of businesses, those that are energy-intensive and trade-exposed, that are at risk of carbon leakage. We need to prevent that happening, not just because those businesses make a very strong contribution to the economy but also because we need them as part of a thriving green economy. We need low-carbon steel to be produced in the EU for our wind turbines. We need to produce our own chemicals for our electric car batteries, et cetera. Our proposed solution to that is to put a system of support for energy intensive industries into the EU-wide framework. There is already a system for some energy intensives in the ETS, although there are questions over whether that is successfully parameterised at the moment. But at the moment there is no pan-European help for electro-intensive installations and we think that that should exist. On your question about border taxes, from my understanding of the issue the first barrier there is simply that of political feasibility.

Jason Anderson: The issue of carbon leakage certainly needs to be taken seriously, but I think we have to have a fact-based approach to that. At the moment, for example, the carbon leakage list of those heavy industries that get free credits under the system is based on the assumption that carbon price would be €30 per tonne. It is now below €5 per tonne and it is partially because of these free allocations that we have too much credit in the system. These are essentially being held as assets by those companies with no relationship to improvements in their operations or even plans to use the revenues from that to improve their operations in the future. That is the wrong way around. What we would like to see is an emissions trading system that incentivises innovation. All of these industries, for example, take the steel industry, they have technologies out there, the Fastmelt process, the Hlsarna process, CCS, electrolysis; they can get them down to zero carbon steel production. The cement industry, including Oxyfuel, including magnesium oxides, getting down to zero carbon cement manufacture. What they need is a way to innovate and to find investment in those technologies, which the emissions trading system some of the revenues reinvested would help, particularly if there were actually a cost. If there were a price to carbon, you would have more revenue and that is the direction we would like to see things heading.

Dr Brown: May I make a further point? From my experience of speaking to people in those industries, they all want to become low carbon and, indeed, in Europe are making significant

investments to implement these technologies, both the ones that exist and the ones that need to be researched. The challenge is that there is no business case for them to do that at the moment because they are very expensive and it is cheaper for them to just set up in a different country.

Q315 Lord Renton of Mount Harry: I would like to get back to the very basic question of the financing of investment over the next decade. I think it was you, Dr Brown, who quoted the European Commission's estimate that basically €1 trillion of investment in the energy system by 2020 was its first view. First of all, Europe should be able to afford much more than that. It seems to me that what is lacking is the policy certainty that will actually produce the money that will unlock that investment. One wonders how that gets challenged and done over. How do you unlock private investment to the necessary degree when there is still obviously a lot of enthusiasm but not much certainty?

Dr Brown: I agree 100% with the premise of the question. The €1 trillion figure is entirely achievable in terms of the money that is out there on private sector balance sheets and in the global markets. The challenge is leveraging that into the UK and Europe rather than going to other destinations that offer better business cases. Policy and political certainty is a key part of that and that is why we have set out the solution in our EU brief that we think should be followed, starting off with the 2030 carbon target.

Jason Anderson: I fully agree that policy certainty is a key part of this. It is not so much just "is there money available?". There is money around; it is just a matter of funnelling it into the right investment. Policy certainty helps. We note, for example, that the German feed-in tariff scheme has led to the situation that half of the installations have been done through individuals, private investors. We see opportunities for public funding catalysing much larger amounts of private funding. Currently, in the multi-annual financial framework—

Lord Renton of Mount Harry: Public funding?

Jason Anderson: Catalysing larger amounts of private funding. The European budget is an opportunity. There is the possibility of 20% climate earmarking, climate friendly investment. There is the Horizon 2020 fund for research and development. There is also the possibility to revisit what the European Investment Bank does with its lending because—

Q316 Lord Renton of Mount Harry: I was going to ask you about that. How involved is it willing to be?

Jason Anderson: The EIB has made real strides over the past years. It went from renewable energy lending portfolio in 2002 of 11%. That increased to 28% in 2010. It went up to 40% in 2012. Of the €10 billion or so a year that it is lending to energy, it is giving a tremendous amount to renewable energy. It is the EU house bank, if you will, and so it is meant to be in line with European policy and can create quite a lot of dynamics within the industry, within private finance as well. Unfortunately, that balance has often gone to less friendly projects: €1.88 billion over the past 10 years has gone to coal-fired power plants. They are currently going through an energy policy review that we think allows the opportunity for them to shift their portfolio entirely over to climate-friendly energy.

Q317 Lord Renton of Mount Harry: Are you an optimist then?

Jason Anderson: I am.

Lord Renton of Mount Harry: But you are not going to tell me why.

Jason Anderson: I do not think that I would be in this job if I was not an optimist.

Lord Renton of Mount Harry: Difficult.

Jason Anderson: Well, in the case of the EIB you have to say it has made quite a lot of strides. That is a big growth rate. You look at capacity additions in renewable energy last year where 77% of all power was renewable energy in the EU last year, capacity additions. A report came out yesterday from the European Wind Energy Association showing that there were 1,100 megawatts of offshore wind added last year. It anticipates 1,400 this year and 1,900 next year. These are rapid growth rates, so I think we are actually getting from the stage where we were a few years ago talking about renewable energy and energy savings as something that needed a leg up to compete against the vested interests. It is there and now it needs just to have a clear time horizon to the future to actually be the dominant source.

Q318 Lord Lewis of Newnham: You talk about renewable energy but on the whole you do refer primarily, if I understand you correctly, to wind as the main source of renewable energy there. What do we have in the way of a European mechanism for enthusing other forms of renewable energy? What worries me slightly is that that, after all, was established in the 1960s, the wind position. Now, there are many other potential forms of renewable energy that do not seem to me to be coming to the fore. Who is going to encourage them or are we only going to take the view now that renewable energy is either solar or wind?

Dr Brown: I think that there are other forms of renewable energy that have already been very successful and you rightly pointed out solar. To a certain extent it depends on the geographical disposition of different Member States. In the UK, we are very well positioned for wind because we have a lot of wind. Some of the southern Mediterranean states such as Spain and Italy are experiencing very large growth in solar. I suppose partly what your question is driving at is the technologies that are more in the research and development phase rather than ready to be deployed already. I do think it is very important to provide support for those both in terms of a clear overall framework, things like having carbon targets so we know where we are going, a clear ETS, but also specific support, some of which can be Member State-based. For example, the Government in the UK is providing significant levels of support for wave and tidal power, marine forms of renewable power, where we are very well placed to potentially corner the world market. I hope my stat is not out of date, but I think of eight prototypes operating around the world seven are in UK waters of those types of renewables.

Q319 Lord Plumb: The figures you have quoted on growth, are they related to the present production or are they related to increased investment?

Jason Anderson: I believe that, if I understand you correctly, I have referred to capacity addition, so primarily in terms of megawatts of capacity. I also referred to energy generation in the case of 31% by 2020 for electricity. There are also figures around investment from the EIB and from the multi-annual financial framework I referred to. If there is something else more specific I can also supply something separately.

Q320 Lord Plumb: I think you got the question, but when you quoted those figures you said, “And next year there will be an increase” and I cannot exactly remember the figure, I did not jot them down, “and the following year”. Is that from existing equipment or is that related to further investment before you get that expansion? That was really what I meant.

Jason Anderson: I referred to offshore wind—

Lord Plumb: That is right.

Jason Anderson: —1,400 megawatts this year. That is a projection of what is being built—in other words, being brought into service this year—so that is being constructed now. In

anticipation of 1,900 megawatts next year, that is from the European Wind Energy Association. These are investments and construction that are under way.

Q321 The Earl of Caithness: Given the Public Accounts Committee's criticism of government policy with regard to renewables and the cost of energy bills, when on your projection do you see it feasible to phase out any subsidy for wind and it should be a self-supporting industry?

Jason Anderson: Our view is that any support to renewable energy technologies should be targeted. It should be time limited. It should be rationally based. Now, one of the difficulties is that new entrants to the energy market are actually coming on top of a system that has enjoyed decades and decades of subsidy. I referred earlier, for example, to coal-fired power. The European Coal and Steel Treaty from the 1950s derogated the ability for Member States to give state aid to coal-fired power and a couple of years ago that was extended to 2018. We are basically talking about 60 years of subsidies to coal-fired power. Now there are subsidies to other forms of fossil fuel and nuclear energy, some more obvious than others. While I would like to say that we could reduce the subsidy to renewable energy in a way that reflects its growing maturity and market competitiveness, that has to be overlaid on a system in which other energy sources are also having their subsidies removed. We are quite optimistic that renewable energy, which has seen tremendous price drops—the price of a photovoltaic panel dropped by 50% in 2011 alone—these are benefits that we can actually build into the systems of the future. What we do not want to see are the kind of abrupt and retroactive changes that some Member States have put in place and which are damaging to investor confidence.

Dr Brown: I share Mr Anderson's view that for technologies that are not mature in terms of costs and still have a long way to come down the cost curve, it is sensible to subsidise them to allow them to come down the cost curve, but that subsidy has to be limited to a period that allows them to do that and not just endure for ever afterwards. But it is worth thinking about, when we compare the costs of technologies, first of all the fact that some of them are lower carbon than others and carbon emissions are always going to be an externality that is not in the market unless policy puts it into the market - so that is something we may have to think about far into the future - and also what effects technologies are likely to have on overall costs for consumers in the future. Unfortunately it seems, from the organisations that make projections, energy costs - certainly in the UK - are likely to go up in the future in any scenario largely because international demand is boosting global fossil fuel prices and we are a price taker in that market and because we need to have money added to bills to pay for investments that are good for the economy. We are not going to be living in a world, no matter what choice we make over the energy mix, in which prices go down in the future, but by making a choice to have a balanced energy mix that includes renewables, gas, nuclear and CCS, we can limit those future rises. Indeed, my final comment would be that there are some renewable technologies that already look competitive with fossil fuel technologies; for example, onshore wind, which is a relatively mature technology although perhaps not completely at the bottom of its cost curve yet. When you take into account all the uncertainties and plot that on a cost chart, it can look within bounds fairly competitive with things like gas, depending on the gas price, and nuclear.

Q322 Lord Lewis of Newnham: How do we stand relative to the possibility of importation of cheaper energy? I think in particular of the US where, because of the shale business, now I believe the price of gas is a factor of a third of the price available in the UK. Now, once that energy stream starts coming in, how is this going to affect your pricing?

Dr Brown: I have to defer to the analysts who produce projections of European gas prices and I have not yet seen a projection in which gas price goes down. They do all disagree on exactly what it will be and whether it will plateau or go up, but as I understand it the factors behind those projections are that within Europe there is probably some shale and we should absolutely try to go and get it but there may not be as much and it may not be as easy to get to, because of political and population density issues, as in the US. Then if you think about shale coming from other markets, such as the US, into Europe, you have to add the costs of liquefaction and transport and then you have to consider whether it is going to be sold into the European market or the Asian market, where prices are generally higher. The CBI's position is that shale is great because we are going to need some gas in our energy mix for some time to come so it makes sense to get as much of it as we can domestically and as cheaply as we can, but we should not pretend it is a silver bullet or that it will suddenly cause a tumbling in energy prices the way we have seen in the US.

Q323 The Chairman: Can I just go back to the EIB for a moment? We focused on this number of a trillion that is needed in energy investment. Do you have any sense of what percentage of that will be financed by the EIB? We hear about the great things they are doing, but how relevant is it in the scale of what is needed? Are they just there until Government gets their policy right? Because you would assume, would you not, in a perfect market that the investment would come if Government's policy was in the right place? Could you write to us on that? Do you have any sense of it?

Dr Brown: I suppose so. I do not know a great deal about the specifics of how the EIB operates but—

The Chairman: No, it is the quantum I am after. It is the quantum in those projections.

Dr Brown: The vast majority of that €1 trillion is going to have to come from private investment because my small understanding is that there is nowhere near enough money in the EIB to just state fund it. But I suppose if you think about the range of interventions available to states to try to make the business case for private sector investment in energy in Europe better, it is all about derisking to then bring the cost of capital down. You can derisk by making policy interventions like setting targets or emissions trading schemes or providing incentives and subsidies for particular technologies. One of your options is to derisk by having a state financial institution that can come and make specific interventions at parts along the chain where the risk is too high for the private sector to come in. That is the argument we have made in the context of the UK's Green Investment Bank and I suppose it would apply equally to the European Investment Bank.

The Chairman: Thank you very much.

Q324 Lord Lewis of Newnham: You have referred on a number of occasions to the difference between using coal gas as a source and renewables, and yet we know that, in fact, in the case of renewables primarily because of the intermittent nature of the energy recovery from it that one solution is to be able to have coal or gas available as a backstop, as it were. Now, one of the features there, and I think this is very much dealt with with WWF in your submission, is the emphasis on the repeated delays there have been in the carbon capture and storage programmes that have been involved. When we have been talking with various witnesses, there has been a sort of expression of scepticism, if I may put it that way, of the possibility of carbon capture and storage coming in. How do you think that the Member States and the European Commission can be encouraged to give this technology the boost that it obviously requires? Because if we are, indeed, going to be resorting to the use of gas and coal, and I think particularly as you rightly say in the case of coal and coal, then we

must have a CCS mechanism available to us, or at least that is one of the important features that one would require for it.

Dr Brown: Our view is actually quite optimistic about CCS because it is not just important for decarbonisation, it is also quite a big economic opportunity for the UK and for Europe because there is going to be a great global market for it and we are quite well positioned in terms of the skills that already exist, for example, in the UK in the offshore industry, and our geography to export that know-how that has been developed at home. In terms of what is needed from the policy framework, we need CCS-specific policy and then we also need the general policy that makes all types of low carbon investment attractive. On the CCS specific front, we need the money to support the demonstration programmes, where there is an EU scheme and there is also a UK scheme. Our priority is making sure first of all that the UK competition is completed successfully soon enough that UK projects are able to have a go at getting money from the EU scheme and then that the EU scheme provides enough money. There is, of course, then the overall framework for all low carbon technology where I would come back to my point about the future of the ETS and ensuring that remains strong.

Q325 Lord Lewis of Newnham: But is it not true that the first UK CCS competition that failed in the final project was because of the expense? The actual allocation was I think 1 billion and, in fact, the actual utilisation that came forward was 1.4 billion, so it is failing on the grounds of money. Now, at the moment, if I understand it correctly, this is done on a private basis. Unless there is some major subsidy coming in from Government, this is not going to occur. One has to face the fact that carbon capture does depend very much at the end line on the storage factor. In fact, Germany's attitude towards carbon capture and storage has been very much governed by the fact that they have a very great difficulty with the storage. The generality of this problem worries me slightly. I can see it could work in this part of the world because we have the North Sea, but for the bulk of Europe is this true? It is the storage part that really is going to be a major problem for them.

Dr Brown: Shall I briefly speak about the numbers? You are absolutely correct that public subsidy is necessary to ensure that demonstration plants can go ahead and be successful. Although I have seen the media reports, I do not know the true commercially confidential reasons behind the failure of the initial UK competition. But I do know that the UK Government has still set aside £1 billion worth of money for the successful applicants in this competition and there is European money available as well from the NER300 scheme. I do know that businesses are optimistic that basically there are plenty of consortia who have projects that are raring to go with them and they certainly believe that the business case can be made if these policies do come through successfully. I might have to defer to Mr Anderson on the storage capability, but just to say that I do not generally hear a lot of experts saying there is not enough space in the world. There is a question about where that space is and whether that might commercially advantage some nations over others.

Jason Anderson: First of all, I would argue for consistency, which is that we often see scenarios for decarbonisation in the future that involve a certain amount of CCS, sometimes a very large amount of CCS, which is as yet unproven at scale. As you indicated, there are some question marks around that, whereas we are often told that our high renewables scenario, which we have demonstrated using current technologies can actually achieve decarbonisation with 100% renewables, is somehow less realistic than when using a technology that is as of yet not proven. I think consistency is important in these forward-looking scenarios. That is not to say that we are against CCS as such. We do think that there probably is a need to focus on a couple of areas where it has higher added value than it would for power production. For example, in industry I mentioned a couple of processes

in steel and cement, for example, where CCS is one of the options for storing the carbon emissions. Another possibility could be biomass in CCS as a carbon negative measure. Now, there is competition for pore space. The technically available pore space is much larger than the feasibly politically and publicly acceptable available amount of pore space in the underground, so we have to be cautious about filling it with the emissions of coal-fired power plants. Instead, we should focus on these technologies and they do deserve research and development. The NER300 would certainly benefit from a higher carbon price because those two things are linked, so again we get back to this issue of how you support innovative finance.

Q326 The Chairman: You are optimistic about it then?

Jason Anderson: As I mentioned, I am optimistic that we can actually do without it, but I also think that we could use it for certain processes. I think the technical barriers to those particular processes are probably ones that can be overcome.

Q327 Lord Lewis of Newnham: You are certainly not going to get cement without producing CO₂ if you are using chalk as your primary source. Half of the thing goes to CO₂.

Dr Brown: Yes, and the CBI thinks the industrial CCS is just as important as energy CCS for that very reason.

Q328 Lord Cameron of Dillington: I am just surprised by your relative optimism because in Brussels last week the NER300 we were told, which was specifically set up for carbon capture and storage, that they could not give any money away last year and this year apparently they are unlikely to be able to find any schemes that they can invest in either. I worry about Mr Anderson's idea that it is not to me the most vital thing in the world, carbon capture and storage, if you think about all the coal-fired power stations that are being built in the Far East, not to mention Germany, yet nothing seems to happen. What is Poland going to do for renewable energy? It has absolutely no source of renewable energy and I do not see where it is going to get its energy from because the one thing it definitely does not want to do and is terrified of is being dependent upon Russian gas.

Jason Anderson: My optimism was because I see a pathway towards renewable energy. It was not necessarily optimism about the future of CCS. However, I think that aside from having the NER300 funding actually be worth more, and it is true that in the first tranche it was really only renewable energy projects that were prepared to be funded, those who were backing CCS say that the delay in readiness is not going to last forever and I will take them at their word that that might be the case. The European Commission is currently developing a paper examining the future of CCS and European policy in that respect, and one of the options, which I think is a sensible one, although not necessarily one that we are yet prepared to advocate but it is worth mentioning, is if you want to use CCS then make it required, which is to do something like an emissions performance standard. We are talking about some of the wealthiest corporations in the world that have the patents on the relevant technologies. If they were in the position of being required to put CCS on a coal-fired power plant or in a gas power plant with differential dates or emissions performance limits that seems like a very reasonable way to go forward and to unlock investment, certainly.

Q329 The Chairman: Do you support that?

Jason Anderson: I think it is an interesting idea.

The Chairman: Slightly different, yes.

Dr Brown: I think we should be clear that I do not think the question is whether CCS will happen. I think it is tremendously important to decarbonisation worldwide and all of the various technical elements of it have been proven. There are some schemes in the US that have been operating since the 1970s demonstrating various elements of it. Of 20 operating schemes in the world, only two of them are in Europe and they are not in the EU. They are in Norway. The question is whether we can get in on the market, not whether it happens at all.

Lord Lewis of Newnham: The Norwegian one, in fairness, is not from coal or something like that.

Dr Brown: You are absolutely right.

Lord Lewis of Newnham: It is a separation process, which is, relatively speaking, simple.

The Chairman: Well, we are glad about your enthusiasm but I am not sure other witnesses we have heard from are quite as confident.

Q330 Baroness Parminter: As you know, Member States are responsible for their own energy mix but the EU can take actions to develop an internal energy market so that they can deliver that energy requirement more cost effectively. Would you agree, therefore, that greater interconnection is a key driver or should be a key driver for EU energy policy moving forward? If so, are there any barriers to delivering that interconnectivity and that internal market and how might they be overcome?

Dr Brown: I know a little bit about it, so if you know more you can go first.

Jason Anderson: I would be happy to. If you look at any analysis of the future of our energy systems in Europe, also in the UK, interconnection plays a key role. The European Climate Foundation did a report on the 2050 roadmap and they found that the total amount of backup power requirements could be cut by 40% in high renewables scenario if you had proper interconnection. The *Positive Energy* report from our UK office showed that we could be reaching 61% renewable energy by 2030 in the UK. That number could be increased tremendously with interconnection providing opportunities for export into the rest of the European market. It reduces costs. It provides opportunities.

Currently, we do see some difficulties. One of the roles of the EU in this respect would be to facilitate cross-border projects. For example, under the connecting Europe facility where around €9 billion could be released for relieving bottlenecks, that is under threat in the negotiations on the multi-annual financial framework, which we think is the wrong direction at the moment. Interconnection will also do things like reduce what are called congestion rents where prices go up because there is congestion and you cannot sell across borders. There are over €1 billion a year in congestion rents. Interconnection dramatically eases the internal energy market and will bring costs down and actually open up opportunities for the export of sustainable power.

Dr Brown: I am afraid my knowledge of this topic is small, but all I can say is that interconnection is a good thing because it makes the market more efficient, reduces the amount of capacity that is needed overall, and that the important thing to make it happen is for the business case to be there because, like all the other types of energy infrastructure we have been talking about, the money is going to be largely private sector.

Q331 Lord Whitty: If you examine physical interconnection, if actually all the markets are working on 27 different regulatory and policy frameworks, do you really get anything like an internal market?

Jason Anderson: The last time I checked there were 17 infringement cases on the internal energy market, so it is clear that there is more work to be done to have a proper internal energy market. We do have the European network of transmission system operators, the ENTSO-E, which is doing year-ahead and 10-year network development plans, which is definitely assisting the situation. Of course, they look at it from a TSO's perspective. Most national energy modelling is done still from a rather national perspective. What we would like to see is to have some kind of European standards, for example, that would allow the development of energy markets that take into account the neighbours and take into account the potential for interconnection. We have joined as WWF with 14 NGOs and 11 transmission system operators in what is called the renewables grid initiative, which is precisely meant to examine the ways in which we can overcome the bottlenecks in the development of infrastructure, which includes making sure that that infrastructure can be done in a way that is friendly to habitats and that is acceptable to the public.

Q332 Lord Whitty: Do you see a role for greater integration of the regulators in delivering this at the asset level or wherever?

Jason Anderson: I would because of this problem of still a relatively isolated set of analyses. They are not harmonised in the way they imagined the development of energy systems. I do not think that we can have European harmonisation but we can certainly have some kind of dialogue, some kind of standards.

Q333 The Earl of Caithness: I would like to change the subject just to ask you this. We have a lot of evidence of the increase of use of coal in the past couple of years. Do you see the German/Polish dash for coal as a short-term problem or is this something that is likely to continue for the foreseeable future?

Dr Brown: I think the reason that we have seen that increased use of coal is that the emissions trading scheme is not providing a carbon price that makes gas attractive. The spark spread for gas, the difference between what you pay for it and what you get for it, is very low at the moment and coal looks very attractive compared to that. In many Member States we are seeing a market situation where the zero carbon technologies like renewables and nuclear are being pulled by feed-in tariffs, contracts for difference, renewables obligations, that kind of thing, but at the other end of the market there is no push from a carbon price to switch from coal to gas. I think the question of will that trend continue in the future comes down to a question of will we solve the policy problem of making the ETS more effective.

Q334 Lord Renton of Mount Harry: Could I perhaps ask what you think about Russia? What do you reckon Russia's approach will be to all the shortages in the future?

Dr Brown: Do you know much about Russia? I do not. I know they have lots of gas. There is no way that they are not going to use that. This comes back to several points that the Committee has already made about the importance of CCS and about the fact that we should get as much gas as we can from our own shale resources.

Q335 The Chairman: What do you think the chances of a floor price for carbon are in the next five years and then the next 10?

Dr Brown: On a European level?

The Chairman: On a Europe-wide basis.

Dr Brown: We would not rule anything out at this stage, but our preference is generally for market-based measures. We think that the price of carbon should be the means to the end,

not the end in itself. If you look at the EU ETS situation at the moment, we think that the low price is the symptom, not the disease.

The Chairman: I am not sure I follow that—forgive me.

Dr Brown: Sorry, I apologise. The point that I am trying to make is you set the cap, the total amount of carbon that you allow the economy to emit, and then you let the market find the most efficient way to meet that cap. The market determines the price and the price is an indication of how difficult the market is finding it to meet the cap. Our view is that the reason the price is so low in the ETS at the moment is that the cap only exists out to 2020 and compared to the economic activity that now looks very high because of the recession. If you fix that by providing a cap further out into the future in line with where the EU needs to be in terms of its overall emissions, the market can then respond to that and the price will be an indication of that response. That is what I meant by saying the price is a means to the end rather than the end in itself. The end in itself is the emissions.

Q336 Lord Lewis of Newnham: Is the danger with that argument that if you are going to predict for the future you are saying at the moment our present situation is because we got it wrong in making a future prediction? Are we likely to get it right?

Dr Brown: Well, of course, we will never get economic predictions right, but the question whether we got it wrong or not, you also have to think about the cap being set in line with what science says the EU needs to provide as a contribution to global emissions cuts. There are lots of reasons to determine the cap. Our view would be if you can have a clear cap in place further into the future, then short-term economic volatility will have less of an overall impact on the carbon market because investors can see a 20-year horizon rather than a five-year horizon.

The Chairman: Mr Anderson, the last word.

Jason Anderson: Well, I think we differ slightly here in the sense that it was not a matter of poor prediction. In fact, we predicted ourselves as WWF that an inadequate cap set from the beginning, as I mentioned only aiming to 70% rather than 96% in 2050, and the crucial allowance of a very large amount of overseas offset credits, which are not the economic downturn, not anything that represents real emission reductions but rather dubious projects overseas that are actually causing the oversupply in carbon right now, what that means is that, for example, the coal situation, you are able to burn lignite. I do not think we are seeing a coal renaissance. We have seen 10 gigawatts of coal taken off the system since 1990; 112 coal-fired power plants that were planned in 2008 right before the climate and energy package, only three are in some stage of construction. Coal is actually on its way down in Europe. We are seeing, for example, because of the carbon floor price in the UK an up tick in coal prior to the introduction of the carbon floor price in the large combustion power plant directive taking effect. There are some effects in the short term, but coal is in a downward trajectory that would be much eased to continue on its way if we had an adequate carbon price meaning that you would have fuel switching in the operational sense.

Q337 The Earl of Caithness: You are not alarmed by the building of these coal power stations and lignite stations in Germany?

Jason Anderson: We are alarmed by it, certainly. We are doing everything we can to raise attention to it. I just want to point out that the 9.6 gigawatts that are under construction in Germany were actually planned between 2005 and 2008 so it is not a renaissance that we are seeing now. A lot of these power plants are actually facing financial difficulty; for example, in Mannheim. They do not really have a financial case right now. They find

themselves, much as happens with nuclear power plants, years into construction, realising they do not actually have a business case. We think that if we can have a carbon price that means that you do not have a good reason to burn coal in the near term, then you will have a direction of travel through post-2020 climate and energy policy that will do much to be able to alleviate the future of coal, meaning put it out of its misery.

Q338 Lord Cameron of Dillington: What do you think about the back-loading scheme for the emissions transfer scheme? I got the impression it was the only politically possible solution of manipulation that is going to happen to the ETS in the current round. Do either of you think it is—

Dr Brown: Our view is that on its own it would not do very much because essentially you are taking some allowances out, putting them back in later. Most of the banks and financial analysts predict the price might go up a little bit and then it will come down again. From our point of view it is fine for it to be on the menu of options for short-term intervention that you might choose from to move you on to the right long-term trajectory, but until we know what that right long-term trajectory looks like it is hard to make a final choice from the menu.

Jason Anderson: We fully agree that it is inadequate on its own but the proposal is there. When the Industry and Energy Committee of the European Parliament last week gave advice not to approve it, the carbon price briefly dipped down to €2. The market is watching, and that is an indication that this is a confidence-building measure. It is not a solving the climate problem measure; it is confidence building. If we can get past the back-loading file, get that solved, then we will go on to the structural reforms. We will take the tonnes out of the system, change the linear reduction factor. If we do not get past the back-loading I am afraid that the politics will look very negative.

The Chairman: Dr Brown, Mr Anderson, thank you very much. That has been a most informative session. We are very grateful. Thank you.

Jason Anderson: Thank you.

Centre for European Reform—Written evidence

1. Energy is central to climate change mitigation. Over three quarters of the EU-27's greenhouse gas emissions come from the production and use of energy. Energy is also central to the economy, fuelling industry and providing substantial employment.
2. There is a need for substantial investment in modernising and upgrading energy infrastructure. In the UK alone, the government estimates that around £200 billion of investment will be required for energy infrastructure by 2002. There is also the import cost of energy. The European Union's energy import bill in 2010 was €355 billion.
3. Low-carbon energy may eventually become cheaper than high-carbon energy (particularly when indirect costs and energy security factors are taken into account). But it is currently more expensive. So there is potential conflict between the need for decarbonisation and the need for economic growth and improved competitiveness.
4. However, there are solutions to this potential conflict:
 - much greater efficiency in both energy use and energy supply;
 - expansion of renewable energy;
 - expansion of nuclear and demonstration of carbon capture and storage (CCS) as necessary low-carbon bridge technologies;
 - overhaul of the Emissions Trading System (ETS) to make it an effective market signal, combined with border tax adjustments to avoid negative impacts on European competitiveness;
 - sensible investment in energy R&D.

Energy Efficiency

5. EU countries have agreed to reduce the amount of energy they consume by 20 per cent by 2020. This target is not binding – unlike the other two in the EU's climate change package (to reduce greenhouse gas emissions by 20 per cent and increase energy from renewables to 20 per cent, both by 2020). The EU should not spend too much time arguing about whether the energy efficiency target should be made binding. Instead, it should tighten up existing laws, and spend more of its existing budget on energy efficiency programmes.
6. The EU should tighten standards for the use of energy in buildings, electronic appliances and cars. And it should have the power to set minimum standards and remove the most energy inefficient vehicles from the market – as it has already done for products like washing machines and refrigerators.
7. Europe wastes massive amounts of energy because most power stations do not capture and use the heat they produce when they generate electricity. EU countries should quickly move to combined heat-and-power (CHP) systems. This should cover fossil fuel power stations, biomass power stations and nuclear power stations.

8. Switzerland got 7.5 per cent of its heat from nuclear power stations in 2009. Within the EU, Slovakia got over 5 per cent of its heat from nuclear stations in 2009. Hungary and the Czech Republic also use nuclear heat. But in the EU's main nuclear players, such as France and the UK, the heat is simply expelled into rivers and seas.
9. CHP becomes a more usable technology when a country has installed a district heating system, to transport the heat to homes and factories. In the Nordic countries heat produced in this manner is transported up to a hundred kilometres.
10. Denmark leads Europe in energy policy. Denmark installed extensive district heating networks in the late 1970s and 1980s, and now tops the European league of combined heat and power as a proportion of total energy generated. Successive governments have implemented ambitious and consistent policies on energy efficiency since the oil shocks of the 1970s. As a result, Danish energy intensity declined by over a quarter between 1990 and 2006. Denmark today only uses 60 per cent of the energy per unit of GDP of the EU average, the lowest use of energy per unit of GDP of any EU country.
11. In Central and Eastern Europe, district heating was extensively installed during the Communist era, and need widespread refurbishment to reduce the loss of heat. The least efficient lose around half the heat. Nordic district heating systems were in most cases installed more recently, but would nevertheless benefit from upgrading. In other member-states, there is scope for a major expansion of district heating networks.
12. The arguments for greater effort on energy efficiency and CHP are expanded in my policy brief 'Delivering energy savings and efficiency', CER, January 2011². The arguments for investing in district heating systems are outlined in my policy brief 'Connecting Europe's energy systems', CER, October 2012³.

Renewable Energy

13. A massive expansion of renewable energy must be a priority for the EU. Renewable energy is low-carbon, so expansion is necessary for climate policy reasons. More use of renewables is also necessary for energy security reasons, as this would enable Europe to reduce the hundreds of billions of euros it pays annually for the import of fossil fuels. And renewable energy could be used to help heavily-indebted eurozone countries recover economically. (The most heavily-indebted countries are well placed geographically to expand solar or wind power: solar power in Spain, Portugal, Italy, Greece and Cyprus and wind power in Ireland.)
14. The EU has too many targets. Politicians are attracted to targets – they provide an easy soundbite and are often 'Not In My Term of Office'. (NIMTO). The fact that Europe's leaders chose three targets of 20 per cent, all to be met by 2020, strongly suggested that soundbites were leading analysis. Nevertheless, there should be post-2020 renewables targets.

² <http://www.cer.org.uk/publications/archive/policy-brief/2011/delivering-energy-savings-and-efficiency>

³ <http://www.cer.org.uk/publications/archive/policy-brief/2012/connecting-europes-energy-systems>

15. Many politicians, businesses and commentators believe that governments should always desist from ‘picking winners’, that governments should set the policy framework and then leave it to the market to expand or contract particular sectors or technologies. The British government is arguing that a post-2020 renewable energy target is too prescriptive, and that the EU should instead set only a post-2020 greenhouse gas reduction target.
16. This is a legitimate approach, based on the accurate belief that governments do not have a good track record in picking winners. However, outcomes should only be left to the market if the market is working, and – as discussed below in paragraphs 34-36 - the carbon market is not.
17. Regulation could be used to prevent the construction of new fossil fuel power stations which do not have CCS, by setting a cap on the amount of greenhouse gases that are permitted per unit of electricity generated. The Emissions Performance Standard approach has been used in California, and is being proposed by the UK government. An EU-wide Emissions Performance Standard would – if set at a low enough level - rule out cheap, highly polluting forms of energy. So it would make up for the lack of a strong market signal. New energy infrastructure could then in theory be left to the market, with the private sector deciding whether to invest in renewables, CCS or new nuclear.
18. However, new infrastructure can only be constructed if it is given planning permission, and in a democracy this is only given if proposed developments have public support. Nuclear power has always had many opponents, and their number has increased since the 2011 Fukushima incident. CCS also has many opponents in some countries – notably in Germany. Much of this opposition comes from people who live near the proposed storage sites, but some also comes from campaigners who argue that CCS would divert money away from investment in renewables.
19. Renewable energy is the ‘best’ energy source (though not all renewables are as good as each other). Renewable energy will cut air pollution as well as slowing climate change. And, as the name indicates, renewables will not run out – unlike fossil fuels and uranium. Renewable expansion will also improve Europe’s energy security by reducing the need to import oil, gas and coal.

Low-carbon bridge technologies

20. However, energy policy cannot afford to make the best the enemy of the good. Nuclear power and CCS are not ideal, and certainly not cheap. But they are low-carbon. The EU currently gets around ten per cent of its total energy from renewables, with a target to increase this to 20 per cent by 2020. If that target is met, that will leave 80 per cent of the journey still to travel.
21. The best must not be the enemy of the good, but the fact that one energy source is better than the worst one does not mean that it is good enough. Gas is lower carbon than coal is (though fugitive emissions from fracking mean that shale gas is likely to be higher in greenhouse terms than conventional gas is). But gas without CCS is not low carbon enough. Gas generation emits around four times as much carbon per unit of electricity as nuclear does, and sixteen times as much as wind power. The main

danger of a policy approach which set only post-2020 greenhouse gas reduction targets would be another dash for gas.

22. Nuclear and CCS are a necessary part of the mix for the next five decades at least. If these technologies are to be justified as necessary bridge technologies (the phrase used by Angela Merkel to justify keeping nuclear power stations open, before her post-Fukushima u-turn), it would be helpful to give the public an indication of how long the bridge is likely to be.
23. An agreed statement about how quickly the EU can move to total reliance on renewable energy would also help answer the argument of CCS and nuclear opponents that these technologies are not as desirable as renewables are. That argument is correct, but is often used by campaign groups to imply that Europe can move to a renewable economy almost overnight. It cannot. Europe will take at least five decades to move from the current situation of a little over ten per cent of energy from renewables to 100 per cent. Where will the non-renewable energy come from during that time? Nuclear and CCS are less desirable than renewables, but more desirable than fossil fuels without CCS.
24. Governments need to engage in this public debate, because public opposition to energy infrastructure has prevented, and will continue to prevent, many projects being constructed. So, paradoxically, a specific renewable energy target could help build public support for, or at least acceptance of, nuclear and CCS as necessary bridge technologies.
25. The EU should therefore set a renewable energy target for 2030, and one for the end of each decade thereafter. These targets should be presented, explicitly, as indications of how long the transition to a 100 per cent renewable economy will take. The earliest plausible date when Europe can be totally reliant on renewable energy is 2060. Denmark has set itself a target to achieve this by 2050. This is definitely a NIMTO target, but the Danes have a good track record on delivery. And Denmark is starting from a higher base than the EU overall (22 per cent of its total energy in 2010 – more than double the EU proportion). Yet 2050 is 38 years away. And other member-states will take longer. Rejecting nuclear power and going slow on CCS, as Germany is doing, might speed up renewable expansion. But it will result in more coal and gas being burnt, so the climate will pay a heavy price.
26. The EU should set a target to be 100 per cent renewable by 2060, and work backwards from that to set the following targets: 80 per cent by 2050; 60 per cent by 2040; 40 per cent by 2030.

Should European support schemes for renewable energy be harmonised?

27. Member-states operate different renewable support schemes. The existence of many different schemes increases administration costs, for both public authorities and developers. A harmonised EU-wide renewable energy support scheme would reduce administrative costs. It would also introduce, once the EU scheme had been negotiated and adopted, greater regulatory stability.

28. National governments often change renewable policy in order to reflect different priorities (following a change of government), technological and cost changes (the price of solar panels has fallen very considerably in recent years), or to reduce public expenditure. Regulatory changes undermine investor confidence. Most of the investment in new renewable energy capacity will have to come from the private sector. Regulatory uncertainty increases the cost of capital and reduces private sector willingness to invest. EU policies are usually longer lasting than national policies, because they are so difficult and lengthy to negotiate and because the Commission is not driven by an electoral cycle. So an EU renewable energy support scheme could deliver greater regulatory stability – but only once it had been negotiated and implemented. In the interim, the prospect of an EU scheme would introduce yet more uncertainty for investors.
29. A Commission proposal for an EU scheme would also have little chance of success. National governments would argue, correctly, that each country has different potential for renewable energy. A single level of subsidy for solar power Europe-wide would not represent rational policy making. (Germany has subsidised solar power at very high rates for industrial policy reasons, not climate or energy reasons.) Different countries also have widely differing social constraints on the amount of subsidy they can raise from energy customers in order to support renewables.
30. A proposal to harmonise renewable support schemes would therefore introduce greater regulatory uncertainty, and would not be adopted by the Council of Ministers. The Commission should therefore drop this option. It should focus instead on greater co-ordination of member-state schemes. The structure of the schemes – the type of subsidy mechanisms used rather than the rates – should be more closely co-ordinated. The Commission will publish guidelines on the structure of renewable support schemes in 2013. These proposals should focus on co-ordination rather than harmonisation.

Renewable energy trading

31. It does not matter in climate terms where renewable energy is produced, as long as infrastructure exists to transport it to consumers. The 2008 ‘renewable energy directive’ includes arrangements to encourage co-operation between member-states, and between member-states and countries outside the EU. But these arrangements have not been widely used. According to the Commission, only Luxembourg and Italy indicated an intention to use the co-operation mechanisms to meet their 2020 renewable target, and Italy subsequently said that it might not need to use the mechanisms.
32. Renewable energy trading should be promoted – as the Commission intends. This could help Greece, Italy, Spain, Cyprus and Malta economically (with solar) and Ireland (with wind). A good example of the potential is the Helios solar project in Greece. The Greek government has identified solar power as a potential driver of economic recovery. Helios would cover 77 square miles with solar panels, with the potential to produce 10 gigawatts of electricity – roughly the size of ten large conventional power stations. The sun does not shine every day, even in Greece, but that country gets on average 300 days of sunshine each year. And the sun is stronger than in Northern Europe, making the solar panels more efficient. So Helios could

make a significant contribution to European renewable energy production. But it would not be cheap to construct. Helios would cost €25 billion, including grid upgrades, and the Greek government would not be able to afford this even in better economic times.

33. Germany succeeded in kick-starting the global solar industry, and is now a significant manufacturer of solar panels (though increasingly being undercut by China). Once made, solar panels are easy to transport (unlike wind turbines, for example). So it would be logical for both energy and economic reasons for the panels to be installed in Greece rather than Germany. Once the electricity grid through the Balkans has been upgraded, Germany (and other member-states) could then use the electricity. This would be much more cost-effective than electricity from solar panels in Germany, or other northern European countries such as the UK.

The Emissions Trading System

34. Allowances under the Emissions Trading System are trading at less than €8 per tonne of carbon dioxide. This is far too low to stimulate increased investment in energy efficiency or low carbon energy. The system must be overhauled so that it provides higher prices and greater stability. As a first step, the cap on the volume of emissions should be lowered, to reflect the fact that the economic recession has led to lower emission levels than expected when the cap was set. A lower cap should be combined with a price floor and a price ceiling.
35. Without safeguards, an effective emissions trading system would lead to more manufacturing in countries with cheap energy and no carbon price. The EU should therefore introduce border tax adjustments, with revenue returned to the country of origin for spending on energy efficiency and low carbon energy.
36. These proposals are expanded in my policy brief 'Saving emissions trading from irrelevance', CER, June 2012⁴.

Research and development

37. The Commission proposes, in the next multiannual financial framework, to increase the amount allocated to R&D and innovation, from €55 billion in the current financial framework to €80 billion in 2014-20. This is welcome but still inadequate for a continent whose future prosperity will depend on staying at the technological frontier. Energy technologies urgently need more research and development. The Commission published a Strategic Energy Technologies plan in 2007, but member-states have yet to provide the necessary funding.
38. The attempt to stay at the technological frontier should not lead to EU funding of all scientific research. The EU should make substantial savings by cancelling its participation in the international nuclear fusion project, ITER. The total budget for this project has almost tripled since 2001, and is now €16 billion. The EU will have to pay €6.6 billion of the total cost. In 2010, the Commission awarded ITER €1.4 billion, from unspent parts of the EU budget and the research programme. In its financial

⁴ <http://www.cer.org.uk/publications/archive/policy-brief/2012/saving-emissions-trading-irrelevance>

framework proposals the Commission suggested that ITER should be placed “off budget” because the total amount of expenditure is unpredictable each year. That is certainly correct. But the question of on or off budget accounting is very much second order: far more important is that it is simply not worth the cost. Even if it works eventually (which is far from certain), ITER will not generate electricity for the grid until 2040 at the earliest, so fusion will contribute little to efforts to control climate change or to increase energy security. The EU should redirect the money from ITER to programmes for energy efficiency and renewable energy.

3 October 2012

**Centre for European Reform and DIW Berlin, German Institute for
Economic Research—Oral evidence (QQ 1-33)**

Evidence Session No. 1

Heard in Public

Questions 1 - 33

WEDNESDAY 31 OCTOBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
The Earl of Courtown
Lord Giddens
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Plumb
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Stephen Tindale, Associate Fellow, Centre for European Reform, **Dr Karsten Neuhoff**
Head of the Department of Climate Policy, DIW Berlin, German Institute for Economic
Research, via video conference.

Q1 The Chairman: Mr Tindale, good morning and welcome. Dr Neuhoff, good morning and welcome. Thank you for agreeing to come to speak to us today. As you know, we are at the very early stage of our inquiry, so we are looking for some particularly clear guidance from you on your thoughts.

If I could deal with the formalities first, please. You should have in front of you a list of interests that have been declared by Committee Members. This is a formal evidence-taking session of our Committee. Full shorthand notes are being taken and they will go on the public record in printed form and on the parliamentary website. We will, of course, send you a transcript for you to look at, a copy, and you will be able to revise it in terms of any minor errors. The session on the record is being webcast live and will be subsequently accessible via the parliamentary website. I think that is fairly straightforward.

I shall explain how we would like to proceed with this. We will each ask six questions and perhaps we could agree that Mr Tindale will go first and Dr Neuhoff second, and then we will just get some routine into that process. Of course, Members of the Committee will obviously want to ask supplementary questions as we go along, so we hope to get a flow to that.

If I may, I would like to start with the first question, which is the question of costs or investment in EU energy policy, and to try to establish whether you have a view as to whether energy policy should be driven by reducing costs, particularly in the medium-term, gas, and so on, or by boosting investment, and what the balance should be about short term gain and longer-term investment in the sector.

Stephen Tindale: My view is that it has to be a balance between reducing costs and getting investment. If I had to choose, the more important thing would be getting investment because if we do not get investment, first, the lights might go off, and secondly, we will not reach our decarbonisation requirements. New investment in the energy infrastructure is absolutely crucial, and that applies not only to generation but also to networks and distribution.

Q2 The Chairman: Do you think, as we have heard argued from the United States, that if you could exploit shale gas in the short term—and obviously we are going to get to the question of shale gas later on—and effectively tax it in some way to pay for a better renewables policy, is that something you see as a possibility?

Stephen Tindale: It is a possibility. Gas is much less damaging to the climate than coal or oil, but it is not low carbon enough without CCS; if CCS is affordable, which we do not know yet. Another dash for gas would be an option for the next 18 years or so until 2030, but it would be much more sensible if policy then stated that, in 2030 or around 2030, the gas stations would be closed down. Gas stations are cheapish to build, compared to nuclear stations, for example, and the cost is largely driven by the costs of fuel, whereas for nuclear or for offshore wind—to take a couple of examples—they are very capital intensive and then the fuel is either free or cheap after that.

It is important to give a clear signal to investors/developers that this is a transitional measure for the next couple of decades. Then perhaps CCS can be retro-fitted if it is proven at scale by then, or the gas stations are shut down and, therefore, the investors/developers have to make the calculations and make sure that they get enough profit over the next two decades or so.

Dr Neuhoff: Thank you very much for the question. From a European perspective, I think it is important to maintain the clear framework at the European level, combining energy security, environmental goals that are achieved, and economic provision of energy and to make sure that that is a stable framework that is in place today and, therefore, will also stay in place in the future.

My sense is that a lot of the utilities are starting to ask, “Where are we going in the future?” So, the way to address your question, in terms of how to minimise the costs for consumers, is primarily through increasing the stability of the framework, such that investment risks are minimised and policy risks for investors are reduced as much as possible. I do not see that much of an opportunity to make a trade-off short term versus long term because if we do something in the short term that is not consistent with the longer term perspective, then that will ultimately frighten investors and increase costs for consumers.

Q3 The Chairman: To that question, though, if investors had a fixed time horizon, as Mr Tindale suggested, of a finite period in which to recover their investment, do you think that has merit?

Dr Neuhoff: Sorry, I did not understand the question.

Q4 The Chairman: Mr Tindale was suggesting that, to give investor confidence so that there was stability, you needed to set a framework but on the other hand you put a finite amount of time on gas, for instance, so that investors knew that at the end of that time there had to be alternatives—more sustainable sources of generation.

Dr Neuhoff: For me, the German experience over the last two years was quite intriguing, in that in Germany we had a very long discussion over what role nuclear should play and what role renewables should play in providing energy. In this discourse there was quite a lot of uncertainty for all parties involved as to whether there is sufficient robustness in the framework for their specific technology of choice. After Fukushima, when it became clear that all political parties signed up to a clear commitment to phase out nuclear, suddenly it was clear for companies that they had to follow this trajectory. I think this clarity that has emerged is the most valuable part that came out of the discussions last year. So for me, really, it is how can we provide clarity for investors, where we know that is something that is implemented today and will stay in the future? That is all I can refer to from the German experience.

Q5 Lord Lewis of Newnham: Perhaps I am wrong in this respect, but one of the problems you have with renewables is the actual cost. For instance, I believe that electricity in Germany now is very much more expensive. I am not sure how far this is related to the larger extension of renewables you have, but it is that side that worries me slightly.

Dr Neuhoff: Indeed, that is something that is very much discussed these days in Germany. Two weeks ago, the German Government announced the costs for consumers and small businesses to pay for the subsidy level for renewables, which will increase at the beginning of next year. Ultimately, by next year, consumers will pay on average about 2.5% of their expenditure bill for their power.

An interesting aspect emerged when we took a more historic perspective and realised that in the mid-1980s consumers spent 2.3% of their household bill just to pay for power. Ultimately, costs are seen as something quite big but if you put it into a longer-term perspective that is actually a number that does not really fall that much out of historic perspectives. The challenge that has been earlier identified in the UK is how to deal with the very poorest segment of households and to put specific policies to help these household segments. But overall, the number suggests that it is not as big of an issue as one might sometimes feel looking at the discussions.

The Chairman: Thank you. I think Mr Tindale wants to come in and then Lord Giddens.

Stephen Tindale: I just wanted to comment that, in talking about the costs of renewables, in my view it is important to unpack what we mean by renewables because some are much less expensive than others. All of them are still more expensive than unabated fossil fuel but onshore wind, for example, is not that much more expensive, whereas solar photovoltaics, in my view, are not economically efficient in northern Europe, in the UK or in Germany. Offshore wind is expensive but once the grid is built it will then be there to exploit offshore wind, so in that sense it is a one-off cost. Biomass is potentially cheap. The UK Government is still struggling to define: what is sustainable biomass and what is not sustainable biomass, which is very important. The EU is struggling as well to define that. Some biomass is better

for the climate than fossil fuels. That is relatively inexpensive and, as it can be used for heat as well as for electricity generation, it is an important part of the package going forward.

Q6 Lord Giddens: Against the background of the fact that the eurozone at the moment is flirting with recession, what role can energy investment play in generating net new jobs and generating growth? I have just come back from a conference in Germany where there was a lot of debate about this. It was suggested that, in some sense, the eurozone countries should assume the lead in this, so that they would have a different finance structure from the orthodox EU budget. One of the main points for our inquiry is to see what the relationship is between energy investment, growth and job creation, so I would welcome your comments on that and also on the practicalities of it in a European context.

Stephen Tindale: As you know, the jobs from renewables are much debated.

Q7 Lord Giddens: It would have to be net new jobs.

Stephen Tindale: Exactly. I was just about to say that the net jobs factor is sometimes overlooked. The fact that jobs in fossil fuels will reduce has to be counted in the equation as well. In my view, in terms of job creation, the most sensible job rich approach is energy efficiency, which would help in terms of fuel poverty and social issues as well, particularly in the UK. There are significant numbers of jobs in renewables. However, I think in terms of net jobs, it is not going to be the main argument in favour of renewables.

In terms of getting the eurozone out of its current economic difficulties, Greece, Spain, Portugal and Italy are all well-placed in terms of solar potential, and Ireland is well-placed in terms of wind potential. The fact that the eurozone countries that are facing the biggest economic difficulties also have very substantial renewable energy potential is a fortunate coincidence. To unlock that—for example, the Helios project in Greece, which could generate about 25 gigawatts of renewable electricity, and obviously solar power makes more sense in Greece than it does in the UK—would be a major energy step forward and it would help. It would not solve but it would help Greece's economic situation. I think the way to unlock that is to promote renewables trading, in terms of what counts towards one country's target as against another. It does not make any difference to the climate where the renewable electricity is generated, so it makes more sense to generate electricity from solar panels in Greece than it does in Germany or the UK.

Going back to the jobs issue, the panels could then be made in Germany and transported to Greece—solar panels are much easier to transport than wind turbines—so the trading should be supported. The European Commission is trying to get that off the ground but it has not been much used so far.

Q8 Lord Giddens: We need to persuade the political leaders to endorse it because they run Europe now. Angela Merkel is our President, de facto. The Commission is somewhere down the Rhine.

Stephen Tindale: We need to persuade the leaders. That would certainly help. We also need to persuade some of the environmental groups which think that the transition should be in every country. In my view, it is more important to get a Europe-wide transition, and then a global transition.

The Chairman: A good point for Dr Neuhoﬀ to come in there, Lord Giddens.

Dr Neuhoff: Yes. In this current situation, shifting investments earlier, and making investments that replace fuel imports, are two aspects that can help quite a bit in the job creation part across many European countries.

That comes back to your question then in terms of what are the instruments that we have available. My sense is that EU funding can be quite helpful to unlock investments on the energy efficiency side whereas if I look at infrastructure investment on grid or power it is the financing ultimately that matters. So the focus there should be a bit more in terms of how to facilitate financing at low financing costs and, therefore, lower costs to consumers. There we can start with the European Investment Bank where there has been some recapitalisation. I think it will be important that there should be clear criteria that this money is going to be used to advance the type of projects that have the jobs and the environmental impact that are desirable from European policy objectives.

Where European co-ordination can become a lot more helpful is with regard to regulation. The UK was one of the leading countries in good regulation of grid expansion and, therefore, reducing the costs of capital for the national grid. In other European countries we are still a bit further away from that. From the finance sector, actors look at grid investment as something that is almost like utility investment and they do not really attribute the safety, stability and longevity of this asset to the specific investment opportunities. We almost need to have a more common perspective on grids, such that investors can say, “Okay that is a business model for grids, which is bigger than just one country. It is worthwhile for us to look at that. It is worthwhile for us to take that as a long term investment opportunity”, and take this forward.

On the renewables side, again I think regulation can help a bit. For example, the feed-in tariffs in Germany provided long term guarantees to investors and, therefore, facilitated low financing costs. I think we can integrate a stronger European approach. In contrast to Mr Tindale, I would perhaps argue a bit more for use of other mechanisms under article 9 of the Renewables Directive, where countries can advance joint projects and, therefore, jointly say, “Okay, we want to have this kind of a strategy”, but they do not need to shift to a trading for certificates approach on a European level. My sense is that these certificates will remain relatively uncertain for investors for quite a few years and, therefore, are difficult to use for a simple and cheap financing structure. I think there are more closely aligned strategies at the national level under this European Renewables Energy Directive, could be quite helpful.

Q9 The Earl of Caithness: I have two questions. The second one will relate to carbon capture and storage, but can I ask you, first, whether we should set technology-specific targets for innovative technologies, or should we go for a more technology neutral approach?

Stephen Tindale: In my view, we should set targets for renewables because it would be sensible to leave it to the markets and only set a greenhouse gas reduction target if the market was working. That is a very large “if”, and the carbon market at the moment is not working. The ETS is €6 or €7 per tonne at the moment. That is far, far too low to drive investment into low carbon options. Therefore, a combination of strengthening the market mechanism and, where possible, regulating. A Europe-wide emissions performance standard, for example, would be a sensible way forward, and also setting technology-specific targets on renewables, partly because the renewables 20% target has been very effective in driving investment into renewables and partly also for public relations reasons. I do not mean that in a dismissive sense, but actually convincing the public that low carbon bridge technologies are a necessary part of climate control.

The video link cuts out.

Q10 The Chairman: It did not like what you were saying.

Stephen Tindale: No, it did not. I was just about to talk about nuclear, so who knows. Angela Merkel, before Fukushima, used the phrase, “low carbon bridge technologies”, which I think was a sensible phrase because it will take several decades for the EU to become 100% reliant on renewables. It is not even formally or informally committed to 100% renewables economy yet. In my view, it should be. To persuade the public that nuclear and CCS are two necessary bridge technologies, it is important to say how long it is going to take to get to 100% renewables. The only country that I know of that has set a timetable yet is Denmark, and it has said 2050. That is obviously a “not in my term of office” target, but the Danes have a good track record on delivery and a very progressive energy policy overall. It is not perfect but is probably the best in the EU. A target for renewables would actually, paradoxically, help persuade the public in key countries that nuclear and CCS are important bridge technologies.

In the UK we are quite fortunate that we have a lot of sea around us, so CCS is more popular or less unpopular here than it is in Germany, for example. Karsten has gone, I am afraid, but in Germany they are proposing to store for many millennia, so it is more like disposal really, but to store the carbon dioxide onshore. The same happened in the Netherlands. In Rotterdam, people are very unhappy about having carbon dioxide under their houses. In Rotterdam it was mainly because house prices would fall, but there were also some potential health concerns about it relating to Lake Nyasa and so on.

I think CCS is an important bridge technology. Nuclear is also an important bridge technology. To persuade the public of that, we have to underline that it is going to take several decades and some of the environmental groups—I have been guilty of this myself in the past—suggest that, not explicitly but implicitly, we can go to 100% renewables almost overnight. It is not going to be like that.

Q11 The Chairman: Dr Neuhoff, would you like to comment? No, we have lost the sound, I am afraid. Shall we redial? Let us do that. It will be much better. Shall we do that? Okay.

Mr Tindale, one of the questions we might just be thinking about as well is this question of the existing 2020 targets and what the view is on sticking with those, on the grounds they are too expensive for the time of austerity and so on.

Stephen Tindale: I do not agree with that view because the energy efficiency, in particular, will help get out of economic difficulties and create many jobs. The 20% greenhouse gas production target is at the low end of what the EU should be doing in terms of meeting a two-degree limit to climate change. In terms of renewables, as well as the climate advantages, it has major energy security advantages and the price of importing oil and gas into the EU runs at about €350 billion a year, so there is potential to save a lot of our import bill.

The Chairman: Thank you. Dr Neuhoff, are you back with us now? No.

Q12 Lord Lewis of Newnham: One of the things that worries me specifically about CCS—I am sure we will get on to this particular problem—is that there has been very little success, as one sees, in actually making any direct application of these techniques. I am worried very much by the emission regulations that are going to come in in 2017 and 2020, which are going to impose a tremendous loading onto present power stations from the

point of view of their emissions. How do you view this particular problem? This is once again legislation with dates associated with it.

Stephen Tindale: Yes. Future emissions standards are a sensible way forward because the EU has quite a good track record in terms of technology forcing standards, and so there is a role for that. Whether CCS will meet the requirements, who knows? It has been demonstrated at small scale. It has been demonstrated at all parts of the production, distribution and transport, but it has not been demonstrated at large scale or integrated.

Of course, as we saw from DECC's press release yesterday, there are different types of CCS—pre-combustion, post-combustion, oxyfuel. How much is it going to cost? Well, how long is a piece of string? We have no idea about that, and so it needs to be demonstrated at scale. If I had to choose between the three, I would say oxyfuel looks the most exciting but it needs to be demonstrated at scale. The UK Government and the previous UK Government have messed up somewhat on CCS competitions, to put it one way, so I think they need to crack on and actually allocate the money.

The EU should co-finance as many as possible through the NER300 approach, but the collapse in the ETS price, as Professor Grubb has written about very eloquently, has reduced the amount of revenue that the ETS will deliver. That is going to make it even more difficult—hence the need for a floor price.

Lord Lewis of Newnham: Thank you.

Q13 Lord Giddens: Can I just ask you briefly about what has already been done in respect of energy efficiency? I think it could be quite important in consumer behaviour, because if you are living in a German insulated house you save money, you buy yourself a big Mercedes and you steam up and down the motorway, and so you are not actually—

Stephen Tindale: Indeed. Do they not have speed limits yet in Germany? I do not know that. Karsten does.

Q14 Lord Giddens: Ever since Jevons we know it is quite a significant thing.

Stephen Tindale: Absolutely, yes.

Q15 Lord Giddens: I just wanted your view of it.

Stephen Tindale: My more serious response is that the rebound effect, in terms of end use energy efficiency, is going to be very substantial and will reduce the climate advantages and some of the economic advantages of energy efficiency, whereas the social advantages will be substantial. I think the important point about energy efficiency is that it should not only be about end usage. It should also be about production and generation. The European Commission proposed in its draft Energy Efficiency directive that most new power stations should be combined heat and power, which would be an enormous improvement in energy efficiency because all that heat is just going up the cooling towers at the moment. If you capture it and use it in district heating, yes, you lose a bit of the heat but it was going up chimneys anyway, so that is not a major loss. In Scandinavia, the district heating systems go 100 km, and of course Copenhagen led the way on this. The rebound effect for energy efficiency in the end use of energy is likely to be more substantial than—

Q16 Lord Giddens: Yes, it will work for producers. It is more problematic for consumers, though. It depends on their behaviour afterwards really.

Stephen Tindale: Yes.

The Chairman: Dr Neuhoff, are you back with us?

Lord Giddens: He is having the most miserable time of his life.

The Chairman: They cannot fix the link.

Lord Renton of Mount Harry: May I ask a slightly different question?

The Chairman: Can I just deal with the connectivity, as we call it, and then if I may come to Lord Renton. Dr Neuhoff can hear us but we cannot hear him. If he does not mind staying on the call listening, and then possibly we will send him these questions and see whether we can get a written answer and actually get more of his evidence in, if that is okay with everybody. I will wave to you now and say thank you, and hope you can stay on with us.

Lord Renton just wanted to come in and then we will—

The Earl of Caithness: I just want to ask my second question.

The Chairman: Yes.

Q17 The Earl of Caithness: It was actually more for Dr Neuhoff. He said that we wanted EU co-ordination and Angela Merkel has said that we must have bridging technologies that must include CCS. I find that very difficult to reconcile when it seems to be that Germany are going to build 29 new gas stations and 17 new coal stations and none of them are going to have CCS. Can he let us know what the German position is with regard to CCS, why is it so unpopular, and how one can possibly get any sort of European co-ordination when a major player within Europe is ruling out both nuclear, which produced 23% of Germany's electricity in 2009, and now CCS? It does seem to be making life very difficult.

The Chairman: I am sure Dr Neuhoff is grateful that he can write to us on that. It gives him time on that. Thank you, Lord Caithness.

Q18 Lord Renton of Mount Harry: My original question has really been answered, but if I could just say a personal thing. We have a small house off the west coast of Scotland and there is now a possibility of a very large offshore wind farm, about five or six miles away into the sea but from the Island of Tiree, where we live. That started two years ago. Nothing more has happened. There has been an awful lot of discussion. There is the possibility now that, actually, it is so far out that it is going to be too expensive and not going to happen. This does cause an enormous amount of disturbance to those who are involved. In this case on a small island, they do not know—the 800 people on the island—whether that is going to shoot up in time or not.

Is there any way that you can see in which the different possibilities, in a sense, are made to happen or to be answered more quickly, because it seems to me that a lot of the trouble for those who are touched by it is that they really do not know what their position is going to be in the future, and of course it is very worrying for many people.

Stephen Tindale: Yes. The issue of the timetable for decisions being made is one of the major complaints, both from developers and from residents. One reason why it takes a long time is that the public authority—whether it is local government, or the Scottish Government in this case, or the UK Government—has to consult properly as otherwise it might face a judicial review. Broadly speaking, public authorities are committed to consultation and that takes time. One of the challenges for those of us in favour of offshore wind is to get people who support it to speak out as well as people who oppose it. They

speak out anyway, but the pro side tend not to. They tend to stay at home and watch TV instead.

Q19 Lord Renton of Mount Harry: That is absolutely true in the case I have mentioned. There are those who support it and those who do not. Both are very noisy.

Stephen Tindale: Yes. Oh really?

Lord Renton of Mount Harry: They are very noisy.

Stephen Tindale: Yes, well, I am pleased to hear that the pro side are being noisy as well. An increase in regulatory stability would be a step forward. Going back to the feed-in tariff or the renewables obligation, if we were starting from scratch a feed-in tariff would be a preferable way forward, because it provides guaranteed income and, therefore, reduces the cost of capital, but we are not starting from scratch. For the last decade we have had a debate in the UK about whether we should move from the RO to the feed-in tariff, and now we have CfD FITs on their way, possibly, and that is yet more regulatory instability.

An important thing, both to reduce the cost of capital and to speed things up a bit by the UK Government, is just to leave it alone. Just introduce your EMR changes but then just leave it alone and get cross-party support for that if possible, which would help both the developers and help speed up the planning process.

On offshore wind, the planning process is less sticky than for onshore and the UK Government and the Scottish Government have done quite well on that. The Scottish Government actually has done better than England and Wales have. The SNP are doing some good things on renewables, and the Beauly-Denny line eventually being approved was a major step forward.

I do not think I have really answered your question, but I can understand why people get frustrated by the seemingly endless delays in decision-making. That is one of the major challenges that everyone has to try to overcome.

The Chairman: Can I take us then to the next question. We are covering a lot of ground but we have four more questions to go in a relatively finite amount of time.

Q20 Lord Cameron of Dillington: I want to talk about the European grid and energy infrastructure and interconnection. You both obviously favour this, both for security reasons and also because it encourages renewables, particularly the intermittent sort because you can play one country off against another in that respect. You both seem to indicate that it will reduce costs for consumers. I wonder whether you could put a bit more flesh on that argument in terms of costs saving. Clearly, it would be very expensive up front but I am not quite sure how the price would come down later.

Stephen Tindale: I am very sorry that Dr Neuhoff cannot answer this one. It would reduce costs in two ways. First, it would enable the intermittent renewables that are currently being generated to be used, which are sometimes simply being wasted because there is no grid to take them anywhere. It would enable them to be used. A good example of that is the trans-Pyrenees grid, which has been talked about for 30 years. Before its recession, Spain was often producing more electricity than it could actually export because it had done well on solar and on wind. Getting that to people so that they could actually use it would reduce costs.

The trans-European super grid—if it ever happens, which I very much hope it will—as long as it was two-way, would enable electricity from solar in southern Europe to be transported

north and then wind generation from northern Europe to be transported south during the night and so on. It would have to be two-way.

On the cost of the electricity grid—not only electricity as gas is also part of the equation—it is crucial to leverage in private sector investment. Most of it will come from the private sector clearly, but the energy project bonds, which the European Investment Bank is trialling at the moment, are a very important part of that. The Commission's proposals for the European budget—the multiannual financial framework—had €50 billion for a connecting Europe facility, of which €9.1 was going to go for energy. Earlier this week the Cypriots suggested reducing that to €7.1 billion. Who knows what the House of Commons will say this evening but I suspect that it will not want to increase it.

We need to look at that in terms of what are the priorities in terms of EU spending, and in my view energy infrastructure is a major priority. There are many other parts of the EU budget proposals that could be reduced. Some of them concern energy; for example, nuclear fusion—a complete waste of money, in my view.

Q21 Lord Cameron of Dillington: You have talked about the trans-Pyrenean. As a matter of interest, do you know what the attitude is within the other member states to a European grid? For instance, we have a problem with our grid in the UK, Scotland coming across the border where you have quite a lot of possibilities for energy renewal and we cannot get electricity down. Do other countries have similar problems within their own boundaries?

Stephen Tindale: Yes. In particular Germany, which is going to shut down nuclear power stations in the south and get a lot more renewables from the north, including offshore wind. The grid inside Germany needs very substantial upgrading and extension. Germany has been using neighbouring countries' grids to transport electricity and some of them—such as Poland—are now saying, “Enough is enough”. The German population is more positive towards wind than the UK population in general, but not more positive towards electricity pylons.

Lord Cameron of Dillington: Pylons, yes.

Stephen Tindale: Which even I have to accept are not beautiful, so it is a major challenge. In terms of a trans-European grid and cross-border interconnections, all Governments are in favour of it, theoretically, but they all want to be the ones to take the decisions. Subsidiarity comes into play. In my view, with regard to the priority infrastructure projects that the Commission is proposing—it is saying that decisions should be taken within three years—I think it would be a step forward to say that if these priority decisions are not taken within three years they will be taken away from the national Governments and given to the Agency for the Co-operation of Energy Regulators, ACER.

Lord Cameron of Dillington: Thank you very much.

Q22 Lord Whitty: Before I go into what I want to talk about, which is energy efficiency which we have partly covered, on that last point on the European super grid, you are clearly an advocate for it, Mr Tindale, including giving greater powers to the European regulator to get us there. Would sufficient benefits arise if we could not get a totally pan-European super grid but we could produce a north west European super grid, which would have fewer technological problems, fewer investment requirements and probably sharper decision-making?

Stephen Tindale: Yes. We should certainly go for a North Sea grid, partly to harness the offshore wind capacity, and wave and tidal, which will be in the 2020s, I suspect—in a big way, partly to harness the renewables, but also partly to enable us to use Norway and Sweden's pumped-storage capacity to overcome the intermittency problem.

Q23 Lord Whitty: Thanks, that is helpful. On energy efficiency itself, from what you were saying in response to Lord Giddens—there clearly is an energy efficiency target, but much of that relates to end-user energy efficiency—you seem to be shifting the balance of energy efficiency interventions or emissions to the efficiency of the grid, or the efficiency of the system, so the grid will be losing less heat using CHP and district heating and so on. Is that a correct interpretation of where you are, and do you think that is yet reflected, for example, in the policy regime for the 2020 targets for energy efficiency or beyond?

Stephen Tindale: It is a correct interpretation and it is not reflected in policymaking, either in Europe or in the UK. The Commission—as I think I said—said in its Energy Efficiency Directive proposals that most new power stations should be CHP. That was rejected by the Council of Ministers, which I think was a major mistake. The Danish Presidency at the time was keen on CHP, given Denmark's own track record, but was unable to get that through the Council of Ministers.

In terms of the end use of energy and the system, much greater energy efficiency refurbishment of houses is crucial mainly for social policy reasons and fuel poverty reasons because of the rebound effect rather than for climate reasons. Obviously there is climate mitigation as well, but I do not think that should be the main driver of the policy.

The UK could do an enormous amount in terms of combined heat and power expansion and district heating expansion, and the involvement of local government in energy again, which Chris Huhne announced when he was Energy Secretary, is a step forward. However, we have an enormous way to go before we catch up with the Scandinavians, for example.

Q24 Lord Lewis of Newnham: How far would you include waste incineration with the combined heat and power relationship? If I understand it correctly, this is done in Sheffield and in Nottingham but I think they are about the only two with any extensive arrangements of this sort.

Stephen Tindale: Waste incineration does have health implications. There is technology to capture them and scrub their exhaust but it has to be very carefully monitored and regulated. The Environment Agency has a central role in that. Leaving that aside, of course not all waste is organic. It is partly plastic, so fossil fuel as well. So it is not a fully renewable technology, but it is probably lower carbon, certainly than coal and probably gas.

Lord Lewis of Newnham: Thank you.

Lord Whitty: Can I just follow up on the rebound effect because Lord Giddens seemed to imply that you would always get nearly 100%—if not 100% plus—rebound rate. In practice, that is not the case. There is always a rebound effect because people use the money saved or the time saved for other purposes, but it is rarely anything like 100%. Even with investment in energy efficiency homes, which you mentioned, people who save the money as a result of that are unlikely to buy a Mercedes and go down the Autobahn but, even if they did, it would not be 100%. Even if they spent it on going to the Bahamas, it would only be about 40% rebound, so there is a benefit in terms of deployable energy and, therefore, of carbon.

Q25 Lord Plumb: I think we have already established that energy costs are important in terms of investment choices. There are plenty of choices, but it is a question of which way companies go. I wonder whether Mr Tindale can tell us—and certainly Dr Neuhoff in his response—how significant that impact is on energy costs for companies such as steel and cement companies and other large companies. Should this be specifically the responsibility of those companies or should measures be put in place to assist energy-intensive industries to absorb those energy costs?

Stephen Tindale: The latest DECC consultation suggests that various decarbonisation programmes and subsidies are going to increase electricity use in energy-intensive industries by around 28%, so that is significant. In my view, the way to tackle that is, first, to give them financial help consistent with state aid, which is what DECC is proposing to do. That is sensible for preventing carbon leakage within the EU. Globally it is also a way forward. But in my view a more effective way of reducing carbon leakage, or preventing carbon leakage, would be through border tax adjustments from any country that does not have a carbon price. This would be consistent with World Trade Organisation guidelines because the criteria would be clearly stated and if you were in America or in China you would be dealt with in exactly the same way under these criteria.

It would also be a way of encouraging all countries to have their own carbon price. The border tax adjustment should work in the way that countries with a carbon price do not pay tax or, depending on the level of the price, they could pay a reduced tax, whereas countries that do not have a carbon price would pay the tax. A Government in country X would have a choice, “Shall we collect this revenue ourselves or shall we let the Europeans collect it?” In my view, that would be quite an effective way of encouraging carbon pricing around the world.

Q26 Lord Plumb: But it could lengthen the negotiations quite considerably, I imagine.

Stephen Tindale: The negotiations, which?

Q27 Lord Plumb: To arrive at that situation where some countries would be paying tax.

Stephen Tindale: It could not be negotiated through the UNFCCC because then it would probably never happen. It would have to be negotiated in Europe, which would not be overnight but it could be done. Then it could be bottom up and individual countries could decide whether to have a carbon price or not.

Lord Plumb: Thank you.

Q28 The Earl of Courtown: We have already mentioned—you, in particular, Mr Tindale, have already mentioned—the emissions trading system. If there has been progress with the ETS, what scale of revenues would you expect to be raised? Is there any way that this can be pointed to any particular type of expenditure? What changes are required to it in order to improve its ability to encourage low carbon investment and what prospects do you see for such changes?

Stephen Tindale: How much progress so far? Very little. The change in 2008 to auctioning was a step forward, but then the recession arrived and so there were still, again, far more too many permits. Since not many people expected the depth of the recession, the Commission cannot really be blamed for that. There are now still far too many permits, and so set-aside, back-loading or whatever is a necessary first step but not a sufficient step. They might prevent it collapsing to zero but they will not raise it very much and they will not give stability. Stability is very important for investment decisions.

A more sensible way forward would be to have a price floor, which would be only a fall-back or a sort of safety net approach. It would not be turning it into a tax and so in my view it would not require unanimity. If it would require unanimity it would never happen, of course, because of some Governments.

A floor price could be combined with a ceiling price as well, which would be a more political move. The necessary price is probably—well, who knows?—€70 or €100 per tonne. It is never going to go anywhere near that in the foreseeable future so a ceiling price would be more political negotiation. If we had a decent carbon price—I think €30 per tonne would be a sensible place to start—then we would certainly need border tax adjustments because carbon leakage would become a much more significant problem.

Sorry, I cannot remember the other bits of your question.

Q29 The Earl of Courtown: Yes, I was also asking what changes are required in order to improve its ability to encourage low carbon investment.

Stephen Tindale: Yes, well, stability. A floor price and ideally a rising floor price would be the way to do it. In terms of revenues, Professor Grubb's paper has some good numbers. If we had a €15 per tonne price, then the revenue would be about between €150 and 190 billion between now and 2020, whereas now it is going to be obviously much less.

Again, Karsten cannot answer but I think that is one of the possible ways of encouraging the German Government to support strengthening the ETS because, whether you think it is sensible or not, the Energie Wende is not going to be cheap so they need some money.

Q30 Lord Giddens: Just before we conclude, can you comment briefly on the role of shale gas? If it combined with closing down coal-fired power stations, could it also help reduce emissions?

Stephen Tindale: Yes. It would be very desirable to close down coal-fired power stations and replace them with gas stations, whether shale or conventional. The suggestion from Cornell a couple of years ago that, because of emissions from the process, shale gas might be as high in carbon as coal has not been backed up by other—

Q31 Lord Giddens: No. I think that has been rubbished, actually.

Stephen Tindale: Yes, I was being polite. I think shale gas—and the Environment Agency here has said this—needs to be very clearly regulated, partly because of the diffuse pollution and partly because of possible impacts on local environment, the water table and so on. It is an acceptable way forward as a bridge technology, and shifting from coal to gas is certainly desirable. Going back to what I said about gas earlier, I think the clear signal needs to be taken that this is only a transitional step and it is not going to be gas for the next 50, 60, 70 years unless CCS delivers.

Q32 Lord Giddens: The trouble with all of these things is that you have no way of predicting technological change and it is pretty hard to plan against something that might come from a side fuel and transform almost everything.

Stephen Tindale: As shale gas has in the US.

Lord Giddens: In the US it did that, yes. Well, it has not changed everything but it made an enormous difference to everything.

The Chairman: Are there any more questions?

Q33 Baroness Parminter: Just a quick question, Mr Tindale. In one of your responses earlier you said that, in an ideal world, there would be a more pan-European response to the energy situation if you did not have to deal with all the subsidiarity. We talked about interconnectivity and we have talked about ETS. Are there any other European initiatives that could be pursued that would help deal with the energy security and affordability issues, which at the moment are not being addressed purely because of the politics of subsidiarity?

Stephen Tindale: There are other initiatives that could and should be pursued, in terms of climate policy; for example, a European-wide emissions performance standard, for which Chris Davies has been arguing—not yet successfully.

In terms of affordability, the other pan-European approach would be to ensure that much more of the structural fund money is spent on energy efficiency. That would also improve energy security because it would reduce the amount of gas that needs to be imported. Hungarian commentators have done some very impressive work on how much could be achieved in Hungary. With Hungary not being that rich a country, that needs to be supported through the EU budget.

In terms of energy efficiency, I think there is more that can be done with EU spending. In terms of other policies, the Commission is sensibly not seeking to get involved in the fuel mix issue, apart from renewables, which is a bit of a step out of that approach, but, as I tried to explain earlier, I think it is a very sensible approach.

The Chairman: Mr Tindale, thank you very much. That has been really helpful.

Dr Neuhoff, the great contribution you made in the brief time makes us look very much forward to the answers to the questions. I think we must try and find a way, possibly, of hooking you up again, or actually getting you here, because there are many things we know you would like to advise and help us on. Thank you very much, and apologies for the technology failure. To both of you, thank you very much.

Chartered Institution of Building Services Engineers—Written evidence

1. The Chartered Institution of Building Services Engineers welcomes the committee enquiry and the opportunity to submit evidence. We understand that the focus of the enquiry is on the decarbonisation of the energy supply system, and we note the references to the "additional" role of energy efficiency as noted in question 3.

2. However, we firmly believe, based on UK experience and international comparison, that unless demand and supply are treated as a single system then the resultant policy will almost certainly be the most expensive Green policy that money can buy. For example, the prior assumption that electric power can be decarbonised by 2030 without considering how to influence (reduce) demand in parallel is already leading to wasteful 'pro-electric' demand side solutions, in which low carbon is adopted regardless of whether it is low energy.

3. While current network concerns focus on extending the provision of high voltage supply to remote renewable resources, pro-electric demand side solutions are just as likely to grow to overload the distribution networks. Similarly, combined heat and power and district heating, both widely deployed in European economies which are conspicuously outperforming the UK at the moment, is both a supply and demand side technology. The Institution recognises the practical need to constrain the scope of this inquiry. But it would be counter productive to perpetrate the myth inherited by energy prediction techniques which date to the 1960's that demand and supply can be separately handled.

4. For example the UK is about to make one of the biggest investments in Europe into smart meter technology. Almost all the substantial cost over simple remote reading capability can be attributed to demand side management technology. This has no rationale if the load curve for power, green or brown, is not to be modified substantially. But such a modification implies quite different marginal costs for power generation in the power market. Much the same is true for expectations of a general improvement in energy efficiency and peak load avoidance (see annex).

5. These considerations undoubtedly bear on the minds of private sector investors even if not in other evidence to the Committee. If investors believe that energy efficiency will dampen power demand growth (and inter alia improve economic performance) they may well need expensive inducements from the start to invest 'prematurely'.

6. In summary, CIBSE considers that attempting to separate energy policy into supply side and demand side is an unhelpful division.

Annex A: Energy Efficiency and Growth

A1. CIBSE suggest that the view of energy efficiency as an “additional” policy is flawed, and is a barrier to growth in its own right. For some years the European Commission has maintained that energy consumption within the EU could be cut by 20% using currently available cost effective measures and technologies. In the UK the Green Deal is predicated on the fact that many buildings can be made more energy efficient using existing technology, and that the necessary investment can be met from resulting savings in fuel bills.

A2. Realising these reductions in energy consumption has several potential benefits. The activity required to deliver the savings, through energy advice and consultancy and the manufacture and installation of energy saving measures, is itself a positive economic benefit. It has been estimated by the Confederation of British Industry that as much as one third of the growth of the UK economy in 2011 is attributable to 'green' activity. Further stimulation of energy efficiency related activity has the potential to maintain a significant contribution to further growth over the coming years, at both a UK and an EU level.

A3. Such savings also reduce the spending of consumers and businesses on energy. What is not spent on the energy efficiency measures is available to spend elsewhere in the economy, further contributing to growth. Helping the Green Deal to succeed, both for dwellings and for businesses, is therefore an important step towards more efficient use of energy, decarbonisation, and stimulating economic growth.

A4. But there is a further potential benefit from investment in energy efficiency, which is very directly related to energy supply policy. In the UK OFGEM has estimated that the cost of renewing and upgrading the electricity generating and distribution infrastructure in the UK to be some £200bn over the next decade. To attempt to consider the requirements for energy supply without taking into account the likely future demand, and without considering the likely or possible reductions in that future demand through energy efficiency measures seems rather shortsighted. Reduced energy demand will reduce the required investment in new generating and distribution infrastructure, freeing capital for investment in other activities, and reducing the additional costs to energy users that will accrue to repay the investment in that new infrastructure. This will have a further positive impact on the economy.

A5. It is essential that any thorough analysis of energy and decarbonisation takes full account of the potential to reduce demand through energy efficiency. Not to consider future demand alongside supply is like making a budget statement that addresses revenue raising, but is silent on spending. When revenues are constrained, as now, we have to cut spending. A similar link exists between energy supply and demand, and it is unwise to attempt to decouple them.

A6. Finally, investing in energy efficiency reduces UK reliance on energy imports, reducing cash outflows from the UK economy and retaining that cash within the UK economy where it can contribute to economic activity.

Notes.

N1. CIBSE is the learned and professional body for building services engineers, with a global membership of almost 20,000 people, over two thirds of whom work in the United Kingdom. Our members work in the manufacture of energy using building products and systems and in the design, installation, operation and maintenance of these products and systems in new buildings and those being refurbished and improved.

N2. The Institution exists to ‘support the Science, Art and Practice of building services engineering, by providing our members and the public with first class information and education services and promoting the spirit of fellowship which guides our work.’ CIBSE sets standards for building services engineering in the UK and overseas, publishing the CIBSE Guide, Commissioning Codes and other guidance material recognised internationally as authoritative and setting the criteria for best practice in the provision of energy using systems in buildings.

3 October 2012

Confederation of UK Coal Producers (CoalPro) and European Climate Foundation—Oral evidence (QQ 104-117)

Evidence Session No. 5

Heard in Public

Questions 104 - 117

WEDNESDAY 5 DECEMBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
The Earl of Courtown
Lord Giddens
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Matt Phillips, Head of UK Programme and Head of European Coal Strategy, European Climate Foundation, and **David Brewer**, Director General, Confederation of UK Coal Producers (CoalPro)

Q104 The Chairman: Mr Brewer and Mr Phillips, you are indeed welcome. Thank you very much for coming to see us today. We are looking forward to hearing your evidence. If I may, I will just deal with the formalities. You should have in front of you a list of interests that have been declared by Committee Members. This is a formal evidence-taking session of the Committee. We are taking shorthand notes. They will go on the public record on the parliamentary website. We will send you a copy of the transcript and you can revise it in terms of minor errors. The session is on the record, is being webcast live and will go subsequently on the parliamentary website. Perhaps we could suggest you might each like to start, although you do not have to, by speaking for three minutes. If we can restrict you to three minutes, we can allow time for the questions and, if you will forgive me, I might have to metaphorically ring a bell if it goes beyond that. I do not know who would like to start first. Mr Phillips, would you like to go first?

Matt Phillips: Yes. I am more than happy primarily to answer questions, but I will just lay out a little bit of landscape from our point of view. We have been looking very closely at the coal issue specifically in the European Union since ECF came into being right at the beginning

of 2008 and I have been involved in that for all that time. We have observed something quite significant that has not been widely understood, I think, which is there was planned in the early 2000s a very large wave of new coal plant proposals in the European Union, despite the existence of the carbon price in the EU. Since then most of these projects have not been advanced, aside from plants that were already under construction or right at the point of being fully permitted in around the end of 2007/beginning of 2008.

In fact, of 112 announced projects, only two, maybe three, have nominally reached construction stage. One of those, Šoštanj in Slovenia, the Alstom, walked off the building site a couple of weeks ago; so even those might not ever get finally built. Something happened. That big wave of new coal that was planned in the EU has not come about. Nevertheless, there is still something of a pipeline of new coal proposed in the EU, it is just that many of those projects have been very severely delayed and that amounts to a mid-20s number of new coal plants.

There has been a modest amount of coal plant closure over that time and a general underlying trend of coal being displaced by other options in the generation mix of the EU, but perhaps not as much as one might have expected. Coal still represents about a quarter of EU electricity generation across the piece. There was a big air pollution directive, the large combustion plants directive, but that will only result in about 20 gigawatts or so of coal plant closure across the European Union. Big decision-making will be taking place in the EU from the utilities on the industrial emissions directive, which succeeds the large combustion plants directive. Utilities will be deciding in 2013 whether to keep their plants open or schedule them for closure under the IED.

The story of European coal is one of a big wave that has not happened—a lingering intention from a number of utilities and Governments still to pursue coal despite the carbon price. There has been a very substantive change in what is being built in Europe, which is related to gas and renewables. In that respect, Europe is undergoing a low-carbon transition, but big questions remain as to why coal is still on the agenda—what happened to CCS; what about the coal plant plans of European countries applying to join the European Union; what are the implications and what are their policies; and, therefore, what is EU neighbourhood policy doing about the issues related to coal in the EU neighbourhood, particularly the Western Balkans, Turkey and Ukraine? That is a sort of map of the work we are looking at.

The Chairman: That is very helpful and I think we get to some of those in the questions. Thank you very much. Mr Brewer, it is your turn.

David Brewer: What I would like to say is that certainly the introduction of carbon pricing through the EU ETS scheme fundamentally changed the landscape for coal. It meant that expansion in coal generation facilities was no longer going to take place, at least not at the same scale as it had been, but there has been a fundamental change in this last year, not necessarily in terms of intention but in terms of coal burn.

Q105 Lord Renton of Mount Harry: In terms of what?

David Brewer: Coal burn, or coal usage. The EU ETS price is low, at about €7 to €8 a tonne, because of the recession, which has reduced carbon emissions from industry in Europe. The gas price is very high—it is scandalously high. The fuel cost of generation from gas in this country is more than double that of coal. The consequence is there has been a very sharp increase in coal burn in the UK. For example, in our country coal burn is up by 40% so far this year, from 28 million tonnes to 39 million tonnes in the first nine months of this year, and there is no reason why that surge will not continue. The same has happened in

Germany; added, of course, in Germany by their decision to close down their nuclear plant. So both in the UK and in Germany there has been a very big increase in coal burn in this year. This may be something of an Indian summer, we shall see, but this is a combination of the low-carbon price and the very high gas price.

Q106 The Chairman: Excellent, thank you. I think we will come to some of those issues. Going on from that, and perhaps we can take in order Mr Phillips and then Mr Brewer, I have two questions that you have partly dealt with: the outlook for coal in the UK and in the EU—Mr Brewer, you just touched on the huge rise in consumption—and, secondly, the implications for the coal industry in respect of the IED and the large combustion plant directive. But first, the general outlook for coal as you see it.

Matt Phillips: I think I would draw a distinction between generation and capacity and there are two different dynamics related to those. David is absolutely right, coal burn has increased and that is a factor that relates to the short-term dynamics in the market. There is a short-run issue between the relative costs of burning coal against gas and that is within a context of existing capacity. Let us just look for a minute at the installed capacity issue and that is a matter of investment decisions. It is the investment decisions of utilities about whether to go behind coal or whether to go behind alternatives.

In that context, what has clearly happened is that five years ago there were a lot of utilities that were having perfectly sensible people sitting around saying, “Coal is economic. We should be announcing to our investors and to all and sundry that we are planning to build new coal plants and we should get in train an investment programme to get building on new coal”. What has subsequently happened is that those have melted away for a number of reasons relating to the risk profile of coal investment, which have proven to be not what utilities were expecting five years ago. They had not taken account of the economic risk profile of coal, the policy risk profile and the political risks of advancing new coal. That has changed. Those circumstances have quite dramatically changed. That is around new capacity.

Broadly speaking, a lot of utilities have moved away from their big programmes of multiple coal plants in lots of different countries. At one stage, E.ON had plans for a big train of new coal plants across several different countries and now that has been contracting right back to one or two countries where there are still E.ON projects and, broadly, utilities such as E.ON are shifting to look at Turkey, the Balkans, Russia and other places to build new coal.

When you look forward at the industrial emissions directive, that is now going to open up questions about the economics of the existing coal fleet going forward for utilities. I think the best analysis I have seen so far is by Bloomberg New Energy Finance who have identified that there is about 207 gigawatts of coal capacity in the European Union and, of that, about 60%, which is about 124 gigawatts, is not compliant with the industrial emissions directive. Approximately 20 gigawatts of that is already scheduled for closure under the large combustion plants directive. The UK is very exposed on that directive. That is where a lot of the UK capacity is closing, because of that directive, and countries like Germany face a bigger closure programme as a result of the industrial emissions directive.

Utilities will now face the decisions about whether to close their existing coal fleet or invest in retrofitting those plants in 2013. Therefore, what Europe does in terms of its overall direction of travel on policy is going to be extremely important, next year quite specifically but going beyond, because if Europe wants to meet the longer-term emissions reductions targets it is going to have to constrain coal generation probably faster than existing policies will ensure. You can see how existing policies are insufficient when you look at what has happened this year in terms of increasing coal burn despite having a carbon cap.

The existing policy suite will not necessarily enable Europe to meet its decarbonisation targets as things stand just at the moment. Therefore, what happens around the choices over the industrial emissions directive is extremely important for climate reasons. Of course, in addition they are important for wider air-pollution considerations. You will know that Europe is looking at next year being the year of air pollution and I think the wider role of pollution from existing coal plants will come back on to the agenda next year.

Q107 Lord Lewis of Newnham: I do not know whether it is appropriate now or when Mr Brewer has spoken, but we are using this word “coal” as though it was a singular operation. In fact, it covers a whole variety of different commodities. If you take, for instance, the particular factors of the large combustion plant directive, surely this is going to depend upon the coal that is being utilised, whether it is anthracite or whether it is brown coal or something of this nature. Is there any large variation within the actual—

Matt Phillips: There are two important distinctions. You are absolutely right. There is hard coal and there is lignite and that is broadly it. The situation is that hard coal is a tradable commodity. It has a price that is in some ways tied to international markets. We heard in the run up to 2008 coal is cheap, but, as fossil fuel prices and commodity prices rose very rapidly in 2007/2008, coal prices also rose with global fossil fuel prices. Hard coal is heavily influenced by what is happening more broadly on fossil fuel prices because hard coal is tradable.

Lignite, because of its nature—it has much lower calorific value, it has had much more water in it—you cannot move it around anything like as easily. Lignite is not a substantive issue in the UK, of course, but as you go further east and southeast in Europe, lignite is a much more substantive issue. The remaining new coal plant proposals in the European Union are largely lignite plants rather than hard coal plants. It is bad for climate because those plants are much more polluting. It is bad for wider air pollution because they also more polluting on all the other pollutants. However, because lignite is not tradable, its price is what it costs to mine it and use it locally.

The plants to burn lignite cost more than conventional hard coal plants because they have to be very tailored to the particular conditions of that particular pile of lignite in that particular location. So they are much more tailored in situ plants. The broad recognition is that burning lignite is cheaper than burning hard coal but, of course, because the carbon impact is higher, a carbon price should have a much greater impact on a lignite plant than even a hard coal plant, let alone a gas plant. The dynamics are indeed substantively different between lignite and hard coal and if we were having this conversation in the Czech Republic or Poland there would be a very much more intense discussion around that lignite and hard coal issue.

Lord Lewis of Newnham: The emissions you get are significantly different. You have sulphur coal, you have the whole problem over sulphur dioxide emissions, which would not occur with your anthracite coal to the same extent. The implication to me would be that the cost of dealing with the actual emissions is going to be different depending upon the actual source of coal.

Matt Phillips: Yes, it is tailored to the individual plant conditions and other factors: the age of the plant; the market it is selling electricity into, because the market is quite dramatically changing as renewables come on much more than they have done in the past. There are all sorts of other situational factors and, in the context of the industrial emissions directive, those will be factors that will have to be considered by utilities in deciding whether to opt their coal plants in or opt them out of the industrial emissions directive.

Q108 The Chairman: I think we should let Mr Brewer in now. I can see he has some things he would like to share with us.

David Brewer: The position is now fundamentally different between the rest of Europe and the UK. The Large Combustion Plants Directive, we know what the position under that is going to be. We know what closures there will be. There will be 8 gigawatts of coal-fired plant close in the UK, of which 5 gigawatts will close by March next year. That is about two years early and one reason why it is two years early is because it is so cheap to run coal now that they have been running coal, making lots of money, and they have used up their hours under the derogation in the Large Combustion Plants Directive. The Large Combustion Plants Directive will lead to some plant closures in Europe as well.

The Industrial Emissions Directive that follows is somewhat different and the implications between Europe and the UK will now be radically different. That has nothing to do with the EU ETS. It has everything to do with the UK Government's carbon pricing policy and carbon price support because it means coal in the UK will become increasingly uneconomic compared to gas despite the fossil fuel price differential. The rising trend of carbon price support in the UK will gradually drive coal burn down and will result in gas burn increasing.

In Europe, it is completely different because there is no such thing as carbon price support. There is the EU Emissions Trading Scheme, which has a low price at the moment. Now, there are various measures proposed by DG Environment to try and increase the carbon price. They will not work because all this will do—

Q109 The Chairman: Shall we hang on to that point, because we are coming to the ETS in a moment. I know Lord Caithness has some questions. Can we take that ETS piece when we come to that, Mr Brewer?

David Brewer: In Europe, if the present differential between carbon price and the high gas price continues then I would suspect that, for most plant within Europe, it would be worth their while investing to meet the requirements of the Industrial Emissions Directive. All such plant in Germany effectively already meets those requirements. In this country, they do not. What generators are doing throughout Europe, throughout the world, is looking at lower cost means of meeting the requirements, in particular, under the Industrial Emissions Directive for reduced emissions of NO_x.

The IED does not substantially change the requirements in terms of sulphur. It does change things dramatically in terms of NO_x and only one plant in the UK has made the decision thus far to invest to meet the requirements of the IED. Carbon price support may well mean that no other plant will do so and we face the closure of the whole of the existing fleet, more or less. This is the fleet that, as of today, is generating over 40% of this country's electricity.

Q110 The Chairman: That is a sobering thought. Perhaps we should then look at investment.

Q111 Lord Renton of Mount Harry: I am no expert on this and I confess I am quite confused. I would very much like to know, given the background that you have both put before us, what you think is likely to happen next. What are the risks that coal investors face? Will it be worthwhile risking getting out more hard coal or not? I feel you must both have slightly different views about this as to whether this would be a good idea or not.

David Brewer: What?

Q112 Lord Renton of Mount Harry: More coal.

David Brewer: I represent the Confederation of UK Coal Producers.

Q113 Lord Renton of Mount Harry: I understand that, yes.

David Brewer: I am interested in producing more coal from this country.

Q114 Lord Renton of Mount Harry: But only from this country?

David Brewer: Yes. I could not care very much what happens elsewhere. If we can produce coal and make money at it, then that is fine by me. It is difficult to make money at the moment because one reason why coal burn is so high is not only are gas prices high but the international coal price is low. That peak that was reached has fallen right back. The international price is low and our eyes are watering.

Q115 The Chairman: Yes. That is shale gas displacing east coast US coal.

David Brewer: Coal in the United States; that is right.

Matt Phillips: I do not know what a low coal price is. Is about \$90 a tonne. It is hard to describe that as a low price. I do not think it has fallen right back. It has not fallen back to the levels it was in the mid-2000s.

Q116 Lord Renton of Mount Harry: That is about £60 to £65.

Matt Phillips: Yes. At its peak it was \$120. It is lower, but I do not think it is necessarily accurate to call it a low price, although I dare say producers might be feeling that difference more acutely than others. I want to just come back on one thing and then answer your question about risks and what might happen. David commented that the UK is exposed because it has a carbon floor price. It is not unique for countries across the European Union to have introduced policies to constrain coal. The Dutch have introduced a coal tax. The Danes and the Finns have introduced policies to rule out coal.

Q117 Lord Renton of Mount Harry: Could I just ask you: why have the Dutch done this?

Matt Phillips: Why have the Dutch done this? There is a combination of factors. A lot of people advocated that they should put a tax on coal because they have too much coal on their system and they will have a problem meeting their own carbon targets and their own contribution to the European targets if they do not do something in the face of a low carbon price. They have opted to put a tax on coal as one of their ways of constraining coal burn. Denmark we all know is terribly green, but it has a very high electricity burn from coal, more than 50%. The Danes have announced they will phase out all use of coal in Denmark, as have the Finns.

You can go across other parts of Europe where they have introduced national level policies to do one thing or another related to coal, sometimes favouring it and sometimes preventing it. There are all sorts of motives as to why the carbon floor price might be there and you can speculate on them, but the underlying issue is that the UK is not unique in doing something to address the issue of coal's contribution to climate change through policies additional to the ETS.

The question you had is: what are the risks and what will people do? That package of risks I just talked about is policy risk. These were all policies that, five years ago, utilities did not imagine would be there when they were saying, "Coal is terribly cheap and economic and we will go ahead with it and it is a low-risk investment". The UK is now legislating to introduce

an emissions performance standard. It is the same standard as is going to be introduced in the US at a kind of pan-United States level. Those are all policies that turned up, so policy risk has proven to be much greater. As you look ahead, take the long view: what has happened with climate change policy in the lifespan of existing coal plants? It has moved from not existing to existing. There is a general trend of more policy coming in to constrain climate change and if the ETS is not delivering what is necessary to meet the target at a national level and eventually at the EU level, I think you can probably anticipate there will be boot-strapping other policies like the carbon-floor price, which will have a greater effect on coal than any other. In other words, an investment in coal now carries a much higher policy risk than probably other kinds of investment—low carbon, for instance.

That is one package of risks that I would submit would probably be quite substantial. You could add to those political risks. New coal plant proposals around Europe have been opposed systematically, one by one, and you can see that everywhere. Even two weeks ago there were protests in Warsaw over new lignite plants. This has happened almost everywhere. The UK example would be Kingsnorth and what the NGOs and other voices did to say, “Well, a new generation of coal exposes the UK to high carbon liabilities”. The public resistance and political opposition to coal has been much greater than utilities expected. That has not gone away, but probably the overwhelming risks are economic and so within the package of economic risks there are quite a few reasons why it also does not make sense to keep coal capacity open forever.

There is an incompatibility risk to the electricity market. The electricity market is changing. Yesterday’s market involved base load and load following capacity. Tomorrow’s market looks very different. It involves large amounts of renewables dispatched on to the electricity grid in short run terms they are more or less free—and capacity that is capable of being flexible of forming the gap between what renewables supply and what the demand is at that particular moment. This requires flexible capabilities on the market. Old coal plants do not very well fit that profile of highly flexible resources capable of forming the gap between renewables and the demand at that particular moment. While old coal might fit a sort of mid-merit order for a period of time, new coal plant investment or investment in retrofitting means you are playing your capacity into a market where it is becoming more or less incompatible with the requirements of flexibility on the grid.

Things are dramatically changing in terms of the market. The capital investment costs around coal are continuing to rise relative to gas. Coal looks much more like nuclear. It is all about the capital costs and how much it costs to build the thing and then the running costs are quite low. Coal has a not dissimilar profile but, especially when you compare it to gas, gas plants are cheap to build and expensive to run. Coal plants are expensive to build and, relative to gas, cheap to run, but relative to renewables more expensive to run. You have a lot of capital involved.

Q118 The Chairman: Mr Brewer might like to offer any comments and then we should go to Lord Whitty’s question. I do not know if you want to come in there.

David Brewer: The international coal price is now at about \$90 a tonne. In the mid-2000s it was at about \$60 a tonne. So it is higher than it was and, in our terms, it is higher in real terms than it was. Compared to any other commodity, it is probably lower. If you were to take a basket of commodities and index that, the coal price is probably fairly low. It is certainly much lower than the gas price and that is why coal burning is very high, not just in the UK but throughout Europe. The coal price is relatively low.

If there is no change in the basic parameters between the carbon price and the gas price and the coal price, if all those parameters stay broadly the same, then in Europe the prospects for coal are better than they were because most plants, I think, will invest to meet the requirements of the Industrial Emissions Directive and so they will continue. New plants—because of the high capital cost, because of the political risk, because of the economic risk, because of the regulatory risk—will be much more difficult to justify and may not get built. That results in higher carbon emissions because old plant is relatively inefficient and new plant is much more efficient, and the difference in carbon emissions is of the order of 25%.

That is what Germany has done. Germany has invested in relatively efficient coal-fired power plants, relatively new coal-fired power plants, including lignite-fired power plants. Therefore, its emissions per unit of electricity generated from coal are much lower than ours. It is interesting to know that, for example, the enormous amount of coal-fired generation capacity being built in China and India, is state of the art. It is highly efficient. It meets pollution requirements, such as under the LCPD and the IED. It is our plant that is ancient and old-fashioned and third world, not theirs.

Q119 The Chairman: That is a good moment to move to Lord Whitty's question, thank you.

Q120 Lord Whitty: All Governments in the EU theoretically are signed up to escalating carbon reduction targets, with varying degrees of enthusiasm in reality—but they re nevertheless signed up to them. However, they also have to meet the EU targets to make their contribution there. Why is it, given the economic risks and this apparent consensus on reducing carbon that people are continuing to invest in coal in Europe and, indeed, government agencies and the European Central Bank are continuing to invest in coal? Understanding some of the economics and the fact that you can meet the non-carbon pollution targets nevertheless the overriding commitment to carbon reductions seems to be missing here and missing among some public authorities as well as private ones.

David Brewer: There are people who say that the answer to this is in changing the EU ETS scheme and making sure that the carbon price is much higher than it is now, and that is what the UK Government and some other Governments are endeavouring to do through carbon price support and other carbon taxing measures. That might have been the intention going back a few years but the world has changed. We are in deep economic difficulties in Europe and increasing the price of electricity is becoming much less palatable to people and to Governments. There is a geopolitical element as well. Unless you go from where we are now on the carbon price to very high levels immediately, it does nothing for zero or low carbon sources. If you get on a gradual track all it does is drive you from coal to gas. That results in lower carbon, but all it does, if you are in Poland or the Czech Republic or Bulgaria or Romania, is to drive you more into the hands of Gazprom, and you are not going to have it. That is why these countries will not permit tinkering with the existing arrangements of phase 3 of the EU ETS. They may or may not have enough to represent a blocking minority within Europe but one thing is now clear, from our own knowledge and contacts, is that if not overtly then covertly they are being aided and abetted by Germany.

Lord Whitty: Is that primarily, as you suggest, because of fear of falling into the hands of Gazprom, which must be quite an important issue particularly in the ex-Eastern European states. Or is it because coal for social reasons, which are aggravated by the recession, that the coalmining areas would be severely hit and there is not so much alternative employment in the alternative technologies?

David Brewer: There is probably more employment in the alternative technologies. All that tells me is how expensive they are. But I do not think that is the reason. Hard coal production in Germany and in Spain will be eliminated by 2018 when subsidies are eliminated under the State Aid regimes. In Poland there has been a huge reduction in coalmining employment and, if you like, there is less to get them to zero than they have already done within the last 20 years. No, I think the real reasons are geopolitical.

Matt Phillips: Can I come back on your original question, which was about why, despite the carbon price, coal is being pursued and appears to still have some sort of economic resonance. The reality is that Governments in Europe are subsidising coal, they are subsidising coal in a whole range of different ways. For instance, through a complicated deal the Polish Government wanted to be able to have new coal plants, not have to pay the carbon price up until 2020, and to be able to recycle the money they would have made into a subsidy for their construction. Actually, they failed to achieve that, so now the Polish Government have announced that they are going to introduce a new government fund directly to subsidise eight new coal plants in terms of their construction.

The Spanish subsidise the mining of Spanish coal, and then they subsidise again the burning of that coal in Spanish coal plants. There are lots of freebies in terms of free water, free planning controls. In Romania, one of the new coal plants at Galati is in a free trade zone. So it will pay no taxes to operate there and will burn Ukrainian coal. So no surprise that Enel wants to build that coal plant.

Essentially what is happening is that Governments who want new coal are finding ways around the ETS by subsidising them to come forward. That underlies my point, that coal is ultimately not economic.

Lord Whitty: Can I just take you up on that: there are subsidies of various sorts for renewables and for nuclear as well around the world. The recent IEA report said coal was being subsidised more than those but in Europe is that also the case if you—

Matt Phillips: We have never actually done a financial calculation, it is very situational. So the countries remaining in the EU, which are still planning new coal plants, the ones at the head of that today, are Poland and Romania. Is Germany building new coal plants and is the coal plant fleet compliant with the IED? On the latter point, no, it is not. There is a huge amount, in particular, of the old East German coal plants owned by Vattenfall and E.ON in Brandenburg, about 9 or 10 gigawatts of them, which are not compliant with the IED, which are existing coal plants. So Germany will have to face that issue. I just wanted to correct that point.

But, more broadly, back in 2005 Germany did indeed have nine coal plants under construction and a further 35 coal plants were proposed. None of those 35 has reached the end of permitting and gone under construction. Two of those that were under construction are still in the courts, in fact. So Germany is in a vexed position. It has now locked itself into a certain amount of new coal and to meet its own targets on carbon emissions it will have to do something about the existing coal plant proposals, and it has ruled out CCS. So German coal policy is a total mess. Germany will face a climate conflict with its existing infrastructure unless it develops a policy capable of dealing with it.

Lord Renton of Mount Harry: Why has it ruled out CCS?

Matt Phillips: Local opposition primarily. Remember it is a slightly different situation in that it does not have such easy access to the offshore injection and storage options as the UK and the Netherlands do. Because it is primarily underground, as an uncertain new

technology, a lot of local opposition in CDU, farmer states, were opposed to CCS, so they have never agreed a CCS programme, which has any tangible chance of succeeding.

Q121 Lord Cameron of Dillington: Mr Brewer said a moment ago that Germany was phasing out all its coal production by 2018.

David Brewer: Hard coal production, not lignite.

Lord Cameron of Dillington: Not lignite? I was wondering if it is going ahead and building power stations it would render—it is going to use lignite?

David Brewer: Yes.

Q122 Lord Lewis of Newnham: You have touched on this point a moment ago, which are on the carbon capture and storage situation. This was projected as going to be the salvation for the production of both gas and coal as a potential source in here. To my mind, it has been singularly unsuccessful. There have been, to my knowledge, no real successful stories, certainly in this country, and I am not sure what the situation is in Europe. However, I do not get the impression, for something like the reasons you are saying, that in Germany it has been virtually shoved aside primarily because of the lack of storage facilities that are coming through with it. What is the situation on carbon capture? At the moment, the main backing, if any backing is occurring, is not occurring via the coal industry. Why is the coal industry not investing in something like this, or do you take the view that each one is an individual and you are not going to get a general solution to this particular problem?

Matt Phillips: There are two dynamics there as regards the public plans to commercialise CCS, but what about where the private interests have gone in terms of securing CCS? So Europe did have a programme, and technically still does, which was designed to commercialise CCS. That involved a number of projects around Europe. What has happened is that Governments were not seriously backing that range of projects. The German ones fell down, as did a number of the other projects. Frankly, I do not think that Poland is serious about developing CCS. Belchatow is a useful demonstration project but the country is not serious about developing an overall CCS programme that is capable of dealing with all the new plants they think they are going to build.

As you start going down at the Member State level, it melts away from a coherent EU programme, and I think therefore the EU has struggled to get that moving.

The UK's programme was put in a very flawed position. It opted, in John Hutton's era, for one shape of project and has suffered from that ever since, which is a sort of Kingsnorth-shaped project, with post-combustion capture and then storage.

A more rational programme, which was built from the bottom up, would have looked at CCS in the round, not just as something that comes out of the coal box. It is something about industry, potentially gas, and also potentially the role of coal. So it makes a lot more rational sense to locate it in industrial clusters where you can get lots of by-products from heat, lots of by-products from the CCS generation, and also located well with the chemical industry and other users of by-products from CCS and co-users of the CCS infrastructure.

I think this is therefore where Europe is going, because there has not been a big wave of new coal plants Europe does not need CCS for coal. What it does need is CCS for gas and for industry. Therefore, on CCS policy, if it is going to make any rational sense, Europe needs to go in those directions. If coal wants to play a part in that, then it is going to have to look at those co-location opportunities for coal in Europe to form part of that.

Then we elevate to the global picture, what does it mean if Europe does not have a big reason to commercialise CCS for coal but it does for these other reasons? That is probably quite a good thing. The Chinese like to gasify quite well but we do have a big problem because the world's Governments, the IEA and others have said we must have CCS and that is plan A. At the moment, plan A is not coming about. If you look at the latest IEA analysis and projections of what needs to happen to make coal anything like compliant with a two degree world, it requires vast amounts of coal CCS that does not look like it is coming down the path. They need to get a much more accelerated CCS programme, which means abandoning ideas like carbon capture ready, which have not worked, and getting straight on to CCS deployment only; or they have to shift off coal quick, which means accelerating things that are not coal even more rapidly.

Q123 Lord Giddens: I just wonder if I can ask you to summarise at this point what Europe should do in an optimal fashion to pursue the goal, which seems to me, as someone who spends his life studying climate change to reduce greenhouse gas emissions, absolutely necessary. What would be the optimum strategy with regard to coal in an energy mix? I found this discussion very interesting in respect of the point, for example, you made about differences in efficiency in coal stations and the fact that you put up a suboptimal policy, which you were trying to use as a carbon reduction strategy that might backfire. What, at this point, should the EU do in terms of future planning, trying to reconcile these things? Bearing in mind that we also need economic renewal, you need growth patterns in Europe, you need investment, you need to get out of recession, which is going to have a higher level of energy use over the past four years or so. Could you tell us what is in your mind about that, given that the ETS seems, by in large, a failure?

Matt Phillips: I think HSBC has published the notion that in 2020 15% of the global economy will be low carbon energy. Positioning yourself well as Europe to be in that market early, delivering goods and services on low carbon early into that global market means accelerating the innovation and accelerating the commercialisation and deployment of low carbon technologies. If you look back at the UK, BIS has done a very useful analysis of the benefits the UK receives from low carbon goods and services and is a huge net exporter to China on those goods, and it brings a lot of billions of pounds into the UK economy.

Lord Giddens: Except the Chinese are undermined by European solar or energy industry.

Matt Phillips: What happened was Germany and others pioneered it and had the first generation of manufacturing but China came in with newer plants and newer manufacturing, which could then start scaling it up globally, which was also cheaper.

Q124 Lord Giddens: And much cheaper, which is also going on at the moment.

Matt Phillips: But that is part of a healthy global economy as well. Europe is still getting big benefits from solar and is still at the innovation end of that cycle, and is also deploying—

Lord Giddens: I do not want to stop you, but we need to get on to what should happen to coal specifically in this mix.

Matt Phillips: In this context, Europe has to do something about coal so, first, it has to stop subsidising it and, secondly, it has to either advance CCS from the outset and therefore be a part in commercialising, advancing and innovating around that industry, or just move on and put CCS into the gas industry camp and concentrate on it in that context. It cannot build coal plants that will leave liabilities both for the European economy and for its industrial future. That will cause all sorts of problems.

In that regard, we just need to divide it between the new plant investment and these questions about existing plants and what they have to do. To be compliant with meeting carbon targets, they are going to have to reduce the generation from coal. Climate emissions are where ECF is coming from, and they are falling back on air pollution legislation rather than on an actual climate agenda, and that seems just wrong. It is not clear to the markets and it is not clear to investors. It is mucking around with air pollution rather than having a clear direction of travel with the carbon price, which everyone can rely on and understand and which will be consistent and clear, which we would all like across Europe.

In the absence of that, they are going to have to do some things that correct the flavour of the carbon price to deal with coal generation. To constrain it, they will either have to do some things David alluded to, which is have a big battle over what the carbon price will be in Europe, and they keep inventing new ways of having that discussion, or they are going to have to introduce an emissions performance standard or some such, which forces the closure of existing coal on a timetable. That has, after all, been done before using emissions levels on sulphur dioxide, nitrous oxides, which is what the Large Combustion Plants Directive is. So it seems to me that there just needs to be this recognition that existing coal is going to have to be constrained and they are going to have to advance CCS if they want a future role for coal in Europe.

The final point was about the private sector's role related to this. Globally coal is booming. Coal is growing and growing. It is growing, as the IEA will tell us, in a way that is consistent with a six degree world, not a two degree one. That means a lot of money is ending up in the hands of people who produce and sell coal and process it and so on. At the moment, the coal sector has relied on utilities to commercialise CCS, and, frankly, utilities do not have to do coal. They can use gas, they can do renewables, they can do other things. In Europe, for instance, coal is quite likely to be on the way out, but the issue is how quickly it goes out. If coal is to have a future, the coal sector is going to have to grapple with it, invest in commercialising CCS and, essentially, pay for it so that the utilities do it.

Q125 Lord Lewis of Newnham: But you did suggest that in point of fact the application of CCS was not unique just to the coal industry, that there were other industrial concerns—

Matt Phillips: If the coal industry does not do it, it is relying on the gas sector doing it. The gas sector is quite strategic and it does have big balance sheets.

Lord Lewis of Newnham: But there are industries like cement, which is 6% of the CO₂ produced in this country, and the chemical industry. Why is there not some general interaction between these various groups?

Matt Phillips: I think the problem is that it has been allowed to be a debate that is about coal when it should be a debate about industrial clusters and that is where CCS, if it is going to happen, will be commercialised because there will be multiple users using shared infrastructure for multiple different reasons. Co-location is where we will get the efficiencies in the deployment of CCS and that makes a lot more sense. It is rather pleasing that the UK is ending up in that place after five years of mucking about, frankly.

David Brewer: The question was: what should Europe do?

Lord Giddens: How should it reconcile obligations to reduce carbon emissions?

David Brewer: Its obligations on carbon emissions extend to the 20-20-20 target by the year 2020. These are Europe's obligations. It has no obligations beyond that. Those obligations will be met under existing policy with the EU ETS because the EU ETS sets a cap on carbon emissions. So those targets will be reached under existing policies.

Q126 Lord Giddens: Largely because of the recession.

David Brewer: If it had not been for the recession then the carbon price would have been higher and it would have forced more transfer away from high carbon sources. Under existing policies, those obligations will be met.

Q127 Lord Giddens: But I mean a long term—

David Brewer: Europe has longer term ambitions and longer term targets. The question is: will it go there? A debate will take place in Europe as to whether Europe should go further if the rest of the world does not come with it.

Lord Giddens: What is your opinion?

David Brewer: On what? Whether the rest of the world will come with it or what Europe should do?

Q128 Lord Giddens: What Europe should do given that it will sustain—

David Brewer: Assuming that the rest of the world does not come with us, Europe is an irrelevance. It is an irrelevance. We produce in Europe perhaps 10% of the world's carbon emissions, so unless somebody does something about the other 90% we are going to be all toast anyway. So what is the point of a grotesquely expensive investment in utter futility? What is the point? And it will be very expensive for us because if we continue in Europe to pursue a low-carbon agenda and the rest of the world does not it will be expensive. We are also in a situation where climate change is still going to be taking place, if that is the case, on a runaway basis. We are also going to have to spend truckloads of money on mitigation measures. So we suffer doubly. I think that is the real question for Europe. Europe has decided where it is going and policy measures are in place to get us to 2020 but whether we go beyond that is a question and it is a question of whether the rest of the world comes with us, and if the rest of the world does not come with us whether we are prepared in Europe to go it alone, with all the consequences that that entails.

Q129 Lord Cameron of Dillington: Does that mean that you believe that the coal industry has no responsibility—the question was about carbon capture and storage—to look further and to promote and do the research into carbon capture and storage?

David Brewer: We do, and in Germany. In Europe the big lignite producers, which is the majority of coal production in Europe, lignite, are owned by the generators and the power stations are mine-mouth power stations. Huge mines, huge power stations, and they are in common ownership. There is vertical integration. So when you are talking about most of the coal industry in Europe, lignite producers, you are also talking about the utilities. So in Germany, the lignite mines that produce over 170 million tonnes a year, and of course it is now increasing because of their decision on nuclear, are owned by RWE, E.ON and Vattenfall who also own the power stations.

Q130 Lord Cameron of Dillington: Do they have responsibility for—

David Brewer: Yes, they do. For hard coal producers like UK producers, I have to say it is a bit more difficult for us. We have neither the skills nor the wherewithal to do it. We just do not have the money. The kind of money that is being talked about is way beyond our capacity, we would have to borrow it all anyway, and we do not have the skills. I think for the hard coal industry internationally the big players, the RTZs, BHP Billitons, Anglo Americans, Xstrata Glencores of this world do have a responsibility and we would go along

with them. But UK coal producers, which are medium-sized, small cap companies, some of them genuinely small companies, SMEs, do we have the ability to do that? No, we do not have the skills, we do not have the wherewithal.

Q131 The Chairman: Lord Lewis, do you want to come back in or shall we move on to Lord Caithness? Thank you. Lord Caithness.

Q132 The Earl of Caithness: **You defined it very well, and we are going to be the maiden aunt of the world in Europe and forgotten about, which makes the Emissions Trading System rather irrelevant. If we want to continue to be the maiden aunt, do you prefer a trading system that has a basic floor price for carbon or would you prefer a carbon tax?**

David Brewer: I prefer regulation. I think that is the way to do it so that you will say to all fossil fuel producers, “By a certain date in the future you will have CCS”. You make that date the same for gas as for coal because if you do not make it the same for gas as for coal all that anybody will do is just build gas. For some people that is fine, but it comes at a price, and the price is that the fuel cost of generation from gas is more than double that of coal. That is the price you pay.

I think you do it by regulation. You say that as from a certain point in time all new fossil fuel plant or all fossil fuel plant will have to be equipped with CCS and you put in place mechanisms, as is proposed in the Energy Bill, by a contract for differences, which will make sure that that plant can be economic. But do not be under any illusion, the price for electricity customers will be very high. It will be very high under any circumstances.

The Earl of Caithness: Following that through then, if it is going to be high, should we be pursuing this route? Do you think there is a remotest chance of Europe ever agreeing a common policy on energy post 2020 other than continuing to be green when the rest of the world is dirty?

David Brewer: I think you will find a split emerging in Europe, as it is emerging now between Central and Eastern Europe, with high levels of dependency on both hard coal in Poland, in particular, and lignite in many other countries, and Western Europe where the dependency on coal may be less. They may feel that there are other alternatives—nuclear or a combination of nuclear and renewables—and they are not particularly concerned, rightly or wrongly, about an increasing dependency on gas.

Q133 The Earl of Caithness: So you do not agree with Professor Helm in saying that we should go for gas in the short term and renewables long term?

David Brewer: If I take my coal hat off, the argument that you should go to gas from coal in the short term or in the medium term to get carbon emissions on the downward path is a very seductive argument but not at these prices. The world oil and gas price is controlled by who? It is controlled by the oil majors and the various national gas companies, Sonatrach, Gazprom and Qatar, and they are oligopolies, whether they are in the public sector or the private sector, and they are interested in maintaining their profits.

The answer is: tell them to go away and come back when their prices are 30%, 40% lower, as they are in the States. This is not just a matter of gas availability. It is a matter of market structure. In the States multiple producers of shale gas are competing with each other and driving the price down. That does not exist in the rest of the world, so no matter how successful shale gas exploration might be outside the States, it is unlikely to result in a lower gas price, while you have this oligopolistic structure.

I do not think anybody in the oil and gas industry in Europe has the beginnings of an inkling of an idea of what the words “market” and “competition” mean, whereby marginal revenues are inexorably forced down to marginal costs. It is utterly beyond either their experience or their comprehension.

Q134 Baroness Parminter: Rather than market mechanisms, you have argued that Governments, particularly the UK Government, should use regulation, but can you give an example of any politician who is prepared to legislate for what is an unproven technology? How can Governments legislate the CCS?

David Brewer: Are you talking about CCS as being—

Q135 Baroness Parminter: Yes, because you argue that the Government should legislate for the future using CCS. That is an unproven technology. What politician has ever or will ever use a legislative tool to do that?

David Brewer: I think the answer to that is quite simple: the individual elements of CCS are proven. What is not yet demonstrated on a commercial scale is sticking them all together. But when you look round the world at the enormous amount of coal-fired generating capacity that exists and is being built as we speak, without CCS there is no route to a low-carbon world. It is that or nothing. It does not mean to say that other low carbon technologies do not have a part to play. They do. But without CCS we just do not get there, so it is an imperative. You make it work. You have to make it work. That is what you do. It is an imperative.

Matt Phillips: Can I make an observation?

Q136 The Chairman: Yes, in a couple of minutes and then we should come to Lord Courtown’s question, but please do.

Matt Phillips: David raised a lot of points. It is a familiar debate about what should Europe do in the context of global inertia. It is worth examining—for instance, the IEA’s analysis of the future fossil price scenarios. What the IEA has looked at is a current policies trajectory on fossil fuel prices globally and a 450 scenario—the scenario where the world adopts policies capable of living within 450 parts per million, which is the two degrees scenario apparently all Governments are signed up to.

The way fossil fuel prices will be moderated is if you go for the 450 scenario than if you allow business as usual. Business as usual says, “Let us all just give up on this climate policy because I am not convinced. Let us go for the race to the bottom in terms of standards rather than trying to pursue a high ambition pathway”. All that does is it means more people use more fossil fuels, the supply and demand dynamics in the fossil fuel industry, according to the IEA, just projects them all continuing to go up. What keeps them low is if people start decarbonising the power sector, move out of fossil fuels and get going with low carbon. Most of the costs of global decarbonisation are not in the power sector. They are in transport. So the power sector is quite a modest intervention. It just depends on your taste as to whether you think fossil fuel prices will go up or fossil fuel prices will go down as to whether it will cost anything to decarbonise the power sector over the longer term, especially if you are deploying other parts of the package preventing energy waste through energy efficiency programmes. What that does is it helps moderate the costs entirely across the whole economy as well as for bill payers. There are plenty of ways that you can decarbonise that do not necessarily mean you go for the higher price technology.

What should Europe do? Should Europe just go hell for leather for coal or should it go for a decarbonisation pathway? It partly depends on Europe's bet. Will other countries play ball on decarbonising and will Europe get a benefit industrially from being there at the start rather than trailing? It depends how you look. If you look at it from global climate negotiations, it does not look that encouraging. If you look at it from other ways it looks extremely encouraging. What is the policy that meets David's need? It is an emissions performance standard. What that does is regulate to rule out coal.

The US has now introduced that. The US is not buying into a global agreement but it has regulated out all new unabated coal in the US through an emissions performance standard. It is possible that would have fallen had Romney come in. He has not. Obama is in there. That policy is going to stick. That has prevented 150 new coal plants being built in the US and now the US is tightening up air pollution controls, which is leading to the closure of some of the existing coal fleet.

What Europe is doing on coal and what the US is doing on coal is broadly similar. China has introduced a coal cap. It is capping in the 12th five-year plan the amount of coal it will allow to be burnt in China. In the course of the next year or two, that will be turned into policy in the regions where it will be enforced. Is the huge coal expansion in China going to continue? That is unlikely. The reason China is doing that is partly climate and partly because it does not want to keep on importing.

Globally the picture is not one of no one going with us if we do not do anything. Quite the opposite is the case. Europe's leadership is already gaining some traction and results in other parts of the world. While our eyes might be focused on a global climate agreement, if you start looking at real things that economies are doing, a lot of economies are willing to decarbonise. So should Europe trail that and just do it when everyone else has done it or should it be ahead? It seems to me that Europe needs to think a lot about its industrial renewal and think about where future markets are going to be. It can have a lot of edge on low carbon. I think that will be my general commentary in response to some of David's points there.

However, I think we are probably agreed that a solid clear regulation helps a great deal and also that regulation stimulates innovation. If you mandate CCS or you cannot build, that is an extremely good way of encouraging actual real investment as a serious way forward. That is what happened with sulphur dioxide controls, so I think we might well agree that regulation is a very good way forward. You would simply say that no new coal without CCS from the outset globally should be a standard that all IFIs adopt from 2015.

Q137 The Chairman: It is nice to have you agree there at this point. If we could go on, because we are slightly—

David Brewer: I do not agree with that. I agree that you should have regulation not with an EPS. I think that you should have from a point in time all new fossil fuel plant CCS, gas as well as coal. I see no merit whatever, either from a climate change point of view and certainly not from an economic point of view, in ending up with a system, be it a carbon-pricing system or a regulatory system, which just drives you from coal to gas.

Matt Phillips: But an EPS—

Q138 The Chairman: I think we have taken that point.

Q139 Lord Cameron of Dillington: Can I just ask a quick question? On the cap that China has introduced, when is it likely to meet this cap?

Matt Phillips: Within the course of the next five-year plan the cap is slightly higher than in the previous five-year plan. It is the 12th five-year plan. It is a quite remarkable thought.

Within the course of the next five-year plan they have capped the amount of coal they are allowing to be burnt in China. It is projecting ahead over the next five years. When they will meet it is within the five-year period.

Q140 The Chairman: Perhaps if we have five more minutes, Lord Courtown, and we can get the answers to that last question.

Q141 The Earl of Courtown: We have already looked at EU enlargement and coal to a certain extent, but is there anything you would like to add on the implication of eastern enlargement and the EU energy policy? At the same time, with regard to the pre-accession negotiations, how should coal be tackled in negotiations with these different countries?

Matt Phillips: I think David made an important observation when he said that there is a difference between Western Europe and Eastern Europe. It was not quite accurate in terms of who is, if you like, leading the opposition to climate high ambition in Europe. It is only Poland which stood out. All the other countries in Eastern Europe aligned around Europe going for a deeper cut. It was only Poland that held out against it. Let us be very explicit, that was because of coal, and we know it was because of coal because they said so.

What happens if Europe, as it expands, allows another five countries in the Western Balkans, all of which see their future including new coal, and Turkey, which sees a future of planning to build 60 or 70 new coal plants? Those countries coming in mean that you get a lot more Polands dragging Europe behind a low ambition direction rather than a high ambition direction. When you dig into the situations in those countries as to why coal is nevertheless being progressed, those Western Balkan countries are part of the energy community, which means they must adopt EU policies. But of course they do not adopt the carbon price. They adopt all the other parts of the EU policies, like the Industrial Emissions Directive, and the Large Combustion Plants Directive must be applied in Western Balkan countries and after that negotiation within the Aquis, with Turkey, conceivably in Turkey in preparation for EU accession.

So the problem is they simply discount the carbon price. They do not include it in their economic assessments because they are not manifesting in the way they operate the power sector in the Western Balkans, like Serbia and Kosovo and so on. They are not manifesting in their actual national context a reality that they would one day be part of the carbon price. All those Western Balkan countries intend to be part of the EU by 2020. They all face the carbon price on the plants they are proposing should be built right now. It is a form of cognitive dissonance. They are expecting that they can do the same as Poland and other former Warsaw Pact countries did when they joined the EU. They expect that they will simply get some form of derogation and will fight for it. That is why there will be a continual drag and therefore this points to what policy needs to be adopted, which is a neighbourhood policy. The EU just has to wake up. DG Energy has to wake up and look at what is happening. If those countries build a shed load of coal it will change the dynamics of the political negotiation on Europe's ambition on climate change in the future.

The Chairman: Anything further? Thank you both very much. I think it was a very stimulating exchange. Thank you very much. We learnt a great deal.

Juan Pablo Davico—Written evidence

I - As you know, the mathematical projections (The Global Report 2000 made by order of Department of State in the Carter administration in 1980, the report of the Nobel Prize in Economy Wassily Leontief published in 1980 in Scientific American, the report of Zucker and Goeller published in Science in 1984, and similar reports such as “The Limits of Growth” made by Economists and Businessmen of the Club of Rome) indicate that the non-renewable resources will be extinct in few decades and while pollution and human population will be excessive.

The same mathematical projections indicate that these problems will decrease the human population in an enormous proportion.

According to these reports, all the technologies to extract resources that we now have will be useless because those resources “will not exist”. On the other hand, if we find, for example, more petroleum and gas, burn these substances will produce more CO₂ and this will worsen climate change, and this will destroy more crops, and this will affect our civilization even more. This is something that is happening now and that increase the international prices of food.

Therefore, the problem is much bigger and deeper than the energy and economical crisis.

2 - The solutions:

A - Into our planet there are still huge amounts of mineral resources, but most of us do not know. These resources are dissolved in the ocean water. For example, there are 0.5 mg of aluminum / kg of water; 0.02 mg of iron/ kg of water; 0.01 mg of copper/kg de water; 0,005 mg of zinc /kg of water, and so on. (Oceanografía, Biología Marina y Pesca, F. Lozano Cabo, Volume I, Page 28).

Therefore, if we develop simple and inexpensive technologies to extract these resources, and if we use these resources wisely, we can avoid the collapse of our civilization.

B - Similarly, we have no more new croplands and croplands we have are affected by climate change. But we have 2/3 of our planet without “agriculture” or “livestock”: the oceans. Besides, what we put into the ocean water is not affected by the drought or hail, and as the ocean water has a stable temperature, which we put into the ocean is not affected by extreme temperatures or by sudden temperature changes, and so on. Therefore, if we develop technologies to make “agriculture” in the oceans we can replace the affected farmland and we will produce more food and bio energy. (As Brazil did on their lands, but in the oceans and at a higher level):

a - To produce bio energy vegetables absorb CO₂. Later, when we burn the vegetable to release the bio energy, the CO₂ return to the atmosphere. Therefore, climate change will not progress or backward. But when we burn gas and petroleum, we only release the CO₂ (CO₂ is not absorbed by anything), which worsen the climate change, which worsen the problem of food.

b - On the other hand, if we increase “cropland” through oceanic agriculture, and if we do not burn all vegetables to produce energy, the vegetable will absorb more CO₂ from the atmosphere, CO₂ from the atmosphere will descend, and climate change will began to decrease.

C - On the other hand, in the ocean there are many energy in waves and, the most important, the geothermal energy is closer. Therefore, if we develop simple and inexpensive technologies to exploit these energies, and if we use these energies to produce hydrogen via hydrolysis, the best combustible that we know (the hydrogen produces more power per

pound than any other combustibles and when we burn hydrogen we produce only water), we will have another supply of renewable and clean energy

D - We can use the same energy distribution systems we use now: oceanic pipeline and ships tanks for liquid bio combustibles and hydrogen gas.

Later, we can burn these renewable and non-polluting combustibles in current thermoelectric plants of electricity and distribute this energy with current laying cable.

This does not mean that petroleum will be useless. We will need petroleum, but to produce plastics and other structural elements.

E - With these technologies, we will increase the offer and, if we maintain stable the demand, we will descend the cost of food, energy and other natural resources. Later, these lower costs will decrease the cost of production and distribution, and, moreover, is obvious that all these technologies will bring jobs.

3 - Summary:

A - If we observe all these above we can understand that part of the solution is to colonize the oceans.

For this reason, in the last twenty years I have developed simple and inexpensive technologies to colonize the oceans. Now, if we unite our intellectual and material resources we can construct these technologies, colonize the oceans and then our specie could survive the changes, as it always did.

B - The other part of the solution is to change our behavior to avoid falling again and again into the same problem. But first we must ensure the food, energy and other natural resources to our civilization.

4 - If the Committee decides that they, with the U.K., are interested in developing these technologies, we can produce the first results in two years.

16 October 2012

Chris Davies MEP and Dan Jorgenson MEP—Oral Evidence (QQ 248 – 253)

Evidence Session No. 13 Heard in Public Questions 248 - 253

WEDNESDAY 23 JANUARY 2013

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
Lord MacLennan of Rogart
Baroness Parminter
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Dan Jorgensen MEP (S&D, Denmark), Vice Chairman, ENVI and **Chris Davies MEP** (ALDE, UK), Rapporteur on the Roadmap, ENVI

Q248 The Chairman: Mr Jorgensen, thank you very much for sparing the time in what is obviously a very busy day, following our Prime Minister's speech earlier. It is a pity that we do not have more time to talk to you about that. If I may, I shall deal with the formalities of the session. You should have a list of interests that have been declared by the Committee members. This is a formal evidence-taking session of the Committee. We will obviously be taking notes and they will be on the public record in printed form and on our website, and we will send you a copy of the transcript. If it is okay, perhaps we could go straight into a few questions in the 25 minutes or so that we have with you. I guess that the first question concerns the post-2020 EU energy and climate policy and what you would see as the key features of that policy in that period, as well as how some of the technology and science issues may affect things, and how that is weaved together with getting investor confidence—the usual basket of questions.

Dan Jorgensen: First of all, thank you for the invitation. I am obviously always happy to speak to visitors from different Member States, but I would have to say that British members are especially welcome because a lot of things are going on right now in your country with regard to your relationship with the EU. So anything that we can do to help to clarify matters and show our good will, I am happy to facilitate. Also, I have a personal interest in British politics. When I left the gymnasium, as we call it in Denmark—it is like high school; it comes after public school and before university—a group of us in my home town drove to London and got off the bus. We went backpacking and that was it. I stayed for a year, carrying suitcases at the Hotel Russell in Russell Square. I have to tell you that I did not have a lot of money, but it was probably one of the best years of my life. You get in shape when

you carry suitcases. This means that you can also then drink a lot of beers in the pubs afterwards.

The question is a very good one. As you all know, we have a 20-20-20 plan, which means that in the year 2020 we will have reduced our CO₂ emissions by 20% compared with 1990, we will have 20% renewable energy, and we will be 20% more energy-efficient than we are today. This has been the plan since 2006 and the way it has been implemented tells us that not only will we achieve this but we will overachieve it. Already we have almost achieved the reductions, and because of the financial crisis production has also been smaller. So not only do we have more green energy, and not only are we more energy-efficient because production has gone down, but we are in a paradoxical situation in the sense that from now until 2020 we will actually be able to increase our CO₂ emissions. This is because we have almost always reached the target, but we still have the possibility of offsetting. This will not happen but this is just to tell you that we are no longer in the state where EU law drives the reductions—at least not when we talk about the ETS system. I will get back to that in a minute.

However, we do have two other types of legislation that help us there. One is of course the renewable energy directive, which will lead us to having at least 20% renewables. In that regard, many countries are definitely pushing in the right direction. The second dimension is the energy efficiency directive. I think you might have spoken about that with the previous speaker. That one thing alone, on top of what we have already done, will probably lead to our having a domestic reduction of 25% in the EU.

This means that we have very good new legislation that, if it succeeds, which we expect it will, will mean that the other legislation that we have on the ETS is old-fashioned and does not work. For an ETS system to work, we need a certain price on carbon, and that price is now too low. The only reason why a system like that is better than just having a tax is that it would be difficult to have a tax at the EU level. Theoretically speaking, why would we choose a carbon trade system instead of a tax? Well, a carbon trade system is better because it means that if you auction some of your allowances and you have a certain price, the parts of industry that want to transform the way they produce and consume energy faster than they actually have to can auction their allowances and use the revenue from that to finance the transformation. It is a pretty good system if it works. The problem, of course, is that it does not work, for some of the reasons that I have just mentioned.

More directly, the question is what we can do from 2020. I have been arguing, and I know that Chris has also been arguing, that what we should already have done was raise our ambitions so that we had a target of a 30% reduction by 2020. I think that that game is probably over and we will not be discussing that again. Instead, we are discussing whether we need targets for 2030 and what those targets need to be.

Personally, I think we need as strict and ambitious targets as possible. I think that with the measures that we have already taken, with the global economy and knowing how scarce our fossil fuels are, if in that situation we still do not wish to drive the process from a political point of view from Brussels, then the targets need to be much more ambitious. Let me give you one small example of what I am talking about.

I have studied China and India quite a bit. If you are interested in climate change but you do not study those countries, then obviously you do not know what you are talking about. We tend to focus only on ourselves and maybe on the US, and we rarely focus on what is going on out there. We are important for historical reasons, and we are important because we need to be frontrunners, but they are the ones that we really need to target.

There are some positive elements and some negative elements. The negative elements are that if things just keep going as they are now and we do not change fundamentally—especially also in those countries, with the way they produce and consume energy—then within five to 10 years we probably will not have a chance of staying below 2 degrees, which is where we expect the point of no return to be. After that, self-enhancing effects will set in and we will have no chance of preventing really disastrous climate change. That is the bad news. I recently read somewhere that right now 10,000 new cars hit the streets every day just in Beijing. That is 10,000 new cars every day in one city in China.

The good news is that, because this is happening and it will probably proceed, the pressure on the resources is going to be so big that market forces will help us to make the transformation that we want. One example is that if China's growth stabilises at 8% a year, which is very likely, although it could be even higher, then in 2030 China will have the same per capita income as the US has today—not as the US will have then but as it has today. If you then assume that they will have more or less the same consumption pattern—for instance, three cars per four inhabitants—then China will have to use 99 million barrels of oil every day. Today, the entire planet uses 84 million barrels. This is what the economists call *ceteris paribus*—all things being equal—but obviously everything is not equal. Long before that, oil will be much too expensive to put in a car, for instance.

This is good news; it means that we will have to change. In my opinion, what we are doing here does not so much concern making a green revolution—that will happen. What we are trying to do is, first, to make us the frontrunners of that revolution so that we do not become the Disneyland of China in 30 years' time, with them coming as tourists, but so that we will also have something to sell to them. The second thing, even more importantly, is that if we can drive this transformation just five or 10 years before it happens anyway, we might also be able to save the planet. That is the short version.

The Chairman: Thank you. Mr Davies, welcome. Thank you very much for sparing the time to see us today. We appreciate it.

Q249 Lord Whitty: You have been disparaging about the ETS and, in one sense, it clearly has failed as a driver, although a market has been created. Are you saying that the ETS is really not the key instrument, or are you saying that we need to radically change the ETS—in which case, the Commission has set out various ways in which it could be improved? How would you see the ETS being improved?

Dan Jorgensen: I also teach this stuff at university, so I also tend to sometimes get into a very theoretical argumentation of what would be the best system. I will spare you that, because the answer would be “not ETS”. Now I am here as a practical politician. We are not going to change that system and introduce a tax or something else now. That game is over. What we need to do is to make it work, and that can be done, I think. It needs political will, though. The most important thing that needs to happen sounds pretty simply but obviously is not, and that is reducing the number of allowances and increasing the level—that is, lowering the cap. This would also mean a higher price. One way of giving the market the assurance that it needs would be to set a minimum price. That, for me, would be the one of the most efficient things that we could do. Then we should more or less eradicate the possibilities of off-setting to other countries. If we fear carbon leakage, instead of dealing with carbon leakage by giving free allowances we should maybe introduce a carbon tax for people exporting to us. These things are not extremely likely, but on the other hand they are not impossible either.

I would also like to make another very positive point. Almost anywhere you go in the world, they are at least thinking about introducing a cap and trade system. As you probably very well know, the US actually negotiated this in Congress. Unfortunately, it only got through the House of Representatives and not the Senate. This was just when Obama was just elected and still had a majority. This was with a Democrat majority, so it is probably dead in the US for some years still. One of your colleagues, Lord Giddens, wrote a very good book about these things in which he also argues that even in the US, when they really begin to see the damage it is doing, they might also change pretty quickly. They have changed on other issues very quickly in that country.

China is introducing it as we speak. It will probably be a better system than the one we have because it is sector based. For us it is very difficult to have to common rules that cover both cement factories and medium-sized greenhouse gardens. That is the situation in Europe, but it will not be the situation in China: they have it sector-wide, which is much more clever. Australia is going to be doing one. I was just in Taiwan, and they are going to be doing their own. In the United States, there has also been talk about some states doing it on their own. When Schwarzenegger was governor, even he said that he would have California join the European trading system. Obviously that did not happen, but it just shows there are some possibilities for this. As I said earlier, because of the pressure on fossil resources, the whole world will be forced to think about how to deal with this, and that is definitely one possible way of doing it.

Chris Davies: I know that you have CCS on your agenda, and CCS is my main subject. I am the only person in Parliament, I think, on this. It seems to me that when the ETS was introduced, the Commission said, “We are going to learn by doing”, so I do not have a problem with tampering with it; we learn, we make mistakes and we learn from our mistakes. Ideally, perhaps, we should leave the third phase as it is and set an ambitious fourth phase that deals with the problems and increases the trajectory for CO₂ reductions and the like. The trouble is that, politically, in the current circumstances, as everyone is swayed by the circumstances in which they find themselves—of the financial crisis—I cannot see us agreeing an ambitious fourth phase. So what do you do except tinker?

Lord Whitty: If part of the tinkering—it would be somewhat more than a tinkering—was the floor price, would it be possible to agree within the EU a floor price that was sufficiently high to become a driver, or would it be subject to the lowest common denominator?

Dan Jorgensen: I do not see that happening. I shall fight for it, but I do not see it happening.

Chris Davies: It would not even have Commission support. The Commission would set itself against it, so politically it is a non-starter in the real world. Unfortunately at the moment—I have had a lot of gloomy and depressing conversations of late—almost everything is a non-starter. As with this backloading proposal, which should be the simplest thing in the world, there were doubts over whether the Commission even had to bring forward legislation, and it is causing the most enormous debate about the whole future of the ETS.

Q250 Baroness Parminter: Like you, we are very aware of the issues around CCS. We have had lots of evidence from people saying how crucial it will be in the future, but equally we have been made aware of the technological and financial problems. Is there anything else that the European Union and the Member States can do to really push this forward?

Chris Davies: All right. Clearly, the economics of CCS have never been good, but then they are not that good for renewable energy at the moment either. We throw money at

renewable energy to make that possible. It has always been accepted by the International Energy Agency and the like that there will come a time when CCS becomes commercially viable, but in the meantime we have to build demonstration projects, bring down costs, improve the efficiency of capture and the like. And, of course, we have to overcome the problem in many countries of public resistance to underground storage, a problem that for the most part the UK and the Netherlands do not have to deal with.

Of course, the economics of CCS have changed for the worse because of the collapse in the carbon price. It is a triple whammy, if you like, although I am not sure if anyone else in Europe understands what a triple whammy is. I remember double whammies. First of all, the EU support mechanism, the NER300 funding, is much reduced because of that. The money from the sale of allowances that comes to national Governments from the auction is dramatically reduced, and the advantage of not having to buy allowances to avoid the emission of CO₂ into the atmosphere is negligible now at current prices. It is very difficult. I cannot think of a way of going forward except by finding ways of throwing money at it, and who wants to part with the money? It is concentrated on just a couple of Member States.

As for the status of the European situation, our funding mechanism in Part I failed to get a single CCS project. That was quite incredible really. We originally had 13 projects bidding from seven different countries, and we ended up with nothing. The second phase, which the commissioner wants to start very shortly, we will try to complete by the end of the year. She sees the end of her term coming up and wants the money spent. After all, €1.2 billion has gone into innovative renewables schemes, so it is being used for something. But as we look around, I do not see the UK qualifying because of the DECC timetable. I will be talking to Ed Davey in an hour's time, but as far as I can see the DECC timetable makes it impossible to fit in with the Commission's requirements, despite the fact that Britain shaped the European competition. We delayed it by six months while we shaped it, and we created the NER300 in the first place. Anyway, France offered money and gave a guarantee the last time round, but it does not really have a project at the moment, its project having been withdrawn by Mittal. Rumania has a good project, but it will take a long time because it has a big funding gap of about €200 million, which could be bridged by the use of structural funds but is not going to be sorted out in time—or not within the next few months; that is my impression. So, really, we are looking at the Netherlands and one project—the Green Hydrogen Project—and there, there is a dispute between the Dutch Government and the Commission, which needs to be sorted out before the Commission fires the starting gun. We cannot negotiate at the moment.

There is one other project in the Netherlands, the road projects, which is not coming through DG CLIMA but might come through via another avenue. So the Netherlands still has two possible projects, but there is virtually nothing else around, except the projects in the UK. The Carbon Capture & Storage Association told me yesterday, and no doubt Ed Davey will assure me again in an hour's time, that the British competition, in isolation from any European funding support, is still going ahead and we are seriously committed. But this competition started up as a new competition back in 2007, and the process is going to take some seven or eight years to reach fruition. Perhaps I may entertain the Committee with an example. I represent the north-west of England. We built the Liverpool and Manchester Railway, which was the world's first intercity railway. It was started by an Act of Parliament passed in 1826 and the railway was opened in 1830. It was 50 kilometres long and built with tunnels and bridges crossing Chat Moss marsh. They did not even know what was going to pull the trains until 1829. They did not know whether it would be horses or stationary engines with ropes. Then they held the competition, which was won by the "Rocket" and hence the steam locomotive as a modern passenger engine came into being. You look at

what we were able to do in the 1820s and then look at the decision-making process in Europe today, and you just despair. How can we possibly compete with the Chinese in these circumstances? The United Kingdom is possibly still going, and there are a couple of projects in the Netherlands, but there is not much else at the moment.

Dan Jorgenson: I just wanted to say that in Denmark we also had a project that did not really happen. Probably the main reason was that there was a lot of popular criticism of it. It was a little bit crazy, but because there were newspaper articles and TV debates about it, people did not think it was safe. Originally, when I heard about it, I also thought, “Well, do we want this in the ground?”, but Chris managed to persuade me quite quickly that that was not the problem. It was technically so easy to deal with it, but that was not the problem. Nevertheless, I think that Denmark is probably not the only country where you see this because we have some Green NGOs—I think they are working against their own cause by doing it; nevertheless, they are—making campaigns against it. Intuitively speaking, it is easy to say, “We shouldn’t put this stuff in the ground”. That is one point.

My second point perhaps is more positive. If we think this will go where I fear it will probably go with climate change, we will not prevent ourselves going above 2 degrees. Every time we have new conclusions from the scientists who know the most about this in the world, they are always more depressing than we had feared. The worst scenarios in the IPCC report are turning out to be far too optimistic. I personally fear that we will not save the climate.

What will this mean? It will mean that all of a sudden the entire planet will see that this is something we need to deal with. The only technique we have right now to take CO₂ out of the atmosphere would be if you combined CCS with biomass. For that reason alone, I think we should support it, plus all the other good reasons. But that might be one of the things that also can help persuade some of the Green NGOs.

Q251 The Earl of Caithness: Is one of the reasons why CCS has not got off the ground in a commercial way is that there are so many different types of CCS technology, depending on what type of plant you are going to do? Each one will have to be tailor-made to each particular situation. There is no common blueprint that one can do. Is that a major contributory factor? The second question I want to ask you is this: even if we do get a commercial CCS operation off the ground, do you think we could ever persuade the Germans that it is something that ought to be taken sensibly, or are they always going to be the dragged anchor on this?

Chris Davies: I do not think people would hold back because they were not sure which technology to use or because it was not quite clear what the advantages or disadvantages of using one particular technology were. There is the idea of having a demonstration project. Let us remember that the Prime Ministers collectively at the European Council committed themselves to having up to 12 projects by 2015. That was European decision-making by press release—the Council needs to say more about climate change and to add a few words about CCS, so at the end of a Council meeting, out came that fantastic paragraph—no funding arrangements, no anything.

The Zero Emissions Platform, or ZEP, which is the Commission’s industry partnership, said, “Look, we need a minimum of eight CCS demonstration projects to test the full range of technologies”. Of course, some of the developers are very keen. Alstom has been the strongest lobbyist around here in favour of CCS. It has said, “We must go forward and Europe must keep its technological lead”. I am told that the Chinese five-year plan has 10 full CCS projects in it. Okay, that could be regarded as a mere gesture, given how many coal-

fired power stations they are still building, but if it is in the five-year plan it may well come to fruition because they still build Liverpool and Manchester railways in a way that we do not.

Dan Jorgensen: Sorry, Chris, I have to leave. I thank everyone very much. If you have any questions or anything, feel free to write to me.

Chris Davies: I think it comes down to money. It is a big gamble. Companies really want to know that they are going to be bailed out by a public sector funding organisation before they take the risk. National Governments are looking at themselves and saying, “Well, why should we do it if no one else is doing it?”. We do not really have any joint partnerships. I think the next step is that the Commission is supposed to be bringing out a paper, which has already being leaked in a draft that has been doing the rounds, from the energy department, on where we go from here. It is proposing regulatory methods. At least it provides us with the basis for further discussion, because I do not think that the regulatory methods are very attractive. One is an emissions performance standard, which really just means that you might as well not build coal but just go for gas because of where it would be set. One would be a licensing regime. I cannot remember what it is called in the UK, but there is a UK scheme that requires providers to get a certain proportion of their electricity from renewables or from low-carbon sources. The licensing regime could be something along those lines but on a European basis.

I think we also need to look at ways of Governments working together and getting something for it—not a financial return but at least some sort of CO₂ credit return or something, so that they could invest where there was the least public resistance. There are possible ways forward, but it comes down to political will and the determination of Treasuries—and public resistance. Germany was mentioned. I do not understand Germany. I do not understand how it can have a 40% CO₂ reduction target, can spend all this money on wind and solar, can close down its nuclear power stations, and still carry on opening lignite-fired coal-fired power stations. We hold up Germany all the time, but I do not know anyone who understands that policy.

The Chairman: Do you have any sense of what the cost of CCS would be, if it were to work, what it would add and how it would then fit into the hierarchy of value cost and things?

Chris Davies: It depends who you talk to, of course. In the right circumstances, if you put in a cluster—and we have some fantastic potential clusters; the Humber cluster is probably the best in Europe, with the possible exception of Rotterdam—at the very worst, you might be talking about the same sort of subsidy that is required for offshore wind. Whereas offshore wind is a series of small projects and single turbines, you are talking about one big chunk of money to get an initial construction under way, pipelines built and the like. Once you have that infrastructure, then you can start building branch lines. Oil refineries can start linking into the same pipe. Other power stations can link into that pipe.

Q252 Lord Cameron of Dillington: It might not be your area of expertise, but I just wondered whether you felt that shale gas might fit into the overall picture.

Chris Davies: I am afraid that this is a political judgment. I do not have a problem with the use of shale gas, so long as we have the right environmental controls in place. I just do not know how much is there and whether we are going to see the cost revolution that has occurred in the United States. It is early days, but by all means let us move forward.

Lord Cameron of Dillington: Do you think that that is a generally accepted view within the politics of Europe, and would you think that it is going to cause the same sort of

problems as the reform of the ETS where it looks as though nothing is going to happen at all because no one can agree on it?

Chris Davies: At the moment, on climate change issues, the usual suspects in the opposition camp start with Poland, whereas on shale gas it is the opposite way round. They want to go to shale gas. France is quite good in some circumstances, but is opposed absolutely to shale gas. So it is an interesting mix. Politically, it is more deliverable.

Lord Cameron of Dillington: Where does Germany fit into the shale gas spectrum? Do you know?

Chris Davies: I simply do not know. I have not asked the question.

Q253 The Chairman: Chris, looking forward to post-2020 policy, because there are so many differing views do you think it is even possible to get something like a coherent policy at the EU level?

Chris Davies: Is it possible to get a policy? Yes.

The Chairman: An effective policy, I should say.

Chris Davies: I do not think that any of us can boast about coherence the whole time. Circumstances have changed hugely. Just look at the climate. In March 2007, when Merkel held the presidency, climate change was top of the agenda, the IPCC reports were coming out and we were preparing for Copenhagen, so politically almost anything on the climate change front could be delivered—and, of course, we were all talking it up as something that would help us drive forward technological progress, encourage investment and keep the European Union at the head. The political attitudes five years later could not be more different. Everyone is very nervous about spending any money, people are not sure what the advantages are because we are going to releasing only 9% of the world's CO₂ emissions, so what difference would it make in the absence of an international agreement? There are lots of national initiatives across the globe, but no international agreement. It is just a different frame of mind. But say that the IPCC report, which starts coming out in September and is formally released next year, pushes us back to 2007 and says that this is a global imperative. Maybe the political cycle will start to change, especially if the economic prospects start looking more encouraging. Then we come down to political leadership, I suppose.

The Chairman: Thank you very much, that has been tremendous. Again, we have found some other insights and we are very grateful for your time. Thank you. Is there anything you would leave with us as a parting message?

Chris Davies: Only to say that on this side of things the UK continues to be regarded within the Council as a very firm supporter of the measures necessary to keep this issue at the top of the agenda. Sometimes on the domestic front, it does not quite play out like that, but on the European stage we are still doing well, I think.

Department of Energy and Climate Change (DECC)—Written evidence

Q *The dominant theme of the Commission's Energy 2050 Roadmap is decarbonisation, with a particular focus on renewables. How can energy policy make its contribution to both decarbonisation and to economic growth? In what specific ways can energy drive economic growth in the EU?*

1. The EU needs an energy system fit for the 21st century that meets its dual challenges of security of supply and climate change:
 - The EU needs to decarbonise its energy generation in order to tackle climate change. This will generally also reduce the EU's dependence on imported energy sources;
 - The EU needs to move towards a single market for energy – in both electricity and gas. A well functioning, liberalised and integrated energy market will promote EU competitiveness through competitive pricing and increased security of supply.
2. The EU's 'Roadmap for moving to a low carbon economy in 2050' (March 2011) explained how a low-carbon economy would have a much greater need for renewable sources of energy, energy-efficient building materials, hybrid and electric cars, 'smart grid' equipment, low-carbon power generation and carbon capture and storage technologies. For example, the Roadmap puts across that by stepping up climate action 1.5 million additional jobs could be created by 2020.
3. According to the Roadmap, by 2050 the energy sector, households and business could reduce their energy consumption by around 30% compared with 2005, while enjoying more and better energy services. More locally produced energy would be used, mostly from renewable sources. As a result, the EU would be less dependent on expensive imports of oil and gas from outside the EU and our economies would be less vulnerable to increasing oil prices. The European Commission estimates that on average, the EU could save € 175 - 320 billion annually on fuel costs over the next forty years.
4. The further implementation of the energy single market and the decarbonisation of EU energy generation will require enormous investment. The European Commission estimate up to €1 trillion in energy infrastructure by 2020 (source: EC Communication – 'Energy infrastructure priorities for 2020 and beyond – A Blueprint for an integrated European energy network'). Of this nearly €500 billion would be in networks (€200 billion in transmission alone). There is therefore a great opportunity for growth:
 - through the construction jobs directly created by building new low carbon electricity generators, bigger and smarter networks with more cross-border interconnections, new pipelines to improve security of supply, and major programmes of building insulation and other capital projects to improve energy efficiency
 - through the technical, engineering and other skills needed to develop the necessary energy-related technologies
 - through the creation of innovative financial instruments (e.g. project bonds) and other ways to leverage commercial funding, particularly from new sources (since existing energy companies are unlikely to have sufficient funds of their own to make all the investments needed), and

- through creating a well functioning single energy market as the basis of improving the EU's global competitiveness.
5. The EU is putting in place a framework to remove many of the barriers to securing this infrastructure - in practice:
- a modernised regulatory regime to facilitate cross-border interconnections
 - identification of major cross-border projects
 - development of networks to maximise the use of offshore renewables
 - simplified planning and permitting rules for such projects
 - targets and other measures to encourage a step change in energy efficiency.
5. Despite the progress made the EU is still facing two major challenges. More work is needed to unlock the investment needed and we must secure the full implementation of the single energy market. We are working together with the European Commission and other Member States, notably Germany and France, to encourage progress on the further implementation of the energy single market within the EU. In addition, the European Commission plans to publish a Communication in the autumn that highlights progress made on the implementation of the internal market, remaining barriers and next steps.
- Q To what extent will a common European approach help keep the costs of transforming the energy system down and assure security of EU energy supply? Where do you see economic growth and decarbonisation benefitting from a common approach to generation, transmission, distribution and storage? And what are the risks?**
- Q The internal market in energy is focused on transmission. Should competition in the rest of the supply chain be given greater consideration? What economic opportunities might arise from such consideration? What risks arise?**
6. The principal objective of a single market in energy is to improve the functioning of and facilitate the integration of EU electricity and gas markets. This is not an end in itself but a means of achieving the wider policy objectives of security of energy supply, transition to a low-carbon economy and increased competitiveness and growth.
7. A common European approach through the establishment of the single market in energy may help keep the costs of transforming the energy system down and assure security of EU energy supply in the following ways:
- Increasing competition in wholesale and retail markets
 - Enabling markets to work more effectively with clear and effective price signals and greater regulatory and policy certainty
 - Enabling networks to be used more effectively (e.g. through development of codes reducing market segmentation and transaction costs).
 - Removing barriers to new interconnection (e.g. planning issues, cost-allocation and in limited areas financing;
 - Greater facilitation of RD&D e.g. through financing and cooperation mechanisms could bring down costs
 - By aiding some aspects of external energy policy such as adoption of common standards by countries neighbouring the EU or potential gas pipelines to the EU.

However, the extent of these benefits is hard to quantify as they will depend on Member States' policies, the post-2020 EU low carbon framework and resultant energy mix and other external factors such as energy prices.

8. The foundations for a well-functioning single electricity and gas market have been laid through the three packages of legislation that were adopted in 1996/98, 2003 and 2009. The first two packages were aimed at liberalising national energy markets, but the scope of the third was broadened to focus on integrating national markets by incentivising investment in cross-border infrastructure and facilitating cross-border trading. We believe that the direct costs and benefits from the UK's implementation of these packages are relatively small due to the current liberalised nature of our market. Moreover, significant benefits could derive to the UK from ensuring the compliance of other Member States.
9. As referred to in response to the first question, the European Commission has estimated that €1 trillion of investment is required in EU energy infrastructure up to 2020. An increasingly integrated European market can help to achieve this investment challenge in a more efficient way, minimising costs to consumers.
10. The direction of travel in the EU is clear: increased physical interconnections between national markets and adoption in all Member States of a common market model for cross-border energy trading. A suite of technical regulations are being developed to underpin this. Improvements are already being seen, particularly in North-West Europe, where interconnectors are being used more efficiently so that electricity is flowing where it is most needed, i.e. where prices are higher.
11. In terms of benefits to the UK we consider that:
 - greater market integration will support the UK's decarbonisation agenda by providing a larger market to balance intermittent renewable generation and incentivising the investment in infrastructure needed to transport renewable generation to centres of demand, e.g. from Norway or Ireland
 - market integration in North-West Europe is improving the efficiency of trading across the electricity interconnectors
 - there is an increase in investment in electricity interconnection, facilitated by greater consistency in national regulatory regimes
 - there is also increased investment in gas infrastructure, with investors being attracted by the highly liquid GB gas market and trading opportunities with the rest of the EU
 - following the disruption of gas supplies from Russia to the EU in 2009, investments in physical infrastructure are being made to enable gas to flow more freely around the EU. This will ensure that, in times of shortage, gas can flow where it is most needed. This will benefit the UK if supplies are disrupted in the future.

Q *Energy is a significant manufacturing input and household cost. Is it appropriate to seek to reduce the costs of energy in order to boost EU competitiveness and, if so, how can it be achieved in addition to energy efficiency? To what extent might price reductions jeopardise attempts to decarbonise? What implications, if any, do consumer preferences over the energy mix, such as onshore wind and nuclear power, have for price?*

12. Energy prices have a big impact on competitiveness and household costs. EU policy has long sought to reduce costs by creating well functioning energy markets (as explained above). The need to tackle climate change has added an extra objective which we know will require much more investment and put pressure on costs. It is therefore important that governments do all they can to minimise the costs of decarbonisation. To do this, they need the flexibility to choose how they achieve their decarbonisation objectives, not least in their choice of fuel mix. The EU framework should maximise that flexibility whilst ensuring that the necessary emissions reductions are made.

Q Do you agree with the Commission that “Gas will be critical for the transformation of the energy system”, until at least 2030 or 2035? What mechanisms are required to boost the role of gas, securing appropriate investments, but on the proposed interim basis? Does an active renewables policy require gas in support of it? Should the EU encourage the development of unconventional gas?

13. We can confirm that gas has a vital role to play in the UK energy mix. It provides a significant proportion of electricity generation (around 40% in 2011) and sets the electricity price for most of the year, as generation from gas power stations is used to cover peaking electricity demand. It also provides almost 75% of energy consumption for heating, and is an important source of industrial heat.
14. Gas plays a critical role in providing a reliable and flexible electricity system that meets demand. Currently, gas generation plants are quick to build, have relatively low capital costs and are flexible. They can respond efficiently to changes in electricity demand and play a key role in keeping the power system balanced.
15. Over the next two decades, gas will continue to play a key role in the UK’s energy mix alongside other lower carbon electricity sources. We will need new gas generation capacity to ensure security of supply, as coal and nuclear power stations close, and to balance the electricity system as more low carbon technology become available.
16. Dependent upon the pace of development and deployment of other generation technologies and the rate at which their costs reduce, gas generation may continue to play a crucial role in the provision of base load capacity in the coming decades, also acting as an effective policy ‘hedge’. It could play a significant ongoing role in a decarbonised electricity system with Carbon Capture & Storage (CCS).
17. Government intends to legislate for a Capacity Market in the forthcoming Energy Bill. This has the potential to bring forward additional investment in reliable capacity, including gas generation, that we need for ensuring future security of electricity supply. More detail on the Capacity Market will be published later this year.
18. DECC has carried out a call for evidence investigating the barriers gas investors face when considering investment in new gas plant and will publish a UK Gas Generation Strategy in the Autumn setting out our findings and responses to these.
19. The European Council in February 2011 concluded that the EU should assess its potential for sustainable extraction and use of both conventional and unconventional fossil fuel resources. Assuming that unconventional gas resources are found and that they

can be economically exploited, the acceptability of individual projects would be subject to scrutiny and controls as provided for in EU law, in particular the Environment Impact Assessment Directive and the Water Directive. The sustainable development of economic resources within this framework would have clear advantages for security of supply and the economy.

Q We would welcome views on how the EU can most effectively support research and innovation as catalysts for decarbonising energy and driving growth, and how EU energy policy can be sufficiently flexible to take into account emerging new technologies.

EU energy policy and emerging policies

20. We would like the EU to continue to support a diverse energy mix, as we consider that this will bring competition between technologies that will drive innovation and cost reduction, and will hedge against the risk of one technology failing to reduce costs or becoming publicly un-acceptable and result in a balanced mix of technologies that enhances security of supply.

21. We strongly believe that this can only be achieved by an EU-wide energy policy that gives a clear signal that the EU remains committed to the transition to low a low carbon economy and does not favour certain technologies over others. For that reason we are not in favour of new technology specific-targets after 2020.

EU support for research and innovation for decarbonising energy and driving

22. To understand the extent of support which the EU provides, the Committee may wish to note that the Commission has proposed significant initiatives to support research and innovation towards 2020. The key elements for energy are:

- **Horizon 2020**

23. Horizon 2020 is a newly proposed EU programme for investment in research and innovation which running from 2014 to 2020 and bringing together all EU research and innovation funding under a single programme. It focuses on turning scientific breakthroughs into innovative products and services. At the same time, it aims to cut red tape, with simplification of rules and procedures to attract top researchers and a broader range of innovative businesses. The Commission has proposed a total budget of €80 billion.

24. Horizon 2020 is designed to complement Structural and Cohesion funds, EU education initiatives and forms a core part of the agreed Europe 2020, Innovation Union & European Research Area initiatives. It is intended as a key response to the economic crisis. Specifically, to invest in future jobs and growth, addressing peoples' concerns about safety and environment, whilst strengthening the EU's global position in research, innovation and technology.

25. Briefly, for energy the proposal includes a new Societal Challenge 'Secure, Clean and Efficient Energy' with a suggested budget of €6,537 million for non nuclear energy research for the period 2014-2020. This will be used to develop energy technologies and market deployment activities previously falling under the EU's Framework Programme 7—Energy and Intelligent Energy Europe Programmes. In addition, under the EU's Risk

Sharing Financing Facility, €1,131 million is earmarked for related projects. This will be managed by the European Investment Bank.

26. The Euratom proposal covering the period 2014-2018 foresees €1,065 million for fission and fusion activities.

27. On 30 November 2011, The European Commission formally adopted the proposal for Horizon 2020 and you can find further details at: <http://ec.europa.eu/research/horizon2020> . These proposals are now subject to further negotiation and approval during 2012, but as they stand, would represent useful increases on the budgets available under FP7 Energy and Intelligent Energy Europe 2 which were worth around €2.35 billion and €727 million respectively. Horizon 2020 will be the key EU level funding instrument for its Strategic Energy Technology (SET) Plan after 2013.

• **The EU's Strategic Energy Technology (SET) Plan**

28. The EU's SET Plan outlines what needs to be done from an EU perspective to achieve its 2020 energy and emission targets and 2050 vision. Its objectives are: sustainability, security of supply and retaining EU competitiveness. The SET Plan is the technology development pillar of the EU's Energy 2020 Strategy. Along with the EU's Roadmap for moving to a competitive low carbon economy in 2050, these underpin the EU's Energy Roadmap 2050 strategy and Innovation Union initiatives. It will also now be the central pillar of Horizon 2020's Energy Challenge.

29. Key technologies identified in the plan for 2020 are:

2nd generation Bio-fuels (e.g. from crop residues)	Smart Grids
CO ₂ Capture, Transport & Storage (CCS)	Energy efficiency in buildings, transport & industry
Wind, particularly Offshore Wind	Nuclear Fission (including waste management)
Photovoltaic (PV) & Concentrated Solar Power	New materials for SET Plan technologies

30. The UK has also been supporting proposals for marine / ocean energy technologies and energy storage to be included quickly. A further focus will be on developing international Science and Technology co-operation outside the EU as well as keeping the Plan under ongoing review so that it can incorporate new technologies as they emerge.

31. Technologies expected to have an important role for the EU in 2050 are:

Energy storage	Trans-European energy networks
Hydrogen fuel cell vehicles	New technologies for energy efficiency
Generation IV nuclear fission	Nuclear fusion

32. Funding to deliver the SET Plan remains an issue. Activity under the Plan is estimated to require spending of up to €80bn over 10 years (a threefold increase on average cumulative EU and Member State spending in this area over recent years). Some of this funding has so far come from the EU's Framework Programme Energy budget offering

around €350 million per year, soon to be replaced by Horizon 2020. Also, other sources such as the Emission Trading Scheme's New Entrants' Reserve (although the current carbon price means significantly less than the originally anticipated €4.5 billion being available to spend on the first phase of projects and not all projects will necessarily be SET Plan focused). In addition, European Investment Bank loans and possibly a new EU funding instrument to support large scale demonstration projects are currently being considered. Otherwise, there continues to be an expectation that Member States and the private sector will ramp up their funding, which seems impractical in the present financial climate.

4 October 2012

**Department of Energy and Climate Change (DECC)—Oral Evidence
(QQ 358 – 380)**

Evidence Session No. 18. Heard in Public. Questions 358 - 380

WEDNESDAY 13 FEBRUARY 2013

Members present

Lord Carter of Coles (Chairman)
Lord Boswell of Aynho
Baroness Byford
The Earl of Caithness
Baroness Howarth of Breckland
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Plumb
Lord Whitty

Examination of Witnesses

Rt Hon Mr Edward Davey MP, Secretary of State for Energy and Climate Change, **Mr Tim Abraham**, Director of European Energy Policy, Department for Energy and Climate Change, and **Ms Rocio Concha**, Deputy Chief Economist and Head of Strategic Analysis, Department for Energy and Climate Change

Q358 The Chairman: Secretary of State, good morning. You are indeed very welcome. We have all been very much looking forward to this session. It is nice to see Mr Abraham here and Ms Concha. Welcome back and thank you for coming. We have quite an intense agenda and we have you for about an hour, Secretary of State, so I will just deal with the formalities first of all. You should have in front of you a list of interests that Committee Members have declared. This is obviously a formal evidence-taking session of our Committee. Shorthand notes will be taken and they will go on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript and you will be able to revise it in terms of minor errors. This session is on the record and is being webcast live and will be subsequently available on the parliamentary website. Secretary of State, I do not know whether you would like to make any general comment, in the sense that we are quite tight and we have many questions. Would you be happy to go straight to those or would you like to just have a few words?

Mr Davey: Just two sentences. I am delighted you are doing this study. It is one of the reasons I was keen to come to see you. Seeing energy policy and climate change in the

European context is critical, working with our Europeans partners is critical, so I look forward to your questions, but I am also looking forward to your report.

Q359 The Chairman: Thank you, that is kind. I will take the first question and it is the question of the macroeconomic benefits of energy investment. Clearly a lot of investment needs to go in. We have had these very large figures given to us—€1 trillion across Europe in the next 10 years—and the argument has been made to us that given where we are economically at the moment, substantial investment in green energy and energy generally could drive the economy and help to pull Europe out of the problems we find ourselves in. I suppose there are three questions: do you agree that the current economic conditions are ideal in the sense that that argument holds up? Do you have any sense of the macroeconomic benefits that might flow from that investment and do you have any sense of quantification of that?

Mr Davey: I think the energy challenge can help our economy. I think it could help our economy whether or not we were having the problems that we face. I think it has both short-term positive demand effects as well as long-term supply-side benefits. I think the economic arguments are good, whether you are looking from a macro or a microeconomic point of view. But to focus on the macro side, one of the ways I have been arguing the case has been that we have a big infrastructure challenge in the UK generally, about £250 billion-worth, but of that energy is the biggest slug by far. It is nearly half the infrastructure investment challenge facing the UK over the next decade, which is not as well known as it ought to be. It is 30% higher than transport and six times the challenge for water. Given that one of the key drivers of growth in our economic strategy is infrastructure investment, we have seen the Treasury being quite inventive and innovative in how it approaches its support for that. Clearly energy infrastructure is a key part of that.

I think that is the case in Europe as well. I have been arguing with German, French and other colleagues that we have the long-term supply-side effect of getting the single energy market going, but now is a really good time to make those investments because it could have some benefits in the short term, given the problems we face. I was delighted to see with the Prime Minister's success in negotiating the EU budget that, in the Connecting Europe Facility, energy still took a big share of that. I think that is quite an important signal.

I think there are short-term demand benefits, both in the UK and in Europe, but I would still want to push on the micro side. We need this. It is good for the UK economy and for the European economy. I think the arguments for green growth are quite strong and need to be emphasised. Even if we were not in our current predicament, I would still be arguing for these policies.

Q360 The Chairman: Do you have any sense of what it might do to the economy, both in metrics in the UK economy and the European economy and the like?

Mr Davey: Let us remember this is mainly private sector investment. We are creating an enabling framework for that and a supportive framework for that so we cannot be precise about when that investment comes forward. We know the opportunity is over £110 billion-worth between now and the end of the decade, so that is the overall size of it. But of course that figure does not include things like supply chain benefits, potentially, and jobs created there, which I would like to add in, and indeed, the energy efficiency side in the Green Deal. So there is probably a bigger opportunity than even that figure shows, but it will depend on getting that private sector investment. I am absolutely clear that one of my top tasks, possibly my top task this year, having agreed the policy across the coalition and having

brought the Energy Bill into Parliament—coming to your Lordships shortly—is that we have to sell the message to investors, to global capital and to industry alike so that they realise that this is a good place to come and invest and to invest now.

Q361 Earl Caithness: You said that investment would help the economy. Are you familiar with the concept of energy returns on energy invested and aware of its importance?

Mr Davey: I am not sure that is terminology I have seen, but as an economist by training I am used to seeing “return analysis”. But maybe you want to be more precise about the terms.

Earl of Caithness: Have your officials read the Tullett Prebon report, *Perfect Storm: Energy, Finance and the End of Growth*?

Mr Davey: I have not read that particular report, no.

Earl Caithness: Perhaps I could ask your officials to have a look at that and comment on it, because there are some very serious consequences. If this is right, and his predictions on energy return on energy invested are right, that will have a major implication on everything the Government do.

Mr Davey: Can you tell me what the conclusions are?

Earl of Caithness: The conclusions are that the amount of energy that has been invested to get a return has diminished hugely and is almost at critical point now, even for shale gas and things like that, that we are entering a period of life after growth and that we will not be able to stimulate the economy in the usual way, and therefore our investment decisions have to be taken in different form.

Mr Davey: Obviously I cannot prejudge, having not read it, but it sounds like it is supporting what we are doing in my department. There is a need to look at innovative and new ways and to prepare our economy for a different set of economic drivers. That is what we are doing. But obviously not having read the detailed analysis, I cannot comment on the conclusions or whether I agree with them.

Q362 Earl of Caithness: But if you could look at it and get your officials to comment, that would be very helpful. On the financing investment that you mentioned just now, how are you going to attract the private sector to pump in the amount of money that we are facing? We have heard good things and bad things, but how do you see the private sector investing? Does it have the balance sheets to do so or are there going to be novel ways of doing this?

Mr Davey: Capital will come from many sources. Some will come from balance sheets, but if you look at our big six energy companies, their balance sheets are not big enough to fund all the investment that is going to be needed, so we are going to need many forms of capital to meet the challenge. The question is whether our framework is sufficiently strong to attract all the different forms of capital. I think it is. The framework has been developed over a period of time. We have consulted long and hard, painfully at times, to get to the framework that we have. I see it being very largely welcomed, whether it is what is in the Energy Bill itself or things like the Green Deal or whether it is things like the levy control framework that underpins much of the low-carbon investment between now and 2020. Certainly the message I have is that we have it in the right place.

There has been one issue—there is no point hiding away from it—which has been whether people feel there is a political consensus to give certainty and stability to this issue. When

you are investing in energy infrastructure, it all tends to be pretty big. A lot more of the philosophies are very big, whether it is nuclear, which may be generating for 60 years, or wind farms for 25-plus years. With those sorts of investments over that period, inevitably people need to be reassured that the policy is going to stay.

First of all, one thing that is extremely good about our country is that successive Governments of different persuasions have stuck by the word of government. I think people have noticed that over the years. Compared to other jurisdictions we have built ourselves up an enviable record of honouring our agreements, honouring our deals and having a greater regulatory certainty than elsewhere. People will have noticed that there was a discussion in government ahead of striking the deal that we did across government and I think during those discussions that did create some uncertainty. We had some headlines that were not helpful and would have been read in boardrooms around the world, sending unclear and mixed messages.

The point I wish to make is—and I have been making it since we agreed that deal—that that period has ended. We have a deal. We have agreement. We are sticking to that deal. The Prime Minister is leading it himself and therefore we have, across the two parties in the coalition, that political stability that will endure. I would not want to prejudge the debates in your Lordships' House, but certainly in the House of Commons we have seen in the debates over the Energy Bill a very constructive attitude taken by Her Majesty's Opposition. Of course they have particular points they wish to make and that is quite right, but generally they are supportive of the approach. That suggests that there is a very strong political consensus behind the measures that we are taking.

I am realistic enough to know, having had the headlines in the autumn of last year, that we need to spend some time getting the message out that we have agreement and that will stick. It is not like switching on a light. It has not changed. We have work to do, but we have already started that and we have a programme ahead of ourselves of going out to people to make it clear that that political consensus underpins a strong policy framework and that, in the best traditions of our country, we will honour the agreements that we enter into.

Q363 Earl of Caithness: Given what you have said, Secretary of State, do you think that the work that you did with the Commission in reducing the energy infrastructure amount for interconnectors from €9 billion to €5 billion recently was sending the right message to investors and creating that certainty that you claim is there?

Mr Davey: If I just wore my energy hat and had no other hat on, I would of course have liked a higher element for energy. But I very much agreed with the collective decision that we took, and it was strongly supported by both sides of the coalition throughout this process, that we needed to ensure that the European budget was properly constrained and that we saw the sort of discipline that we are having to place in domestic budgets. I thought it completely impossible to ask people in the United Kingdom to tighten their belts if we were not to tighten our belts in the European Union.

The amounts of money that you talked about over the whole of the European Union are not huge. Moreover, the vast amount of investment that will come, both at European level and national level, will come from the private sector and the private investors are whom we need to be convincing. Of course it would have been nice to have a little bit more for the sector and the policies that I care about but, as in domestic policies, we all have to cut our cloth. I do not think the impact of cutting our cloth in this particular area is significant. I would point you to that whole budget heading. The biggest cuts were in the transport and telecoms sector; the energy sector proportionally held up very well.

Q364 Earl of Caithness: My final question is: what is your view on interconnection and capacity mechanisms? We have heard a lot about interconnection being one of the best ways forward, but if the money is not there for it, will you rely on capacity mechanism?

Mr Davey: While capacity mechanism and interconnections are related, I think they are also quite different policy areas and inevitably all this does have interlinkages. But if we can focus on interconnections, it clearly is a very important part of the single market that the UK Government have strongly supported and continue to do so. We have been exploring the potential for more interconnections, whether it is the one that the former Minister Charles Hendry was looking at in Iceland, with geothermal energy; whether it is the MoU that I signed with my Irish counterpart, Pat Rabbitte, looking at whether or not there could be imports to the UK of green energy from Ireland; or whether it is the feasibility work that is going on I think between National Grid and its Danish counterpart for interconnection with Denmark.

It is not just the UK interconnecting with the rest of Europe—and beyond in the case of Iceland, although Iceland is in Europe—it is what is happening across northern Europe. I worked with my Danish counterpart, Martin Lidegaard, to try to see if we could get more political leadership in this area. We have started something called the Northern European Energy Dialogue and we had the first meeting last year in Copenhagen. We have 12 member states represented, the Commission was there and private sector people were there looking at how we can give more political momentum to the single energy market with the impact on interconnections. We are going to have a follow-up meeting later this year in London. Clearly, it is the whole of Europe that we need to connect, but northern Europe is a good starting place. There are some projects there, not just the Connecting Europe Facility, and the more we can fast-track them the better.

Q365 The Chairman: Just one thing: does your department have any sense of the sort of rates of return that the nation will have to give to get this investment, given that these are global corporations, they can deploy capital and capital markets are global? Is there any sense, as they weigh up the opportunity, of the very firm point about the Government's commitment to that? It is obviously very strong, but do you have any sense of the rates of return people are looking for?

Mr Davey: When we set things like the renewable banding and when National Grid is consulted, doing a corporate reference on future strike prices—we will publish those in draft and we will look at them later this year—clearly when we think about those, we do think about rates of return. We want to make sure that these are attractive and people are going to invest. But I do not know if we publish all the details about the rates of return, not least because we want to get a good deal for the consumer and the business. I hope you understand that maybe it would be unwise for me to say that we are offering huge rates of return.

Let me give you an analogy with a problem we had to deal with—I came slightly late into it, but nevertheless I had to agree our solutions—and that was with feed-in tariffs for microgeneration, particularly solar PV, where the rates of return are, shall we say, generous. They were rather overgenerous, in my view, and I think in the view of my predecessor, and we decided that we would cut those to a more reasonable amount. When we were doing our analysis of how we would control this with the degression mechanism with lower feed-

in tariff rates, we looked at returns that were I think between 6% and 8%, but do not quote me on that.⁵ That is in the public domain, I think, so that gives an indication.

The Chairman: That is very helpful. I think the question was not what you are going to pay but what the market is asking for, which is slightly different. I will take guidance from that 6% to 8%. Thank you very much.

Q366 Lord Lewis of Newnham: In your discussion at the moment you refer very much to interactions with member states in the northern section of Europe. What is happening? As far as we can make out, the majority of our discussions very often involve only northern European countries. What is happening as far as the south part of Europe is concerned? Is there any sort of basic interaction there? One of the difficulties I have is simply that the present arrangements are very much country-based. Subsidiarity seems to have taken over very much as an energy sort of criterion in this sense. The danger here is that one puts more emphasis on security perhaps than on energy and climate change as a factor. How much effort is being made to make a European effect on this? We were given evidence as far as Germany is concerned, with their definite view now on going away from nuclear to basing on wind and solar, so that the grid system is becoming a very important factor to them. This illustrates a European approach, yet it does not seem to be receiving as much attention as I would have anticipated.

Mr Davey: I think that is probably a fair comment. But in defending subsidiarity and member states who have overall control of their energy mix, as the Minister I feel the need to make sure that we meet our energy security obligations and I am not going to apologise for that. If the lights were not on, I think you would be having a different report and therefore I do not apologise that we focus in on that. I think for energy security issues you tend to talk to your nearest neighbours in Europe.

I think you are right to say we still should have a longer-term vision for connecting Europe and I feel passionately about that. There are many influences. I have heard Professor Stern—Lord Stern, I beg your pardon—talk about the idea of connecting the wind in the north and the sun in the south and I think that is the vision that we should always have in mind if we are thinking about tackling climate change and decarbonising. It is the support for the single market that is going to ultimately drive that. It is right to have the vision and to explore that, whether it is the southern part of Europe, looking not upwards but downwards, looking to north Africa and some of the interesting things that are happening there and then maybe using that and having that interconnected market that goes across the European Union.

Much as I would like that to be happening now, we are a little way from being certain that it can happen in a commercially viable way and therefore it is not surprising that we start on a regional basis with northern Europe. I am therefore less familiar with what colleagues in southern France and Spanish and Italian colleagues are doing with colleagues in Cyprus and Malta in relation to north Africa. I think it is a huge opportunity. I hope British companies can be engaged in that opportunity and I hope we can, over the next few years, look to that being developed.

⁵ Note by witness: Some of the returns under the renewable feed-in tariffs scheme are outside the range tentatively mentioned here. The relevant information has been published in the Impact Assessments (IA), which can be located at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/43080/5391-impact-assessment-government-response-to-consulta.pdf and https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42910/5903-impact-assessment-govt-response-to-consultation-f.pdf

Q367 Lord MacLennan of Rogart: Secretary of State, in your December gas paper, it was made clear that combined carbon and storage was essential if fossil fuels are going to play a major part in generation as part of a low-carbon mix. When we were meeting and talking in Brussels with the Commission, they were very critical indeed of the failure to get carbon capture and storage off the ground. We would be very grateful if you could indicate, first of all, why that has been so delayed when it is recognised as important. Can we look to you for decisions where projects support carbon capture and storage and the effects?

Mr Davey: If I can take the answer in two parts, looking at the UK and then looking at the European dimension, in the UK there have been a few false starts but that is why we are taking the route that we are with the robust process we are taking with the current competition. We believe we have one of the most financially attractive packages for carbon capture and storage now with the £1 billion capital and then the contracts for difference underpinning that with future revenue streams should we sign any contracts with any of the consortia.

We start off with an attractive package. I think we can be confident it was an attractive package because eight applicants came into the first round of the competition. In a way, that created a bit of a problem for us because there were eight and we had a lot of work to do to analyse each of the applicants' proposals fully. We ended up having a second round where we discarded four of the applicants, focused on the four most promising that met our criteria after a very, very robust process. We asked those four to enter something called the bid improvement phase. They engaged with our department in a very proactive way. They put in revised bids on 14 January. We are now analysing all of those and we hope to make announcements later this spring, possibly before the end of March.

That decision will not be the end decision, in the sense that in order to make sure we are successful this time, because this is critical technology to get right, we and the companies want to engage in what they call front-end engineering design feed. This is all about minimising risks by doing proper upfront analysis of the engineering design issues so that before you get to a final investment decision to proceed and construct, you really have thought it through and the private investor gets value for money and the tax-paying consumer gets value for money.

How many of the four go through to that feed round and how long that takes, I cannot be sure yet. I have not received the analysis and it is a competition and we have to respect all the rules around such a competition. I do not apologise for that taking a little long, because we are getting it right and we are doing it in a very robust way. I hope I will have some good news to announce fairly soon—the results of that competition—but people should realise that this is a process, not an event. But we are determined to get this right because it is so critical.

On the European side, we are very keen to access the NER300 moneys, but we should be clear that those moneys are relatively small compared to what the UK taxpayer and consumer are putting forward, so we cannot let the tail wag the dog. We have engaged with the Commission very much. In fact, I was speaking to the Commissioner, Connie Hedegaard, yesterday in a very long discussion covering many subjects. We discussed the CCS round—NER300 round 2. I was explaining our timetable and process to her, so she, when she is thinking about the design and timetable of NER300, knows the UK position. We did win NER300 moneys in the first round for some renewable projects. I hope we can get some money for CCS projects too in round 2, but we have to make sure we are spending the £1 billion and signing the CFDs in a way that will stand the scrutiny of your Committee and others and we should not just do it because there are some European moneys there.

Q368 Lord MacLennan of Rogart: Do you think the European moneys could assist us to become the leading technological exponents of this and sell it to others?

Mr Davey: I see the European policy in this area in two ways, in my mind. First of all the money, yes, it could help, but it is a small amount compared to what we would be doing. We have to see it in that context. It is very helpful; I am not trying to dismiss it at all. It would be very helpful and we would like some of it, surprisingly enough, but we have to take decisions that are going to get this project built. The key challenge is to get CCS into a commercial stage so it can have a big rollout in the 2020s. That is the challenge. Everything will be driven by that, not the need to get some European moneys. We have to focus on the actual objective and not be distracted.

But there is a European and, I would argue, global element to CCS because while I want to develop it in the UK—we should be developing it in the UK, we have lots of comparative advantages in it, North Sea oil and gas expertise, our universities, our research base and so on—this is such an important issue for the overall global energy challenge and the challenge on climate change that we need to see a degree of international collaboration. We have been doing some of that with other countries already, with Norway, the Dutch, the Saudis—I think it is called the Four Kingdoms Project. We are seeing quite a lot of movement in North America and in China. I think what Obama has been saying, not least yesterday, on climate change is extremely welcome and I think part of his play will be with CCS. It makes an awful lot of sense in the North American context. If we were to see America going hard on CCS, if we see China going for it, then we need to be part of that and Europe needs to be part of that global movement.

European policy, yes, is about NER300 and finding financial mechanisms to support it, but it is also making sure that we have a positive, outward-looking approach to CCS globally, because it is a global challenge, and if we can move it on ahead of the 2015 climate change talks, the climate change talks will be an awful lot easier if we get a more ambitious agreement.

Q369 Lord MacLennan of Rogart: We have seen almost revolutionary happenings in the States over shale and there has been quite a lot of speculation about it here, but the constraints seem to us to be very considerable. Do you see CCS as being something that is absolutely crucial for shale development in this country?

Mr Davey: I think it would help because if we are going to be burning lots of gas in the 2030s and 2040s, it is increasingly going to have to be abated gas if we are going to be on the right projections to meet our legal obligations to reduce carbon emissions. Therefore if that gas comes from shale or frankly from anywhere, we need to get CCS developed. But there is an argument for shale gas irrespective of CCS because we are going to be burning gas in the UK for some time to come, unabated for the next two decades, more or less. That, by the way, can be climate change-friendly if it is displacing coal. If that gas is produced either from the North Sea or onshore, it means we do not have to import it from the other side of the world. So there is an energy security dimension to shale gas that is often lost in the discussion because the debate around shale gas has a lot of hyperbole, some of which I do not subscribe to and do not believe. However, I think if we can develop and produce shale gas in this country in a way that is safe and does not damage the environment and that is publicly acceptable, it would be a good thing because it makes our country more secure.

Q370 Lord MacLennan of Rogart: Is the continuing uncertainty about nuclear in this country causing greater focus on these alternatives?

Mr Davey: No. I would say that the uncertainty on nuclear is not there, certainly not from where I am sitting. We are engaged in a very ambitious nuclear position. I know our friends in the media want to comment on everything and say, “Oh, it is all going wrong”. It is not. Maybe I could answer that in a later question. The main answer to your point is that we need a diverse energy policy and we need to look at everything. If we put all our eggs in one basket, whether it is a shale gas basket, a nuclear basket, offshore wind basket, whatever, that would be a bad decision. There is so much uncertainty about energy policy. Although we try to give certainty for investors, there is uncertainty over a 40-year period because you do not know what the price of gas is; you do not know whether a new nuclear build will be affordable; you do not know if the costs of all renewables are going to come down as fast as we hope and expect; and you do not know whether CCS is going to be commercially viable. So you are having to create a policy that gives as much certainty to investors as possible but is as flexible as possible to meet these different outlooks, all of which are plausible. That is the challenge of energy policy, creating certainty in an uncertain world. Therefore, you are driven to an energy mix.

Q371 Lord MacLennan of Rogart: May I quickly ask you, in response to what you said about the uncertainty of CCS, what your best guess about it is? Why is there so much uncertainty, because it has been on the stocks for so long?

Mr Davey: Sometimes one has to admit that the Secretary of State is not an expert on everything, particularly with science and engineering. But the people who are tell me that it is not so much the technology where the uncertainty is, it is not so much whether it can work—I think people are convinced that it can work—but whether it can be commercially viable. The challenges that we are going through relate more to the allocation of risks in the end-to-end supply chain for CCS, whether it is capturing the carbon, moving the carbon, storing the carbon and allocating the risks appropriately so that everyone involved in that chain can get a return on their investment. Because that has not been done before, I think people are finding that challenging. That is the bit that is difficult. If you look at where CCS is operating, it tends to be either because the state has put loads of money behind it or that a monopoly utility has a captive market that cannot run away. That is not the way it works in the UK and nor should it work if we are going to make CCS a global champion, if we can.

Q372 Lord Lewis of Newnham: On the situation over the removal of CO₂, if in point of fact you take the situation in Norway, the fact that they charge for carbon emissions allowed them to cover the cost of putting up the establishment. If you are going to emit CO₂ from a whole variety of different sources, do you envisage some stage at which you are going to be charging for CO₂ emissions, in which case of course this could alter the economics of the whole of this balance very rapidly indeed?

Mr Davey: Absolutely. Getting carbon properly priced is what we all would like to see, but we have to do it in a way that still means that we can have an industry in this country—and indeed, in other European countries—and in a way that does not mean that energy is prohibitive for consumers and businesses. It is a gradual process, carbon pricing. Obviously the biggest disappointment is that the EU ETS to date has not delivered on a carbon price that was expected when it was originally constructed. The biggest challenge on carbon pricing in the short term is a reform of the EU ETS. If we had that, it would have the sort of beneficial effects that you are talking about in a way that meets all the challenges that I have talked about in terms of competitiveness and so on.

The Chairman: We have you for about another 30 minutes, Secretary of State. I was just thinking we have four more questions, because we grouped some questions, so we have about eight minutes per question. I am afraid I do not have a clock to wave at everybody.

Mr Davey: I will shorten my answers.

Q373 Lord Whitty: You have already indicated the importance of this issue, so you need not repeat that, but it seems to me the ETS is the major pan-European policy that we have for determining the carbon price. We are not going to get a European tax at this stage, but we do have a market system that was a success in the sense it created a market out of nothing, but as you say, a serious disappointment in terms of the price. That is not entirely unusual in markets, but it does require some further intervention. Could you give me your views both on the short term and the long term? In the short term we have a Commission proposal for backloading the coming round of the allocations and so forth. They think that would help a bit and they strongly urged on us that UK Government support would be helpful in that. That is a short-term issue. The longer-term issue is how we do that radical reform. Are you in favour, for example, of a floor price on a pan-European basis? Clearly the UK Government is going for a floor price that it can ratchet up at UK level, which is not uncontroversial, but on a European basis are you in favour of us moving to that or are there other forms of strategic change in the ETS that you would like to see?

Mr Davey: I have been spending quite a lot on time on this, because there is a proposal on the table and there is the paper that the Commissioner put out that is looking for different ideas. I have been talking to a number of like-minded colleagues across the Council to see if we can drive an ambitious position. The UK Government is the only Government across Europe that has a position on this, as I am aware, for where we want to take this. Let me explain where we started and where we are and what we are going to do.

We started off on the backloading saying we were not going to support backloading unless it was accompanied by set-aside and cancellation, because that is the structural reform that would deliver a carbon price across Europe that was where people had expected it to be. That is what we wanted and we have huge cross-government support on that; BIS and the Treasury were completely aligned in the Government trying to get that. It became clear that other member states were not prepared to go that far. Indeed, some have been having problems even accepting backloading. It is not clear yet whether there is a qualified majority in the Council for backloading by itself. We decided we would be as helpful as we could be to Commissioner Hedegaard and her team while retaining our long-term objectives. We have nuanced our position and we have said, and this is on the record—it is on the record, is it not?

The Chairman: Yes. Just now.

Mr Davey: I think it is, because we are trying to punt it around Europe, that we support backloading at an ambitious level. Indeed, we put a Council proposal that the allowances would not re-enter until phase 4, post-2020. There are quite good arguments for that, but we would also want to tie an agreement on backloading to a timetabled and detailed process towards cancellation and set-aside. We would tie the decision on backloading to a process of getting structural reform. I cannot be certain whether we will be able to deliver that at the European Council, but when we published it, it received quite a positive reaction and we now want to try to persuade as many other member states as possible that that is the place to go. Whether I will manage to do that, I cannot give you any guarantee. Other member states are finding problems getting agreement within their own Governments about the

position that they should take with these negotiations. We have not. But you are right to focus on this. It is critical for Europe to get this right.

Q374 Lord Whitty: You seem to be confirming there is a lack of political will elsewhere in Europe on this. We saw recently that a relatively obscure debate in the European Parliament caused a dip in the price below €4. Going back to Nicholas Stern, he was looking for a price, coming out with a market price for carbon by 2030, I think, of \$30 and eventually \$50. But we are miles away from that. If we cannot even get agreement on short-term adjustments, how confident are you that within the next 10 years we will be yielding prices out of the ETS that drive the decarbonisation process to at least approaching the kind of levels Stern had in mind?

Mr Davey: I cannot be confident yet, but all I can say to you is I am going to be straining every sinew this year—I already have been, but this year is a critical year for this—to try to get an ambitious conclusion to these discussions. To that regard, I am working very closely with Ministers in like-minded countries hopefully to help them persuade their countries to come out where they have been in the past naturally there. For example, I am going to be seeing Lena Ek in Stockholm next week and talking to Martin Lidegaard from Denmark and a Finnish counterpart. I have had a lot of discussions with Peter Altmaier from Germany. The German elections are an issue in this discussion. We cannot hide that Germany is such a critical player. They do not have agreement yet across their coalition, so this is an issue where we need to recognise and understand and help the Germans. I do not believe the French Government has come to a decision yet, but I have been working with Delphine Batho, the Energy Minister. We are just trying to reach out to other member states. There are some good signs. I do not want you to go away too pessimistic. I think the new Dutch Government is in a better place than its predecessor, for example.

I have some ideas, which because they are not in fruition yet I cannot tell you about, but I can assure you I am trying to create some momentum to drive this by working with colleagues. But what I also want to do behind that is try to emphasise the narrative around green growth because when you talk to some colleagues it is almost as if they have never heard of green growth. They do not see the growth potential that we were talking about at the beginning of this session. If they can see it in that context, I think we could move their Governments. This is about persuasion and about showing the opportunity, not just taking other member states' positions in stone. We have to work with colleagues and persuade them.

Q375 Baroness Parminter: Secretary of State, you will be aware that the Commission are proposing bringing forward a Green Paper next month on the future direction of energy policy and climate change policy beyond 2020. Two questions: what would you like to see as the key pillars of that beyond ETS? Secondly, what do you see as the political challenges of getting all member states, including Poland, to sign up to that and the role of international climate conferences, beginning with the one in Poland later in the year, to deliver that?

Mr Davey: I want to give you as helpful an answer as I can. Of course we do not have the proposals from the Commission yet and because we do not have the proposals we do not have cross-government agreement to those proposals. It is quite difficult to have them if you do not have any proposals. We have not engaged across government to get an agreed position. This is more purposeful almost—we do not have an agreed position because we do not have proposals—but I think it reflects the Government's position hitherto, the Climate Change Act, the coalition agreement and so on. It makes sense that above all else in 2030 there is some greenhouse gas emissions objective, target or milestone. We have one

domestically. We have to reduce our carbon emissions by 2030 so it seems to me quite a good thing if the European Union has one as well, to make sure other member states are as ambitious as we are in reducing greenhouse gas emissions. It seems to me there is a logic to that and clearly there will be debate about what level it should be, but as we prepare for the climate change negotiation—the critical one in 2015 that is likely to be held in Paris—if Europe does not have some sort of objective for 2030 in the overall greenhouse gas emission space, then our ability to show leadership will be significantly reduced. That would be, I guess, the obvious thing that Europe needs to focus in on and we will see what the Commission proposes there.

The other area where it is likely that there will be a desire to set some policy is not least in the power sector, just looking at either renewable energy or, beneath that, electricity. Why do I say that? We have a renewable energy target for 2020 and there is some debate, not least in Parliament, that we should have a renewable energy target for 2030. I am less attracted to that, not because I am against renewable energy—I am passionately in favour of renewable energy. If you look at the logic of what we are doing in the UK with electricity market reform and the Energy Bill, we are trying over the next decade to be technology-neutral. I referred to the uncertainties that we face, particularly the uncertainties of which of these low-carbon technologies is going to be the most cost-effective and we do not know, so when you are thinking about policies that are going to be for the next decade, here in 2013 to say “It is going to be that technology” is quite a bold thing to do and you might get it wrong. We have had a debate in this country about a decarbonisation target that follows the logic of the Energy Bill, and indeed we are putting powers into the Energy Bill for the Secretary of State in 2016 to set a decarbonisation target for the power sector in the UK. It is slightly different from a renewable energy target because a renewable energy target covers transport as well.

But, on electricity, which is my brief, the logic for a decarbonisation target in the UK is quite strong. Whether or not we could convince European colleagues that that is the way to go and move from a renewables target to a decarbonisation target, I do not know. Whether there are other targets or objectives we should be setting on energy efficiency or some other measure, I do not know. That is where the debate should be though. The need for a greenhouse gas emissions objective or target follows from what we are doing and follows from the 2015 negotiations. On any other targets, there is a question mark over what they should be and that is a good debate to have. We have certainly not yet had it in this country but we need to have it.

Q376 Baroness Byford: Lord Chairman, that follows in very well because my question was coming up to the targets. Earlier on, Secretary of State, you said quite rightly that you are expecting most of the investment to be coming in from the private sector. The one thing that we have had feedback on is that the private sector looks for a longer-term investment. Therefore, it is a bit difficult if you are saying you are against targets—you have explained why and I accept that—yet they, as investors, are looking for longer-term security. I was very interested in your last comment on energy efficiency and looking at other ways you might look at targets. I wonder if this is something that has in its early days been discussed—we are an EU Committee—across other member states or if it is so early that it has not come that far yet.

Mr Davey: First of all, I want to make it clear for the record that I am not against targets.

Baroness Byford: No, but the suggestion from our brief was that the Government were not looking for beyond-2020 targets at this stage.

Mr Davey: I am not even sure if I said that.

Baroness Byford: Yes, forgive me, on renewables.

Mr Davey: On renewables, but there may well be a case for a low-carbon and decarbonisation target that will incorporate renewables as a really big part of it, but also would leave room for CCS and for nuclear, and indeed for some other low-carbon technologies if they prove to be the cheapest and most effective and quickest way. What we should all be concerned about now is not technology but climate. The cheapest and quickest way of getting there is what we should be about, so if we set a target that did not get us there quickly and cheaply, we would be shooting ourselves in the foot. I am in favour of targets. It is just the right targets and good robust analysis to be clear about what the right target is.

You asked about energy efficiency. One of the good things last year was that we moved in Europe. We have made real progress in Europe and I do not think it has been recognised enough. I do not think it has been recognised enough across government, let alone in the media or elsewhere in Parliament, that the energy efficiency directive that was agreed was quite a good agreement.

My counterpart, Martin Lidegaard, rang me up at the start of the Danish presidency and said, “We are going to sign an energy efficiency directive”. Officials—they are very, very good officials—were saying, “We are not sure if we are going to be able to achieve that in the Danish presidency”. I have to say, having had a little bit of experience now, I thought, “Yes, this is quite an ambitious task”. But he did it. He got agreement and that was a really impressive piece of leadership from the Danes. Okay, it was not as ambitious as some people would have liked, but it was an agreement that moved us forward, and that shows what can happen.

I have to say I am passionate about energy efficiency. It is one of the things that should unite everybody because it saves people money and it makes industry more competitive. It is such a no-brainer. Because the logic is so powerful, I think that is an area we should be looking at beyond 2020. In central and eastern European countries in particular, that is an area where we can find a lot of common cause.

Q377 Baroness Byford: Yes. Perhaps I can just very quickly add into that the much more localised question of the use of waste, for example, to provide local energy in some form. How high or low on the list is that, or is it just so small that it is not something the department is looking at in a realistic way?

Mr Davey: There is a whole set of contributions to this.

Baroness Byford: Yes, we talked about diversity earlier.

Mr Davey: Yes, and energy for waste has a role to play, absolutely, but so has community energy, so has the big stuff, so has energy efficiency. What is clear about the challenge is that it is just so immense and you have to be trying everything. It is immense both in terms of decarbonisation and in terms of electricity supply. What people often fail to remember in this debate is not only do we have a fifth of our power stations closing this decade, which even if we did not have climate change is a bit of a challenge, but if we decarbonise the transport sector and we decarbonise heating, we are going to be using an awful lot more electricity and needing a lot more electricity in the 2020s, 2030s and beyond, so we have to find lots of new ways and low-carbon ways of generating electricity and using it more efficiently. That is why I do not think we can leave out anything.

Baroness Byford: Thank you.

Q378 Baroness Howarth of Breckland: In some ways electricity is the easy one, because we have that identified and I think it is about 40% of total emissions. The real challenge is about the remaining emissions and the much more complex programming in relation to those and balancing that work in terms of restricting those emissions, as you say, with continuing security and supply. Because this is such a complex area, I know that you have a framework that you are working to and I know you are going to publish. Would it be helpful for you to have a pathway which identifies the vision, if you like, and the issues along the pathway to that vision and which has some analysis in it of the comparative areas of the pathway? I have been struck—I have been sick for part of this inquiry, so I have come to it rather fresh, which is quite useful—by whether or not the micro solutions and the national solutions might in fact be more productive than the huge grid macro solutions. But we do not know, and we do not know at the end of the day what is going to produce the best solution. I just wondered how much of that analysis has been done and how much more to try to clarify that pathway could be done to help with some of those issues. It is strategic rather than a—

Mr Davey: Yes. It is quite obviously being done within the UK for the UK. Probably less has been done for the UK and Europe in Europe as a whole. We have a number of long-term vision documents that then are broken down to quite practical measures, so we do, for example, believe we have to, as you rightly said, decarbonise electricity because that is a facilitator to decarbonise transport and heating. It is that sort of pathway in the great big picture that we are embarked on. But if you look at things like the carbon plan that was published in 2011, if you look at the 2050 calculator, these are ideas of enabling people to look at those pathways.

Perhaps I may just touch on the 2050 calculator, because it was something I had never heard of until I came into the Department and I have been surprised at how effective it is. You can all go on the website—it is open access and there is a schools version. What it enables people to do is to look at different pathways: if we went completely nuclear and we had all nuclear, what would that mean? If we had a mix of just renewables and nuclear, what would that mean? What would happen if CCS happened big time and how much could we do on all different types of renewables? When the department was building the 2050 calculator it was open source, so we had huge amounts of input from academia and from industry to ensure the assumptions were correct in terms of both the technologies and the finances underpinning that model. This 2050 calculator gives people an ability to look at a whole range of different pathways depending on what they want to do, and all the different implications of going down different routes.

Baroness Howarth of Breckland: Does it give a timescale, because the real issue I am concerned about is the time that this is all going to take in relation to climate change and how long we really have before two degrees happens and we are into irreversible?

Mr Davey: Of course our approach to that is first of all making sure that Britain is doing as much as it possibly can and meeting our legal obligations of 80% reduction by 2050. All our pathways are designed to fit what we can directly control. But we do a huge amount of work and spend a lot of money and a lot of time in trying to influence others. If I take the 2050 calculator, at least eight or maybe 10 countries are building their version of the 2050 calculator that was designed in the UK. That may sound minor, but I think it is very, very big. The Chinese have their 2050 calculator, and they have not just bought it off the shelf and said, “Oh, we will use all your assumptions”. They went through the whole process that we

did and it was probably one of the most open things the Chinese Government has ever done in asking academia and industry in China to decide what the assumptions should be for China and for the Chinese calculator. I was fortunate enough to meet their team who had come over here to work with our team and to finesse what they are doing. The Chinese are using their version of our 2050 calculator in their long-term planning, not just in this five-year plan, but in thinking about five-year plans ahead. The point I am making is that for us to make sure we play our part in the global battle in relation to two degrees, yes, we have to make sure we are right here in the UK. We have to influence others and help them have the tools and we have to prepare very hard for the 2015 negotiations.

Q379 Lord Whitty: This is in part going back to the energy efficiency issue. In order to drive energy efficiency, you have to change business and consumer behaviour. The most effective way of doing that is by price. In any case, on the supply side this is all going to cost a lot of money so consumers and businesses across Europe are faced with an increase in price for their electricity for all sorts of good reasons, but there is a backlash. I just wondered how far you and your colleagues across Europe are concerned at the political backlash at higher energy prices sustained over a longer period of time frustrating the achievement of any of these desirable goals.

Mr Davey: I do not think we have had that sort of discussion. We probably should have. We probably should have particularly with colleagues in Germany who are at the forefront of that. I can only give you details about what we are doing in the UK, but maybe you do not want me to go on about that, because I worry about it both in terms of fuel poverty as well as public acceptability. That is why energy efficiency—I think this is where you were going—is such a critical part. Are there other things that we can do, whether it is more intelligent support for the most vulnerable to help them with their bills, whether it is tariff reform, something I am particularly keen on, collective switching, or other measures to try to ameliorate the impact for consumers and obviously other measures for energy intensives and other business? But in terms of where the European debate is on that, I genuinely cannot say we have had that discussion.

Lord Whitty: Right. It could be a deal breaker.

Mr Davey: You made the point. As I said in a previous answer, we want to have a narrative about green growth, and it follows from that narrative that we will need to explain how this is beneficial for consumers and businesses, so that debate, if we can get it going at any intensity, would have to deal with this issue.

Q380 Lord Plumb: Secretary of State, you have already made it clear that you support emerging technologies and that we need diverse policies. That has been evident in the evidence we have received from many people, but I wonder if you can be a little more specific. When Dieter Helm came, he argued that the public support should be focused on emerging sustainable technologies rather than already proven but expensive technologies such as offshore wind power. There are others who rejected that argument and said we should stand by what is already there in existence, which of course we can use, and move towards the development of the relevant risk systems, implying a need to support all renewable energies particularly to meet current binding targets. I wonder if you can therefore say, because I think it will certainly help us in our report, where this lies. We have all these emerging technologies. Lady Byford just mentioned the possible use of biomass. It may be small, but there is big waste in this country that can be used. I am a great believer in anaerobic digestion and I hope you can get at the planners a bit, because a lot of those projects have been held up quite considerably. I have been involved in some of them and it is

annoying when you see that waste there—it can be used and we can get on with the job. Those may be small in comparison with the big issue, but where do we concentrate at the moment in all this? What is your view on the Dieter Helm approach, for instance?

Mr Davey: I have discussed it with him, and a number of issues on energy policy, and he is very insightful and entertaining as well.

Lord Plumb: We found that, too.

Mr Davey: Yes, and some of his insights are absolutely right, but he does not always get it right. Let us remember that a few years ago he was saying that there was going to be no gas and we should all go nuclear, so he is not always right. But he is very insightful and very knowledgeable and worth listening to. On this specific point, I do not think it is an either/or. I think his position would be that we should be spending hardly anything on things like offshore wind or mature technologies and we should be putting all of it into research. The problem with that, if you just take that quite absolutist approach, rather than what I think is our approach where we are doing both—we are doing deployment and we are doing research—is that if you simply focus in on the researching of new technologies, you are never going to get there. Particularly if you take offshore wind, the real cost reductions are going to come through learning, through deploying, through things that you cannot anticipate in the university laboratory or in the classroom. You have to go and do it and when you see the companies who are going out and doing it, they are learning every day. They are learning how to do it more efficiently and more cheaply every day. In my first week, I opened the world's largest offshore wind farm in Walney and I am apparently going to be opening lots of the world's largest wind farms as they get bigger and bigger. They were saying to me that that wind farm had taken them half the time to build than the previous one. Each time, as we industrialise, the costs are coming down. They have to come down in offshore wind and we have been working with the industry for a timetable for them to get their costs down rapidly, but you will only be able to do that through learning. Given that the UK has some fantastic resource in offshore wind, it would be bizarre if we did not try to exploit it, so that is where I disagree with him. I am not sure if he factors in the learning by doing. There are other very learned academics, Lord Stern and no doubt many others, who put a lot of emphasis on this innovation element, but innovation as you do things.

I was reading the paper earlier today about shale gas in the United States. They have dramatically changed, over a period, their technologies and we will obviously benefit from that. But I am not sure if there is any other country we can wait to look at how they do offshore wind. His argument might work if there was another country that was doing lots of offshore wind and we could wait and maybe in five years' time learn from their experience. I do not think there is, and therefore you can argue it is our moral responsibility almost, given climate change, to see if we can drive the technology costs down in offshore wind. Others who have some potential can then learn from us.

Lord Plumb: But we do not have the land mass to deal with shale gas like the United States has.

Mr Davey: That is true. We have greater challenges for shale gas than the United States does. That is absolutely true, but it does not mean we should not try.

The Chairman: That has been very frank, thank you. It has been very informative for us. It has helped us with our thinking and we are very grateful. Thank you very much indeed.

DIW Berlin, German Institute for Economic Research—Written evidence

I. A common EU approach to transforming the energy system

The shift towards a low-carbon scenario for the energy system implies a shift from the import of fossil fuels towards the investment in low-carbon generation technologies. Simulation studies show that on average across the next decades the total system costs are similar across different scenarios, but comprise 48% capital costs in a high renewables scenario instead of 39% capital costs in the current policy initiatives scenario.⁶ Thus early investment can contribute to economic growth, while reducing future fossil fuel imports reduces costs and risks for the economy.

A common European approach to transforming the energy system can reduce the cost of the transformation and enhance security of EU energy supply in three ways.

First, an integrated energy system – both on gas and electricity – allows countries to share resources. The natural resource of wind, solar, bio-mass and marine energy varies across regions and time. An integrated electricity transmission system allows access to some lower cost resources.⁷ Integrated electricity and integrated gas systems also reduce the need for expensive storage capacity in any country, because not all countries will require the storage at the same time, as damages to infrastructure, the production from wind and solar plants, and potential interruptions of supply from third countries happens at different periods. Thus an integrated energy system enhances energy security and reduces costs for consumers.

Secondly, EU Directives provide an opportunity for governments to commit to mid-term objectives, because once a Directive is agreed both by heads of state and the European Parliament; it will be difficult to change. This is the type of commitment that investors seek to pursue investments in innovative technology and upgrading and scaling up of manufacturing capacity. Thus the longer-term commitment embedded in a European approach enhance innovation and reduce costs for low-carbon transformation of the economy.

Third, international companies and the finance sector can more easily incorporate a common European approach in their strategic choices than a mosaic of national policy decisions. Thus a common European approach enhances the effectiveness of policy and thus requires less policy interventions to guide the economy towards enhanced investments in innovation and low-carbon technologies. In the absence of a common European approach, political concerns about competition among EU member states will reduce role of economically efficient market based instruments (e.g. carbon pricing) in the policy mix. In the absence of a common European approach, many of the internationally oriented companies will also struggle to respond to the variety of different policy signals from EU countries, creating the risk that these policy signals will be often ignored.⁸

⁶ See EC 2011, Energy Roadmap 2050 (table 40/41).

⁷ See for example “Shaping an effective and efficient European renewable energy market“, Final report of EU research project Re-shaping, <http://www.reshaping-res-policy.eu>

⁸ See for example “European Electricity Infrastructure: Planning, Regulation, and Financing“, Neuhoﬀ, and Boyed

The main risk of a common European approach relates to the complexity of the European decision processes, often requiring unanimity among EU governments. This can result in delays and watering down of policy decisions. Therefore it is essential that EU member states provide mutual support and encouragement towards the implementation of existing EU Directives and contribute to the European momentum by taking a lead on specific policy items – both through demonstrating their success in the national context and by putting them on the European policy agenda.

II. The Internal Market in Energy

The Directives relating to the internal energy market have a strong focus on the delivery of efficient short-term markets, in the expectation that this will be the basis for future revenues for investors. In recent years the public good nature of many infrastructure investments and the core role of transmission infrastructure for security of energy supply, energy costs, and the de-carbonisation of the energy sector has motivated the development of the EU infrastructure package. The effective implementation – particularly in light of the changing mix of electricity generation technologies – of the third energy package and the infrastructure package will still require careful attention in the coming years.

The committee raises the additional important question to what extent governments should dedicate additional attention to the supply chain of several of the low-carbon technologies. Investors into the supply chain face the risk on the performance of their own technology relative to the technology of competing firms. This risk – together with the upside opportunities – is the incentive that encourages innovation and is a necessary driver for an innovative economy.

In addition to risks relating to technology uncertainty investors face uncertainties about future policy developments, in particular on the pace at which governments will implement and refine policies to guide a shift towards a low-carbon energy system. Reducing this uncertainty is key and an essential contribution to attract innovation and investment in the supply chain for low-carbon technologies in European countries. This requires both clarity about the longer-term development and credibility of any such longer-term commitments. Investors deduce this credibility from the actions of current policy makers – are they dedicating resources and time and pursuing policies that are consistent with this longer-term objective.⁹

III. Reducing the costs of energy for business and consumers

A multitude of factors determine the preferred location and thus investment choices of firms, including the institutional stability and quality, availability of qualified employees, a supply chain for inputs and service industry to support production, and suitability of infrastructure. Costs of labor, services, infrastructure including energy and transport, and tax levels and structure are obviously equally important decision factors.

Against this bigger picture, firms will trade-off opportunities and costs across all input factors ‘offered’ by different countries if they are in a position to decide whether and in what

⁹ See paper Relative Importance of Different Climate Policy Elements for Corporate Climate Innovation Activities: Findings for the Power Sector Karoline Rogge (ISI Fraunhofer), Tobias Schmidt (ETH Zürich) and Malte Schneider (ETH Zürich), as part of the Climate Strategies Project Carbon Pricing for low carbon investment.

country to invest. For most firms energy prices and costs are therefore only a minor factor in their investment choices. This is prominently illustrated by the limited attention that most companies dedicate to energy efficiency in their investment and operational decisions despite the opportunities energy efficiency offer to delivery lasting reductions of energy costs.¹⁰

For some sectors, contributing to about 1% of UK GDP and a similar share to the overall European GDP, energy costs are a more significant factor. This is illustrated in Figure I based on the cost increase that a 20 Euro/t Carbon price would create relative to the value-added in the sector. (Note the figure not only captures the impact of the carbon price on energy costs, but also on process related emissions which are particularly relevant for lime and cement production).

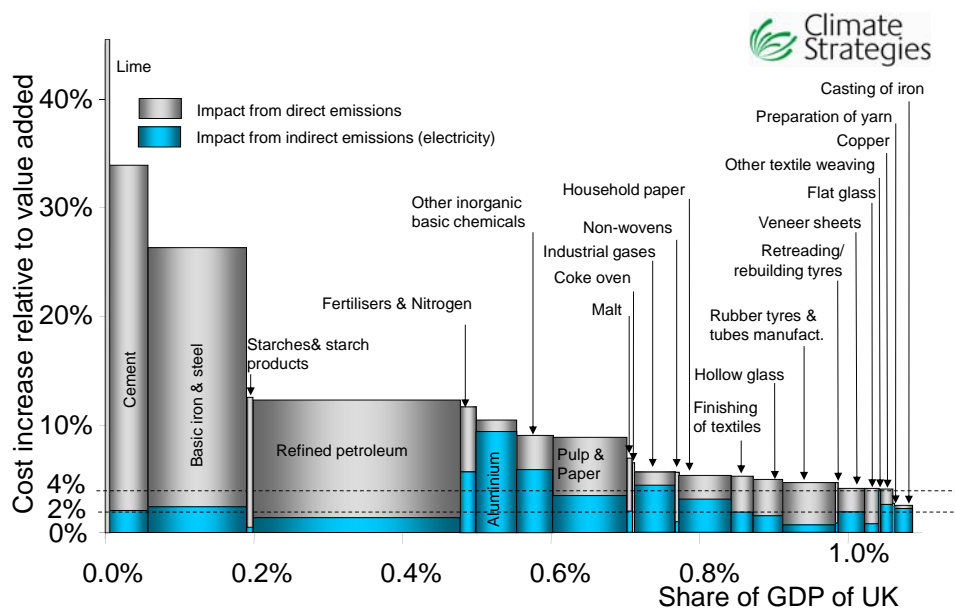


Figure: Sub-sectors of the economy that are particularly energy and carbon intensive.¹¹

For example in primary steel production (not recycling of scrap based on electric arc furnaces) or in primary aluminum smelting (again, not recycling), carbon and energy price increases can significantly impact on profitability. As such, examples from iron or aluminum production are not representative for the overall manufacturing sector but illustrate challenges specific to a very small number of energy intensive activities. This suggests that policy discussion and response with regard to energy prices should clearly differentiate between a small number of very energy and trade intensive basic commodities and the overall economy.

For these sectors it is likely to be difficult to advance a national policy that results in higher energy and carbon prices so as to encourage a more efficient use of energy and reducing carbon emissions, without similar measures pursued across other European trading partners.

¹⁰ "Organisational factors stemming from ignorance and inertia, or from internal structures that prevent the relevant persons from realising the financial/business benefits of decisions that improve energy efficiency, result in inconsistencies in capital deployment and neglect of opportunities that would be cost effective for the overall organisation." The UK Climate Change Programme: Potential evolution for business and the public sector, The Carbon Trust, 2005.

¹¹ Hourcade, J.-C., Neuhoﬀ, K. Demailly, D. and Sato, M., 2008, Differentiation and dynamics of EU ETS industrial competitiveness impacts, Climate Strategies Report: January 2008.

This suggests that effective policy for these industries is particularly dependent on cooperation and a joint approach across EU countries.

One instrument to deliver this integrated approach is the European Emission Trading scheme. It has been effective in capturing the attention of business across Europe and beyond for climate policy, but is currently suffering from an excess supply of allowances due to large imports of off-set credits and a lower than expected capacity and of private firms to bank allowances for future use at times of higher scarcity.¹² The currently very low carbon prices not only reduce the viability of any low-carbon investment choice, but also cannot encourage firms to explore low-carbon business strategies. A coordinated policy response at the European level is required – and illustrates thus the need of continued cooperation for an effective European energy and climate policy.

Most energy intensive activities – perhaps excluding one or two of the basic chemical products – expect a stable or declining demand for their products across most European countries. Thus limited investment is required to increase production capacity. Firms instead sweat existing assets, at the expense of product quality, accepting gradually declining international cost competitiveness. Major investments are instead pursued in countries with growing demand. Innovative capacity will move along with such major investment programs to the Asian and South-American region.

Large additional investment will only be necessary in Europe, if characteristics of products change (e.g. investment in refineries to match new environmental standards and product mix). Climate policy could create such a demand for new product and processes with higher energy efficiency and lower carbon content, and thus could trigger investment in European countries. Thus climate policy can well become the driver for economic activity across many sectors of the European economy.

4 October 2012

¹² See for example “Strengthening the EU ETS - Final Report”, <http://www.climatestrategies.org/>

DIW Berlin, German Institute for Economic Research and Centre for European Reform —
Oral evidence (QQ I-33)

**DIW Berlin, German Institute for Economic Research and Centre for
European Reform —Oral evidence (QQ I-33)**

[Transcript to be found under Centre for European Reform and DIW Berlin, German
Institute for Economic Research](#)

DIW Berlin, German Institute for Economic Research— Supplementary Written Evidence

CCS: *With regard to the question on the German position with regard to CCS, why is it so unpopular, and how one can possibly get any sort of European co-ordination when a major player within Europe is ruling out both nuclear, which produced 23% of Germany's electricity in 2009, and now CCS?*

With regard to CCS, I think, in the German context, the case for CCS is widely perceived to be less credible than the case for an all renewable energy system. This might partially reflect the difficulties of operating CCS other than as base load, but the limited value of CCS as base load plant in a power system with large shares of renewables. As a result, the local concerns in states that are envisaged to host demonstration plants have dominated and where not helped by the limited credibility of the big utilities advancing the projects.

With regard to nuclear, all political parties in Germany have voted for an accelerated phase out. This reflects the broad political consensus in Germany that needed to be reflected in direct action. It explains why the “Energiewende” was communicated in 2011 as a national concept, so as to demonstrate that German nuclear power plants can be replaced with renewables rather than with imports from nuclear power stations in neighboring countries.

With the growing confidence on the basis of the decision (no political party wants to risk the political backlash of touching the topic again) on nuclear power, you can observe an increased focus on engagement with neighboring countries and a European dimension of the energy transformation. I think there is an increasing interest and opportunity to coordinate energy policy more widely.

Fossil investment: *It seems that Germany is going to build 29 new gas stations and 17 new coal stations and none of them is going to have CCS.*

If investors would consider advancing such a number of fossil generation projects in Germany, I would wonder about the credibility of German renewable objectives. However, from my understanding the number is significantly lower.

Eight new coal plants are expected to be commissioned in Germany in 2013 and 2014. These investments were decided prior to 2007 and were delayed due to technical difficulties with the first generation of very high temperature boilers used to increase efficiency. In addition, two out of these projects already under construction are significantly delayed due to legal reasons, meaning that it is not sure whether they are continuing to be built or not (Datteln 4 and Lünen Trianel). Of all the other projects that had been in the pipeline, only three projects (Stade, Pöfgen and Niederaußem) are still actively pursued. It is likely that the respective investors will only decide in 2015 on whether to ultimately take the investments forward - depending on their specific economic situations linked to integration with heat networks, a chemical plant and the local acceptance at the respective sites.

With regard to the gas power stations, today's high gas and low coal and carbon prices do not make for an attractive investment case for gas stations. There are also little expectations that shale gas will change this picture. We recently hosted a seminar on the topic with Polish

and German experts. The geology in Germany is not very promising and would also imply rather high costs should successful sites be identified and environmental permits be granted. Also in Poland the initially high hopes put on shale gas seem to be relativized with the challenges of building up a large scale program. I think it is therefore unlikely that shale gas can fully replace gas imports. Thus the price of imported gas will continue to determine the price to be paid by all consumers.

In fact, E.ON considers mothballing a brand new Combined Gas Cycle Turbine. Thus the only new gas projects that are likely to retain investors' interest are open cycle gas turbines to meet peak demand, but even there the economics would have to first improve.

EU grid: *Lord Cameron of Dillington asked about the benefit of European grid and energy infrastructure and interconnection, both for security reasons and for encouraging renewables? How much cost could it save for consumers? Clearly, it would be very expensive upfront but I am not quite sure how the price would come down later.*

Within the case of grid investment it is important to put the upfront investment cost in relationship to the long periods over which the lines will provide benefits. With strong regulatory frameworks, private capital can be attracted to Europe to finance the upfront costs at low cost of capital, and by expanding the depreciation periods for the assets, as the UK has illustrated, the consumers will not be exposed to upfront costs and instead pay for the lines over the period during which they benefit from the transmitted power.

The EU infrastructure package emphasizes the role of cost-benefit assessments; hence I would assume that grid investments will only go forward where the benefits can be demonstrated. There are 9.1 billion Euro envisaged in the Connecting Europe facility to support energy infrastructure investment for the period 2013-2020, as Stephen Tindal mentioned, but they will be shared across power, gas, oil and CCS. Thus the available amount is small compared to the envisaged investment program, and will thus only be effective if targeted for example to innovative projects.

Lord Cameron of Dillington asked about the attitude within the other member states to a European grid – in particular public acceptance.

Like in the UK, there had always been a strong local opposition to grid expansion plans. As part of the package of laws passed in Parliament after Fukushima, a law for accelerated network extension was planned, that provides for a process to develop a national 10 year network development plan that has now been agreed by the German Parliament so as to enhance the credibility for subsequent planning processes. In addition, planning law was adjusted to accelerate the process from 10 to 4 years and frequent review processes and a joint platform to discuss network issues were created to identify and tackle challenges early. Overall, the clear link of the transmission needs to require renewable projects has so far contributed to a far more positive and cooperative atmosphere between all actors.

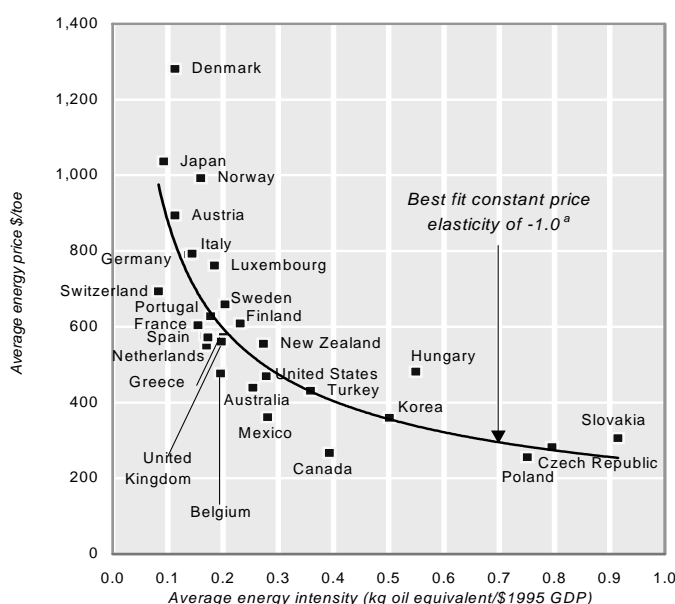
So far, transmission projects in the network expansion plan are primarily within Germany – reflecting the initial focus of the German debate: ensuring shut-down German nuclear plants are not just replaced by foreign nuclear plants. But as the German public has been assured of this, the debate is now moving towards a more European perspective. I expect that transmission lines linked to European renewable projects will be able to obtain a similar treatment and public acceptance.

Energy costs for industry: Lord Plump asked how significant that impact is on energy costs for companies such as steel and cement companies and other large companies. Should this be specifically the responsibility of those companies or should measures be put in place to assist energy-intensive industries to absorb those energy costs?

On behalf of the German Finance ministry, we studied policies on how to effectively support industry in improving energy efficiency¹³. This is likely to be the most effective way of reducing energy costs in a world of rising energy prices.

But this requires sufficient attention and prioritization within companies – and some regulatory support. If I put myself in the shoes of a manager of a company struggling with a myriad of short-term issues, I can see the temptation of mandating the regulatory affairs department to lobby for exemptions on energy taxes – this can quickly reduce my energy costs with direct impacts on profitability and requires no additional internal effort. The alternative requires a bit more attention from the management – setting up the organizational structures and protocols to unlock energy efficiency potentials in operation and investment choices – and has impacts that might only be visible over the following years.

I was struck by the following graph Prof. David Newbery published in 2003:



Source: Newbery, D. M. (2003). Sectoral Dimensions of Sustainable Development: Energy and Transport. *Economic Survey of Europe* 2: 73-93.

It shows the amount of energy used per unit of GDP produced in a country and the average energy price faced by industry and households in an economy: Countries with twice the energy price can produce twice the amount of GDP with one unit of energy. This suggests that companies do respond to energy prices. We have since pursued studies with more detailed data sets, looking across time, across countries and across individual sectors¹⁴. The results remain robust. On average, sectors deliver about half the improvement of their energy efficiency relatively quickly. The reminder is linked to the choice of the efficiency of

¹³ <http://publica.fraunhofer.de/dokumente/N-220181.html>

¹⁴ Steinbuks, J. and Neuhoﬀ, K., 2010, Operational and Investment Response to Energy Prices in the OECD Manufacturing Sector, Cambridge EPRG Working Paper 03/10

new equipment, and thus distributed over several years in line with the (re-)investment cycles.

Obviously, one has to be careful with generalizations, and as you can see from the discussion in my initial submission, there are a few very energy intensive processes, like the production of basic steel or primary smelter of aluminum and copper, for which energy prices have a very significant impact on production costs. They warrant special analysis, and perhaps special policy. In a first screening exercise we assessed employment, GDP contribution, and CO₂ emissions from the 25 industrial sub-sectors with the highest carbon intensity. We find that they contribute to 2% of GDP in Germany (1% in the UK), 1% of employment in Germany (0.5% in the UK), but constitute 22% of total CO₂ emissions in Germany (13% in the UK). The variations among these 25 sectors are large - suggesting that some of the sectors might not be at risk. Hence think ultimately policies should directly address the needs of specific energy intensive processes within these sectors.

For such particularly energy or carbon intensive processes it will probably be difficult to impose significant energy or carbon taxes without creating strong incentives or accelerating processes for shifting production to other regions. One could therefore tax the use of these energy or carbon intensive commodities like steel or aluminum, irrespective of whether they have been produced domestically or imported, so as to reduce their consumption. This would however not create additional incentives to improve the efficiency of their production.

Therefore it would in principle be more efficient to fully price the energy or carbon input into their production, so as to also create incentives for efficiency improvements in production, and then adjust in a simplified form for these additional costs at the EU border: In analogy to value added taxes, imports and exports could be adjusted per ton of these basic commodities at the level of carbon costs incurred with the production with a best available technology. Thus, both leakage and WTO concerns could be addressed.¹⁵ The very small set of applicable commodities and the non-discriminatory nature of the adjustment could facilitate engagement with key trade-partners to pursue this based on a shared understanding of the objective of the exercise.

What I think will be important for Europe is the development of a clear strategy to trigger innovation and a shift to low carbon processes and products. Thus we can use the innovative capacity of our economies, develop new products and services, and attract investment. Without such a strategy backed by clear policies, I struggle to see how we can create job opportunities or even retain all the existing jobs in these sectors.

This brings us back to the broader question of the cost increase of energy during the initial years of the energy transformation. This has been discussed vividly in Germany last fall because the surcharge added to domestic and most industrial electricity consumers to cover the costs of the renewable support mechanism had increased to 5,2 Euro Cent/kWh. The cost increase reflects the cost for shouldering a significant share of the global learning investment for PV and deploying in parallel significant volumes of biogas installations. Can the German society bear these costs?

¹⁵ Ismer, R. and Neuhoff, K., 2007, Border Tax Adjustments: A feasible way to support stringent emission trading, *European Journal of Law and Economics* 24, p. 137–164.

We tried to take a slightly broader perspective to analyses this question. In the mid 1980th, German households had to dedicate on average 2.3% of their household budget to their electricity bill. In 2013 this share has increased to 2.5%. For me this number answers the question whether the German society can bear the cost of the energy transformation and will continue to be able to do so. Obviously, distributional implications, e.g. impacts for poor households require careful assessment and measures to address hardship. Currently programs to provide additional help to increase energy efficiency are advanced and early adjustments of means tested benefits are discussed.

Ultimately the continued economic success of the energy transformation will likely be linked to the continued ability to finance large scale transmission, generation and in the future storage projects at relatively low capital costs. The Feed-in tariff has to date provided investors the confidence of stable revenue streams and thus been very effective in facilitating this financing and allowing both new entrants and the large utilities to participate in the projects. As the infrastructure that is being developed does serve the needs of German and European citizens, this is a long-term sustainable investment case, and we observe interest of actors like pension funds to increase their engagement.

The situation differs in the supply chain. Technology companies that produce equipment for the cell production, or manufacturers of PV cells are competing in innovative environments on global markets. Most of the new manufacturing plants for PV cells were built in Asian countries, while several German PV cell manufacturers did not participate in the rapid shift to new production technologies, cell designs and manufacturing scale. This was prominently reported in the media. Equipment suppliers – providing the machinery installed in new manufacturing plants – however retained a strong position in terms of market share and innovation for manufacturing equipment throughout this period.

As you can see – the “Energiewende” remains a central element of German economic development and I assume that it does require continued development of the policy framework. Like in most other European countries, the European Energy Efficiency Directive has triggered some discussion – and the opportunities for innovation, investment in supply chain, delivery of projects, and savings on fossil fuel import bills are gradually entering into the main stream political and corporate discourse. Exciting times – I wish you all the very best for the final meetings of your enquiry on EU energy policy.

7 February 2013

E.ON—Written evidence

1 The cost of meeting climate change objectives will only be acceptable to European consumers if the price of energy remains affordable, energy supplies remain secure, and if European economies remain competitive and continue to grow over the long-term. The cost of achieving the EU's greenhouse gas reduction (ghg) targets over the period to 2050 therefore has to be kept to a minimum and climate change policies need to be compatible with security of energy supply objectives. This will be particularly important where the EU is pursuing climate change targets in the absence of an international agreement on climate change where the EU may be incurring costs not incurred by some of its competitors, or where fossil fuel prices are relatively low, which would have the effect of increasing the net cost of decarbonising the EU energy sector.

2 Reducing ghg emissions also provides significant opportunities for new areas of economic growth. The EU needs to create the conditions which will encourage European industry to invest in the skills and plant needed to provide low carbon services and products both for deployment within the EU and for export. This will help compensate for the impact of the cost of low carbon policies on European economies, creating new sources of employment and wealth creation.

3 These objectives can best be achieved by:-

- adopting an EU-wide approach to reducing ghg emissions which will encourage action to be taken at least cost across the EU. This will help ensure energy prices do not rise more than they need to. While we recognise that individual countries such as the UK may want to set their own targets, this should not be at the expense of an EU wide approach where this is a viable option;
- moving progressively to a more technology neutral approach which avoids selecting energy technologies which may not deliver at least cost and encourages the lowest cost technologies to come forward. As costs may vary over time and the deployment potential of individual technologies, such as onshore wind or biomass, may be limited, this should encourage a diverse range of low carbon technologies to be developed. We would expect low carbon investment in the power sector to be increasingly incentivised through the carbon price and not through technology specific support schemes. 2030 might be an appropriate target date for ending technology specific subsidies;
- adopting a market-based approach to the control of emissions where possible to encourage the market to identify the least cost measures through price signals. The EU Emissions Trading Scheme reflects this and the previous two points, so should have a central role. We have also advocated a more market-based EU wide approach for renewable support schemes which we have calculated could deliver substantial savings by encouraging deployment of renewable technologies where they are least cost e.g. solar power in Mediterranean countries and wind power in countries in north western Europe;
- continuing to encourage the completion of the single European electricity and gas markets to ensure that a competitive energy market incentivises the right investments and reduces energy costs overall, as we discuss below;

- setting a clear trajectory for emission reductions to achieve the EU's ghg reduction target for 2050 with interim targets set for, say 2030, which industry can plan for. We would favour setting a new statutory target for emissions reductions from the EU ETS for 2030 and realigning the EU ETS cap between now and then. This would help incentivise low carbon investments to be committed over the next few years as it will provide more certainty about the long term value of reducing carbon emissions in the 2020s, when many forthcoming low carbon investments will begin operating;
- providing a stable policy framework to deliver these targets which industry can also respond to and plan for. This will help reduce political and regulatory risk and should on balance reduce the return on capital which companies will seek for their investments;
- providing research and development support for pre-commercial technologies such as carbon capture and storage, where these have the potential to reduce emissions cost-effectively, and technologies which may reduce the cost of managing large volumes of wind generation, including electricity storage technologies. Development work can also help reduce the costs of building and operating existing technologies such as offshore wind;
- taking steps to reduce the exposure to the policy costs of reducing emissions of industries who are subject to international competition, and for whom energy accounts for a significant proportion of their total costs.

The Role of the Internal Energy Market

4 A single EU energy market with compatible wholesale and retail markets should overall deliver lower energy prices across the EU and stimulate economic growth, which will help offset ghg emission reduction costs. The EU is working to deliver a common target model by 2014 which will create compatible wholesale power markets and a common basis for trading between markets. It is important that this goal is delivered. The Commission will publish a communication on the state of the internal energy market within the next few weeks which may be of interest to the committee.

5 Retail markets are less well integrated and in many Member States significantly less competitive than in the UK, although the EU has looked to create minimum standards for customer protection and to encourage a coherent approach to delivering energy efficiency improvements and promoting the energy services sector in the recent Energy Efficiency Directive. Some individual countries need to do more to encourage retail competition and to move away from prices regulated by the state.

6 In respect of transmission and distribution networks and the role of system operators, the EU is developing under the third package a set of new codes to ensure a more consistent approach and common standards which are designed to create a level playing field across the EU. Additional interconnection between Member States is also required to create a more fully integrated market.

7 Clearly there are risks from seeking to impose common standards across the EU. For example new European network codes may be too prescriptive (as evident from the generation connection code recently proposed by the European Network of Transmission System Operators for Electricity (ENTSO-E)) and impose requirements on individual countries which are not aligned with national requirements and which impose unnecessary

costs on customers. It is therefore important that such codes do not go further than is need to deliver a harmonised approach across the EU.

8 There is also a risk that individual Governments impose policies which are inconsistent with the single energy market or EU wide approaches to reducing ghg emissions. Security of supply is seen, quite reasonably, as a focus for national policy measures as it is national Governments who are normally held accountable by the electorate, but individual interventions by Member States to help ensure security of supply can also diminish the efficient operation of the internal market. For example, a number of Governments, including the UK, France, Spain and Italy, have introduced or are introducing capacity mechanisms of different types, to ensure sufficient fossil plant remains in operation or is built where generation is increasingly taken up by intermittent wind generation. These have the potential to distort trading and investment across the EU and it will be important to ensure that their design factors in impacts on adjoining Member States. This is an issue the Commission is likely to focus on increasingly.

9 National climate change policies can also have adverse effects on the internal energy market or on EU wide policies intended to encourage a harmonised, least cost approach to reducing emissions. For example the UK Government's introduction of carbon price support will raise carbon prices within the UK and may lead to additional CO₂ emission reductions at the national level but this will tend to reduce carbon prices in the rest of Europe and will not lead to lower CO₂ emissions across the EU within the EU ETS. This may mean that lower cost low carbon investments elsewhere in the EU are less likely to take place.

The Role of Gas

10 We agree with the Commission that "gas will be critical for the transformation of the energy system", until at least 2030 or 2035. Gas-fired generation has lower CO₂ emissions than generation from coal or lignite and has the potential to reduce emissions relatively cost-effectively where there are significant volumes of coal-fired generation on the system. The extent to which Member States may wish to commit to new gas-fired generation may vary and may depend on the extent to which they wish to become dependent on a single fuel source, and whether there is access to diverse and competing sources of gas to avoid security of supply risks or reliance on a single supplier. The latter can in part be addressed by encouraging reinforcement of the European gas pipeline network where required, as is occurring in south eastern Europe, continuing to work toward a more flexible and liquid European gas market, and encouraging new sources of gas supply to the EU. Unconventional sources of gas should also be encouraged subject to ensuring that exploration and extraction are conducted in an environmentally acceptable way. However, the impact of shale gas on gas prices in Europe is uncertain but is likely to be less dramatic than has occurred in the US.

11 Unabated gas-fired generation will, however, need to be progressively displaced by lower carbon forms of generation if the EU's climate change goals are to be met. Carbon capture and storage has potentially an important role in allowing gas and indeed coal-fired generation to have a continuing role in the longer term as part of a low carbon energy mix.

3 October 2012

E.ON—Supplementary Written Evidence

Economic and job creation benefits of investment in energy

- We have invested over £1.8bn in renewables alone since 2009. Over the last five years we've invested over £5bn which matches the profit we have made in the UK over the same period. Energy projects create significant supply chain and local economic benefits.
- Powering the UK, a report from Ernst & Young carried out for Energy UK, found that between 2007 and 2011, energy companies doubled their investment in the UK to £43 billion. It concluded that the energy sector is among the largest investors in the country, and has increased jobs by nearly two thirds. The number of people directly and indirectly employed in the sector is over 600,000.
- We are training all our customer facing colleagues in energy efficiency. We also aim to install 1 million smart meters during the foundation period and are confident that all of our customers will have a smart meter fitted by 2019.
- We agree with the points made in the session about the high quality of many of the jobs created. In addition, we are also focused on providing the right training and skills for the unemployed. For example, working with National Energy Action our Community Energy Fit programme aims to reduce levels of fuel poverty in five English cities. Skills training and practical experience, focused on fuel poverty reduction, is offered to unemployed people to increase their chances of finding employment. Its aim is to provide basic energy efficiency training to 800 unemployed people and recruit 200 volunteers to share this training with their local community.
- We would also agree with Ravi Baga from EDF who commented that one of the key challenges to getting investment in the supply chain is policy uncertainty.
- To give an example of where policy uncertainty is damaging, in the 2009 Budget Government confirmed it would extend the Climate Change Levy exemption (LECs) for indirect supply of electricity from CHP plants until 2023. Investment in CHP assets (including our own Grain gas project) proceeded on this basis. The subsequent reversal of this decision, as confirmed in Budget 2012, undermines the investment case for existing CHP assets and reduces our confidence in Government commitments to support certain types of investment in future. Opportunities to further develop CHP opportunities will reduce as a result of the lack of ongoing operational support for both new and existing CHP assets.
- It is crucial that Electricity Market Reform (EMR) policies are sufficiently robust so that any future changes in Government direction do not undermine investment made in good faith under the prevailing policy regime, as has been the case for CHP.

Investment in renewables

- We now have 1.3GW of renewable generation in the UK (around 17% of our total generation) and this is a growing area for us. We have a portfolio of 22 wind farms, including four offshore. We have a further offshore wind farm in construction (Humber Gateway) and one in development (Rampion). We own a dedicated biomass plant at

Steven's Croft near Lockerbie and we're constructing a small biomass plant at Blackburn Meadows near Sheffield. We have also converted our Ironbridge coal plant in Shropshire to run on biomass until the end of its life in 2015.

Rising energy costs and impact on growth/investment

- We agree with Rupert Steele's comments about being as "cost-effective as possible in the delivery of programmes" and we agree with his comment that support should be sought for onshore wind because compared with other renewable sources it is much less expensive to deliver.
- Delivering renewable generation is essential to tackling climate change but it is important that we drive down costs where we can. This is why we aim to reduce the costs of onshore wind by 25% and the costs of offshore wind by 40%.
- The cost of achieving the EU's greenhouse gas reduction targets also has to be kept to a minimum and climate change policies need to be compatible with security of energy supply objectives. This will be particularly important where the EU is pursuing climate change targets in the absence of an international agreement on climate change.
- Reducing unnecessary risks and policy uncertainty is also important when looking at costs.

Impact of varying approaches to energy policy by the EU Member States

- We agree with the points made by Rupert Steele about the importance of the proposed capacity mechanism in the UK. It is right that mechanisms should be in place at a UK level to address security of supply.
- We believe that adopting an EU-wide approach to reducing greenhouse gas emissions will encourage action to be taken at least cost across the EU. This will help ensure energy prices do not rise more than they need to. While we recognise that individual countries such as the UK may want to set their own targets, this should not be at the expense of an EU wide approach where this is a viable option.

Capacity mechanism in the UK

- Over the coming years, the electricity market in the UK will undergo profound change. In order to meet our renewable and climate change objectives, new low carbon, predominantly inflexible nuclear and wind capacity is being developed. Whilst this will reduce the running hours of conventional flexible capacity, such capacity will continue to be required by the System Operator to ensure supply is able to meet the variable nature of demand and in recognition of the more intermittent nature of some renewable generation technologies.
- Existing power plants will require ongoing investment in order to continue to comply with technical and environmental standards. To cover these costs against a falling number of operating hours, such plant must be capable of earning a return over the few hours it operates. Consequently the wholesale prices required to achieve these returns will have to rise, potentially reaching thousands of pounds per MWh; this is how a perfectly efficient market would operate, with those price peaks reflecting consumers' requirement for capacity (the value of lost load) at times of scarcity.

- Unlike the majority of other European countries, the UK as a whole is already planning to shut a large volume of other plant which does not meet modern environmental standards by 2015 as well as some existing nuclear stations by the end of this decade. Though the total generation capacity the UK needs is always dependant on changing customer demand for electricity, this is likely to result in a need for new plant this decade.
- With generation plant taking years to construct, the UK needs investors to be able to take investment decisions in new plant in the near future. The energy only market is unlikely to incentivise the efficient level of capacity so a capacity mechanism is needed. Few investors are likely to choose to invest against a background of policy uncertainty, meaning that any capacity based reform must be introduced quickly.
- There is a cost to maintaining security of supply and in competitive markets this cost must eventually be passed to customers. This would be true in a market with very high wholesale prices and no capacity mechanism and it is equally true with an explicit capacity mechanism. This makes it vital that any mechanism is designed in such a way as to minimise the cost to the customer.
- Existing plant is generally cheaper to keep running as opposed to shutting such plant and replacing it with new, albeit more efficient plant. The customer will therefore expect any capacity mechanism to provide similar rewards to both existing and new plant. If however there is discrimination in favour of new plant, some existing plant is likely to close prematurely. This would result in more new build being required and customers paying significantly more than an optimal system would require.

EU ETS and back loading

- The EU ETS was designed to be the most cost effective means to reduce greenhouse gas emissions in line with the EU's 2050 climate target, whilst at the same time creating incentives for investment in low-carbon technologies by reinforcing a clear, long-term carbon price signal.
- The effectiveness of the EU ETS has been undermined by a surplus of allowances and at its current level the carbon price will not stimulate investment.
- We support the back loading proposal and believe that without it the price will fall further, threatening the long term future of the EU ETS.
- The back loading proposal is an important first step but longer term structural reform is essential.

Future for coal and gas including investment plans

- In the future the most likely type of new investment in fossil plant will be gas-fired plant. However, this does not mean a second dash for gas as some new gas plant is still needed in a low carbon energy system, particularly to maintain secure supplies when there is limited generation from intermittent plant, such as wind.

E.ON—Supplementary Written Evidence

- The role of gas-fired generation in the UK electricity market is likely to change significantly as the electricity system decarbonises. We see our electricity system balanced by gas, not based on gas.
- Last year we opened our new gas-fired CHP on the Isle of Grain. Alongside the power station there is also the CHP circuit which takes the waste heat from the generation process and transfers it to the neighbouring National Grid Liquefied Natural Gas plant where it is used to heat the LNG and turn it into a useable form for customers.
- We have also invested in converting our coal plant at Ironbridge in Shropshire to run on biomass until it closes in 2015 and have invested in upgrading our coal plant at Ratcliffe on Soar to improve its environmental performance.

5 March 2013

EDF Energy—Written evidence

Executive Summary

- EDF Energy believes that investment in low carbon infrastructure to meet the UK and EU's decarbonisation goals can be a key driver of economic growth and can lead to substantial job creation.
- A common European approach in a number of aspects of energy policy could lead to benefits arising from integrating energy markets. However, the availability of natural and renewable resources, and the associated costs, varies significantly across the EU. It should therefore be left to individual Member States to develop their own energy policy options to match the relative availability and acceptability of different technologies, and more importantly the associated costs.
- The primary focus of EU energy policy should be on decarbonisation and meeting the EU's long-term goal to cut greenhouse gas emissions by 80–95 per cent by 2050, as opposed to setting and meeting intermediate targets. We believe that Member States must retain the flexibility to meet their own energy policy objectives within the overall goal.
- Relying solely on interconnection will not provide the UK Government with the ability to ensure its security of supply and control energy costs. It could expose consumers to high and volatile energy prices. Building baseload low carbon generation capacity complemented by some additional interconnection (according to economic benefits) is a much more efficient option than building transmission/interconnection with no guarantee of sufficient generation capacity.
- It is imperative that the UK Government maintains momentum on delivering Electricity Market Reform (EMR), which we believe will achieve decarbonisation at least cost. Reform of the existing electricity market arrangements is necessary to ensure the market is capable of delivering the reliable diverse energy mix required to achieve the UK's energy policy objectives.
- Gas-fired generation (whether fuelled by conventional or shale gas) will play an important role in the transition towards a decarbonised power sector in the 2030s by providing the reliable and flexible backup generation required for balancing the electricity system.
- EDF Energy believes that further investment in unabated gas generation plant, beyond the minimum that is required to bridge the gap to the transition to low carbon technologies, would introduce significant challenges in meeting the UK's or EU's climate change objectives.
- The potential development of large volumes of unconventional gas reinforces the need to establish a credible and enduring carbon price signal so that investors are able to make well-informed investment decisions. It is commonly accepted that the current EU ETS price is not providing the long-term signal to make the relevant

investments in low carbon generation and it is important that structural reform of the EU ETS occurs at the European level.

EDF Energy's response to your questions

Q1. The dominant theme of the Commission's Energy 2050 Roadmap is decarbonisation, with a particular focus on renewables. How can energy policy make its contribution to both decarbonisation and to economic growth? In what specific ways can energy drive economic growth in the EU?

1. EDF Energy is committed to delivering affordable, secure, and low carbon supplies based on a diverse energy mix, including nuclear and renewables. We believe that investment in low carbon infrastructure to meet the UK and EU's decarbonisation objectives is, and will continue to be, a key driver of economic growth and can bring additional benefits through a multiplier effect. This can also lead to substantial job creation in the UK and similarly in Europe.
2. Our view is shared by the UK Government, with the Minister of State for Energy recently announcing that "the energy sector is at the core of our economy, crucial for growth and jobs"¹⁶. The critical need to renew the UK's ageing energy infrastructure provides an excellent opportunity to underpin sustainable economic growth across wide geographic areas. In addition, we believe that the new investment being made in low carbon generation will help keep electricity bills stable in the long run, and the removal of volatile prices will benefit businesses and consumers alike.
3. With specific regard to the UK, the Confederation of British Industry (CBI)¹⁷ reports that in 2010/2011, the UK's "green business" (an umbrella term that includes all low carbon economic activity) grew in real terms by 2.3%, gaining a £122 billion share of a world market of around £3.3 trillion, and now employs close to one million people. The CBI's analysis also estimates that over a third of the UK's economic growth in 2011/12 is also likely to have come from such businesses.
4. Despite its focus on renewables, the EC Energy Roadmap 2050 states that "nuclear energy will be needed to provide a significant contribution in the energy transformation process in those Member States where it is pursued. It remains a key source of low carbon electricity generation".
5. We would highlight that the share of nuclear in the EC Energy Roadmap's decarbonisation scenarios ranges from just 2.5% to a modest 19.2% of power generation. Despite this limited ambition for nuclear in the Roadmap (which is in contrast to a share of 26.4% in its reference scenario), the analysis concludes that "nuclear energy contributes to lower system costs and electricity prices". The difference in associated costs is not insignificant and totals around €60 billion per annum (based on 2010 GDP figures) which would otherwise have to be paid for by electricity consumers and businesses.

¹⁶ Letter from John Hayes to the Times Newspaper, 20 September 2012

¹⁷ CBI, The colour of growth – maximising the potential of green business, July 2012

6. EDF Energy plans to invest in four new nuclear plants in the UK, starting with two at Hinkley Point in Somerset. With our co-investor Centrica, we are making continued progress on this project, including on site preparations, with a view to taking the Final Investment Decision (FID) at the end of 2012.
7. Research from the Institute of Public Policy Research (IPPR)¹⁸, commissioned by EDF Energy, sets out the benefits of investment in nuclear new build. These include boosting UK GDP by up to 0.34% per annum, equivalent to £5.1 billion annually for 15 years. If capacity reached 18GW, then nuclear power would account for 0.4% of GDP in the operational phase and could result in more than 32,000 jobs annually in areas outside of the more prosperous London and South East regions.

Q2. To what extent will a common European approach help keep the costs of transforming the energy system down and assure security of EU energy supply? Where do you see economic growth and decarbonisation benefiting from a common approach to generation, transmission, distribution and storage? And what are the risks?

8. EDF Energy supports the overall objectives of the Third Package to strengthen the EU's internal energy market. We expect that its ongoing implementation will be an opportunity for the UK to foster its links with the continental markets and facilitate cross-border trade. We believe that effective market arrangements will help minimise the costs of transforming the energy system.
9. A common European approach in a number of aspects of energy policy could lead to benefits arising from integrating energy markets. Such an approach offers more scope for changing the energy system than is within any single Member States' individual capability. Events such as the Russia-Ukraine dispute in 2009 demonstrate that matters of security of supply are strong drivers for co-ordinated action. Within the EU, the general trend is that energy product imports are increasing, while reserves are concentrated in a relatively small number of countries. As this is occurring in a global context, the unconstrained increase in worldwide energy demand will intensify the pressure on supply chains. In this respect, co-operation becomes all the more important as it enables a more balanced dialogue with energy suppliers.
10. We recognise that the divergent views of Member States may make it difficult to reach a consensus on future policy frameworks. This creates a significant risk that a compromise to accommodate these differences in the future may lead to policy frameworks that fail to serve the best interests of consumers.
11. However, we believe that action on climate change is an area that can only be tackled at a supranational level. The accepted consensus is that only international agreements can avoid the associated problems of issues such as carbon leakage.
12. EDF Energy strongly supports the EU ETS as an essential measure to meet the EU's emissions reduction objectives. This is because the trading of carbon allowances, by recognising that the cost of abatement differs between sectors and/or countries, ensures that mitigation occurs at least cost and in a flexible manner. In the long run, it is also

¹⁸ IPPR, Benefits from Infrastructure Investment: A Case Study in Nuclear Energy, June 2012

perceived that carbon markets are more conducive to the eventual global harmonisation of carbon prices through their potential linkage with other schemes. This is likely to be easier to achieve than through the co-ordination of tax policies across different sovereign states.

13. We recognise that the EU ETS has had problems in its implementation since inception but we believe that, if these shortcomings can be addressed, it still has a key role in the decarbonisation efforts of both the UK and EU. It is commonly accepted that the current EU ETS price is not providing the long-term signal to make the relevant investments in low carbon generation. While the introduction of the carbon price floor in the UK helps restore the long-term price signal that the system was expected to achieve, it does not remove the need for reform of the EU ETS at the European level.
14. However, despite some of the benefits that accrue from a common European approach, it is important to highlight that the availability of natural and renewable resources, and the associated costs, varies significantly across the EU. It should be left to individual Member States to develop their own energy policy options to match the relative availability and acceptability of different technologies and more importantly the associated costs. It therefore should not be automatically assumed that a common EU approach will deliver transformation at the lowest cost.
15. We do not believe that the EU should either extend or increase the existing targets for renewable energy after 2020. Further targets for renewable energy would undermine the carbon market and are likely to entail permanent subsidy, which will raise costs for consumers and create market distortions. We believe that a strong carbon price signal should be the primary driver for the effective and economic deployment of low carbon technologies across Member States to meet the EU 2050 carbon emissions reduction ambitions. This should sit alongside supporting policy frameworks, such as the UK Electricity Market Reform (EMR) package, that can help to reduce the costs of decarbonising the economy.
16. With regard to the EU 2020 renewables target, we believe that this should primarily be met through domestic action. Although trading provides a potentially cost-effective option to meet any shortfall, it should only be used if it is simply not possible to deliver the UK target in full by 2020, or if the only way to close the remaining gap is at a high cost and clearly in excess of the alternative of trading.
17. We are concerned that excessive reliance on trading to meet the target could make the longer-term 2050 greenhouse gas emissions reduction objective difficult to achieve. Renewable energy trading could, when compared with current projections, result in a shortfall of domestic UK renewable generation capacity in 2020. This could have a negative impact on the UK's physical security of supply.

Q3. The internal market in energy is focused on transmission. Should competition in the rest of the supply chain be given greater consideration? What economic opportunities might arise from such consideration? What risks arise?

18. Promoting liberalisation across the supply chain will mean that consumers will benefit from the discipline of the market. We note that initiatives regarding the unbundling of asset ownership have been agreed in both the EU's Second and Third Package. We

believe that the key issue is one of developing the right market model that will facilitate cross border trade between Member States and which will deliver real benefits. To develop the most effective model, the European policy making process should deliver:

- Clear objectives and criteria for the European Gas and Electricity Target models which create the European market template.
- Co-ordination at the European regulatory level that will clarify the interactions between the processes aimed at creating a new regulatory framework for European markets.
- Long-term vision – we need to consider the form of competition that might take place in markets with significant numbers of players with very low marginal costs.
- Investments required – the right incentives need to be in place to exploit the capabilities and endowments of Member States.

19. The focus on transmission means that the scope for increased interconnection is enhanced. This is reinforced by the institutional structure in which Transmission companies are drafting the European network codes (i.e. ENTSO-E). The effect of investment will be to provide increased trading opportunities for all generators across European borders. However, interconnection should be seen as a complement rather than a substitute for investment in low carbon generation assets. This is because it does not guarantee that there will be sufficient generation capacity to meet demand.

20. Relying solely on interconnection will not provide the UK Government with the ability to ensure its security of supply and control energy costs. We believe that this could expose consumers to high and volatile energy prices as studies indicate that countries relying heavily on interconnection to ensure their security of supply have much higher costs for energy. Investment in interconnection must be driven by market signals/price differentials between markets. Initiatives such as prescribing minimum levels of interconnection are likely to be less cost effective for consumers and businesses.

Q3. Energy is a significant manufacturing input and household cost. Is it appropriate to seek to reduce the costs of energy in order to boost EU competitiveness and, if so, how can it be achieved in addition to energy efficiency? To what extent might price reductions jeopardise attempts to decarbonise? What implications, if any, do consumer preferences over the energy mix, such as onshore wind and nuclear power, have for price?

21. It is imperative that the UK Government maintains its continued momentum on delivering EMR, which we believe will achieve decarbonisation at least cost. Reform of the existing electricity market arrangements is necessary to ensure the market is capable of delivering the reliable diverse energy mix required to achieve the UK's energy policy objectives. The UK needs to move faster to renew its infrastructure than other countries in Europe. There is a serious risk that a delay could expose UK consumers to volatile and probably higher energy prices.

22. We believe that the Government's package (alongside its energy efficiency proposals) will provide the investment framework that is crucial for the low carbon investment that the

country needs, and will keep costs down for consumers. It is important to understand fully the factors driving the cost of energy, and recognise that energy policy is an attempt to reconcile two other objectives in addition to affordability, namely the decarbonisation of the economy and ensuring security of supply.

23. We note that the EU ETS Directive provides for temporary measures to compensate certain sectors for increases in electricity prices that result from the inclusion of the cost of carbon emissions as a result of the EU ETS. We believe that UK Government relief for the indirect costs of the EU ETS (and carbon price floor) should be targeted at those industrial sectors and installations where the evidence base suggests there is significant risk of carbon leakage and that the levels awarded are proportionate to need.
24. We endorse the UK Government's conclusion, as articulated in the National Policy Statements, that the UK's need for additional supplies of low carbon electricity should be based on a diverse mix, including nuclear, renewables and other low carbon thermal generation (i.e. fossil generation with Carbon Capture and Storage (CCS)). This is supported by a number of other bodies, including the Committee on Climate Change. The advantage of this approach is that it avoids over-reliance on any one technology. This will make the electricity system more resilient, as, for example, it means that a diverse range of sources can be used to provide back up for the increasing amounts of intermittent generation envisaged for the electricity system. We believe that this will benefit consumers in the long-run.

Q4. Do you agree with the Commission that “Gas will be critical for the transformation of the energy system”, until at least 2030 or 2035? What mechanisms are required to boost the role of gas, securing appropriate investments, but on the proposed interim basis? Does an active renewables policy require gas in support of it? Should the EU encourage the development of unconventional gas?

25. As stated above, EDF Energy is committed to provide safe, secure, affordable and scalable low carbon energy. We believe that unabated gas fired generation will play an important role in the transition towards a decarbonised power sector in the 2030s by providing the reliable and flexible backup generation required for balancing the electricity system.
26. Further investment in any unabated gas generation plant (whether fuelled by conventional or shale gas), beyond the minimum that is required to bridge the gap to the transition to low carbon technologies, would introduce significant challenges in meeting the EU's climate change aspirations. This is because while gas fired generation has lower carbon dioxide emissions than old coal fired generation, without carbon capture and storage (CCS) it is still a significant source of carbon emissions in its own right.
27. Such investment in unabated gas generation plant substantially increases the risk that the EU's long term emissions reduction objectives will not be met, or at least be met in a cost effective manner. This is either because the carbon emissions from these new assets will be 'locked in' or, alternatively, because it increases the risk of stranded assets.

28. We note that there is a large divergence in opinion with regard to the lifecycle greenhouse gas footprint of shale gas (including direct and indirect emissions of carbon dioxide and methane), and the issue of such leakages will need to be investigated further.
29. EDF Energy recognises that the Government's commitment to move to a low carbon economy is likely to mean that fossil fuel plant such as combined cycle gas turbines (CCGTs) will in the future operate at lower load factors than historically has been the case. This is likely to lead to increased revenue uncertainty and this could lead to under-investment and lower levels of reliable capacity. We therefore welcome the UK Government's proposal to introduce a capacity market to help address security of supply concerns. A well designed capacity market will deliver a higher reliability standard in a sustainable and cost effective way. It is vital that the capacity market is designed to provide adequate capacity to ensure security of supply, and we await the Government's design preference by the end of the year.
30. EDF Energy believes that the level of technically recoverable shale gas and other unconventional gas resources around the world is potentially significant, with estimates in Europe alone ranging from around 3.8¹⁹ to 17.7²⁰ trillion cubic metres (tcm). In order to replicate the production experience of the USA, there are still significant obstacles that must be overcome, both in Europe and in the rest of the world. Besides the ongoing need to address a number of wider environmental concerns associated with hydraulic fracturing (such as groundwater contamination), it is important to note that the commercial viability of extraction is variable across countries because it is dependent on specific local issues, including access to land, environmental constraints, technological knowledge and expertise, cost of production, access to market and fiscal terms. Public support, and ultimately social acceptability, will also remain key factors that will have to be considered.
31. Current studies indicate that European shale gas production costs are likely to be higher than those in the USA, with the most commonly stated prediction being around 50 per cent higher²¹. Reasons include differences in regulatory, fiscal, labour and environmental regimes, as well as land and resource access issues pertaining to geology and population density. It is also important to highlight that the low gas price in the USA (~18p/therm versus ~60p/therm in the UK) is due to current overproduction and oversupply, and partly driven by the fact that shale gas is being extracted as a by-product from shale oil production. The current price is perceived by several market analysts to be below break-even and unsustainable for "dry" (i.e. non-oil associated) shale production, and this has probably contributed to the recent \$5.5bn write down in value of shale gas assets by a number of major energy companies²².
32. We note that there is considerable variation in the current estimates of the global reserves of shale gas, and this in part reflects the differences in methodology employed by the various studies carried out. However, we expect the quality of the forecasts to improve as further exploration and drilling proceeds around the world. Therefore we

¹⁹ Wood Mackenzie total unconventional resource

²⁰ EIA, World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States, April 2011

²¹ IEA Golden Rules for a Gold Age of Gas and EU Commission, Unconventional Gas: Potential Energy Market Impacts in the European Union, p129. "cost estimates are in line with current break-even costs for shale gas production in Europe of ... \$5-12/MBtu" which is approximately 50% higher than the \$3-6/MBtu quoted for the US on page 191.

²² <http://www.arcticgas.gov/2012/companies-write-down-value-shale-gas-assets>

agree with the Secretary of State for Energy and Climate Change who states that “until we have more certainty about the scale and costs of shale gas production in the UK it is unwise to assume it will be some kind of magic bullet”²³.

33. The potential emergence of large volumes of unconventional gas reinforces the need to establish a credible and enduring carbon price signal so that investors are able to make well-informed investment decisions. As stated in our response to Question 2, it is commonly accepted that the current EU ETS price is not providing the long-term signal to make the relevant investments in low carbon generation and it important that reform of the EU ETS occurs at the European level.
34. EDF Energy therefore supports initiatives that would help remedy some of the defects of the EU ETS at the European-wide level, and would encourage EU Member States to pursue these. For example, we agree with the UK Government that it should work with its EU partners to arrive at a robust agreement for domestic carbon dioxide reductions across the EU, including a more ambitious reduction target for 2020 relative to 1990 levels.

3 October 2012

²³ Letter from Edward Davey to the Financial Times, 20 September 2012

EDF Energy, Scottish Power and SSE—Oral evidence (QQ 186-202)

Evidence Session No. 9

Heard in Public

Questions 186 - 202

WEDNESDAY 9 JANUARY 2013

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Ravi Baga, Head of Upstream Energy Policy and Regulation, EDF Energy, **Rupert Steele**, Director of Regulation, ScottishPower, and **Dr Keith MacLean**, Policy and Research Director, SSE

Q186 The Chairman: Mr Baga, Mr Steele and Dr MacLean, thank you very much for coming to see us today. We do apologise for starting slightly late. We were running behind on our previous business.

Q187 Before proceeding, I will deal with formalities. You should have in front of you a list of interests that have been declared by Committee members. As you know, this is a formal evidence-taking session of our Committee and full shorthand notes are being taken. These will go on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript and you will be able to revise it in terms of any minor errors. Finally, the session is on the record—it is being webcast live and will be subsequently available on the parliamentary website.

Given that there are three of you it might be difficult if each person were to make a lengthy statement, but would you like to say something briefly by way of introduction or go straight to our questions?

Dr MacLean: Straight to the questions.

Q188 The Chairman: That is very kind. Thank you. I am going to take the first question, which is a theme we have been very interested in, which is investment as a driver of growth and jobs. Very simply, to what extent can investment in energy have macroeconomic benefits for growth and job creation? Net job creation is what we are particularly interested in. I do not know who would like to go first.

Rupert Steele: I will start. My name is Rupert Steele, Director of Regulation at ScottishPower. We are a major investor in renewables and networks in the UK. Our strategic plan over the next three years involves investing £3.5 billion in the UK, which is 42% of Iberdrola's global investment. Over the next decade, we envisage creating around 1,500 jobs in upgrading the electricity network alone. Indeed, at the moment we are running an immediate recruitment drive aiming to bring in 300 new engineers.

Q189 Lord Renton of Mount Harry: 300, you say?

Rupert Steele: Yes, this year. At a practical level, we are out there investing and creating jobs. In terms of the net jobs argument, I would say that efficient investment in generation, in networks and other parts of the energy chain, should have a beneficial impact on the economy and create net jobs, and that is a valuable spin-off to add to the underlying value of the investments that are being made.

Ravi Baga: We certainly believe that investment in low carbon generation has the capability of delivering a significant boost to economic growth. We recently commissioned a report from the think tank IPPR. That concluded that building new nuclear energy capacity could boost UK GDP by up to 0.34% a year, which is equivalent to about £5.1 billion annually for 15 years. This is based on an entire programme of new nuclear build of 18 gigawatts, which will account for about 0.4% of GDP in the operational phase once the assets have actually been built.

Annual exports from the nuclear industry will also increase from £700 million to approximately £1.1 billion to £1.6 billion per year. That is an example of investment in low carbon generation, certainly, within the nuclear spectrum. In addition, the CBI report that has been published documents the benefits and the value that the energy sector brings to the economy.

Dr MacLean: The figures that Energy UK published from the Ernst & Young report were interesting, showing that the numbers directly employed in the sector had grown from 83,000 in 2008 to nearly 140,000 by 2011. That came hand in hand with a massive increase in investment in the sector up to an unprecedented level of about £11 billion in 2011, and it is likely to be more than that when the figures for 2012 are complete.

The fact is that we are investing an awful lot more than we were previously in the sector. Therefore, that money has the potential for bringing economic and employment benefit to the UK, but it is extremely important that we build up the supply chain to be able to satisfy that within the UK to provide the jobs here. When we are looking at local content, often one of the frustrations is that it is very difficult to find local providers not only of things like turbines but also the skilled jobs, engineering and other jobs that are needed for this. That is one of the reasons for getting a longer-term perspective on what our energy targets are, what it is that we are trying to do and what the fast way for getting there is, so that the supply chain is able to make the investment decisions in the UK, to make sure that we take maximum advantage of the opportunity for direct net economic and employment benefit.

Q190 The Chairman: That is a very good point. Do you see the supply chain capacity building then? Obviously the jobs have increased, but are these in serious matters or are

these peripheral, relatively low-cost, low-wage jobs? Are we building the technology capacity here and the capability?

Dr MacLean: Certainly, with regard to the jobs that are created, the average value of the jobs that are created in the sector is quite significantly higher than average. The other aspect is that generally the geographical location of the jobs that we are creating is advantageous, because it is not in the south-east and it is not in the centre of London. It is generally in areas of higher unemployment.

With regard to the technical aspects of that, clearly, if we do not have the level of investment in that technology development and in that technology production, and all of the jobs that come along with that, it is more difficult to get up to the high levels of local content that we would like to see for all of the investment that we are making.

Ravi Baga: To make a further point on that, I think one of the key challenges to getting investment in the supply chain is the policy certainty. The more certainty we can give on the direction of travel, the more willing investors are to invest in the supply chain. We have been organising a number of supply chain events for the last two to three years: first, to create the awareness among potential participants so the opportunities are available; and secondly, for them to have confidence that there will be projects at the end in which, having made their investment, they will be able to get a return on those investments.

On the skills front, in partnership with Bridgwater College, we have committed £15 million to developing a training centre. We also have our national training academy in Barnwood. That trains something like 2,500 people a year and, again, it is part of the momentum in building the skills that are necessary to deliver the investment challenge that we have. They are largely in skilled jobs, rather than low-grade jobs.

Q191 Lord Lewis of Newnham: Following on the remarks of Mr Steele and Mr Baga, what percentage of your business is in renewables and what area of renewables are you interested in?

Rupert Steele: In our case, we have about 1,000 megawatts of renewable generation capacity at present, substantially onshore wind—mainly in Scotland—in a generation portfolio that, when Cockenzie closes very shortly, will be about 6,000 megawatts in total. Renewables are about one-sixth of our total generation portfolio at the moment, and the proportion is increasing as we develop further.

Ravi Baga: For EDF Energy in the UK, our renewables portfolio is down to something like 600 megawatts at the moment. We are in the middle of constructing Teesside Offshore Wind Farm, which is our first offshore wind farm. We are also planning a much larger wind farm off the south coast of Navitus Bay, and that is close to 1 gigawatt in capacity, depending on what the final arrangements will be. Our other assets in the UK include the nuclear generation assets that we bought as part of the merger with British Energy. We also have 4 gigawatts of coal in north Nottinghamshire, as well as a new CCGT that has just been commissioned in Nottinghamshire as well.

More widely within Europe, we have a substantial nuclear fleet in France. We are the largest operator of nuclear plant in the world, and we are probably one of the largest renewables generators as well, thanks largely to our hydro portfolio in France, as well as other renewables investments that we have been making. We also maintain an active interest in developing CCS and other generation technologies.

Dr MacLean: We are the largest renewables generator in the UK at the moment. We have more than 20% of our capacity in renewables, mainly a combination of wind and hydro. In

terms of our investment programme, a much, much greater percentage of that is being spent on renewable investment, in terms of generation, but also in terms of the network investment that is needed—particularly, in the north of Scotland—in order to enable other generators to connect to the National Grid.

Q192 Lord MacLennan of Rogart: This is a more general question I want to ask before we move on to the more particular. Is investment going to have macroeconomic benefits for growth only if it results in reduction in costs to the users of power? What consideration do you give to the inherent costs, as opposed to the subsidised costs—let me put it that way—or user costs, in viewing systems as competitive? Sorry, that is a rather rolled-up question, but my concern is that, if energy costs keep rising, that is going to put a damper on growth and jobs. How much does the industry itself pay attention to that issue?

Rupert Steele: That is a really important issue to raise. If you look at the transcript carefully, you will see that I said that efficient investment is the kind of investment that creates jobs. By that I mean investment that is needed and is efficiently delivered. That falls into two areas. One is about being as cost-effective as possible in the delivery of programmes, so we encourage people to seek the benefits of onshore wind compared with other renewable sources because it is much less expensive to deliver. The other issue is: is it needed? In a world where there was not a need to address climate change one might get to a different answer but, given a need to address climate change, it seems to us inescapable that a significant renewable component will be part of that. We are engaged in delivering that as efficiently as we can. On that basis, we think that that is a positive economic activity.

Dr MacLean: It also highlights the importance of getting the policy and the regulatory framework clarity that was mentioned earlier on, because where that is possible, where you get sufficient clarity for the supply chain to invest, you get significant reductions in costs. We have seen that regularly with the reductions in the cost of onshore wind, and—quite remarkably—we have seen the impact of increased confidence that there was for a while in the solar market for the cost of solar PV to absolutely plummet. Both onshore wind and PV are getting to levels now where, with a robust carbon price, you could quite easily see subsidy not being required anymore. We have to continue on that path. We need to do the same with offshore wind. We need to do the same with other emerging technologies to make sure that we get into that virtuous circle where there is sufficient investment in the supply chain to bring the costs down and to get the volume up, because the affordability issue—that you rightly raise here—is absolutely essential in terms of public support. Public support is essential in terms of deploying the technology so that people see that there is a benefit for them from doing that. Once again it highlights the importance of getting a longer-term view of what it is that we are trying to do, and making sure that those investors in the supply chain also have that confidence to make the necessary investment.

Q193 Lord Renton of Mount Harry: Those are answers to the questions that I would have put to you. Just remembering that we are a European Union Committee, trying to think of what is going to happen throughout Europe, I have a letter here saying, “The European Commissioner has estimated that capital expenditure in the EU’s energy sector over the next decade will need to be in the order of €1 trillion”, which I think means €1,000 million. Would you agree with that?

Rupert Steele: I think the number, €1 trillion, is presumably 1 million million—1,000 billion—which sounds like quite a lot of money.

Q194 Lord Renton of Mount Harry: Yes. That is the difficulty.

Rupert Steele: Probably looking at the total is not necessarily helpful. There are some jurisdictions where I think people are quite reluctant to invest at the moment because of varying government policies, and that does not include the UK. As far as our company and our parent company Iberdrola is concerned, where there is a clear and bankable long-term commercial and regulatory framework then we will be ready to invest. That is the position at the moment in the UK. There is clearly a trade-off between speed of delivery of decarbonisation and the cost that consumers have to pay in order to remunerate the investment. I think that is a trade-off for Governments to make, to address and to justify the outcome in terms of the benefits and the costs. We are certainly pressing ahead strongly in the UK on the basis of the framework that the UK Government have laid out.

Ravi Baga: £1 trillion actually does not seem to be that large a number. If you look at the numbers that are quoted in the UK context alone, you often get numbers of anything between 110 billion to 200 billion, so if you multiply that by a factor of 5 or 6 then you get to your 1 trillion. In the European context, €1 trillion is not a large sum of money.

The key point, which has been made, is about making sure that investment is efficient and that ties into the affordability point as well. If I could tie those two points together, we certainly think affordability is a key consideration but we are no longer in the days of producing energy at lowest cost. We recognise that there are other energy policy objectives, which include decarbonisation and security of supply, and it is important that we get the right balance between those three.

In the wider European context, there are certainly some elements of European policy development that could help make investment more efficient. One of the key areas where that efficiency could be made is if we had a more robust EU Emissions Trading Scheme and a more credible long-term price signal. That said, each Member State has its own availability of natural resources and renewable resources and so will naturally tend to make different decisions on how it wants to meet its own energy needs. Therefore, it is equally appropriate that there is a degree of delegation down to the Member State in how it chooses to meet those wider objectives.

There is then a need to balance this tension between something that may be seen to be a more efficient and unique approach adopted by individual Member States. Therefore, it becomes essential that each Member State is held accountable for the policy decisions it makes, and that the European policy frameworks are not used to socialise some of the more expensive decisions across all EU consumers. So, in the context of the inquiry and EU energy policy, I think there are some real tensions in those that we need to be clear on and make sure that we safeguard against those.

Q195 Lord Renton of Mount Harry: You are the largest company in this business. Who are your owners now?

Ravi Baga: EDF is 75% owned by the French Government; by the French state.

Q196 Lord Renton of Mount Harry: By the French state?

Ravi Baga: Yes. The rest of it is share capital that has been issued for the remainder of the shares.

Dr MacLean: Again, contextualising the very large number, if you go back to the Ernst & Young figures for investment in the UK in this sector, it was about 11 billion in 2011. If we maintain that sort of run rate up to 2020, we are very close to the 110 billion that is being talked about as the need in the UK. If you put that in the context of the UK's share across

Europe, we are not talking about orders of magnitude difference in the numbers that could be achievable. Perhaps what those numbers hide is the big political uncertainty that has developed over the last few years. That means that those levels of spend are probably not going to be continued beyond 2012, because there has been a hiatus in investment in quite a number of European states, and in the UK, on the basis of the policy uncertainty that has developed. It just shows that you can actually get to that level of investment, but I absolutely underline the points that the others have made about the need to make sure we are doing that in an efficient, effective and affordable way, and not simply spending the money in an inefficient manner just in order to make progress.

Q197 Lord Renton of Mount Harry: It must be quite difficult at the moment, with the falls in the stockmarket and so forth.

Dr MacLean: Yes. The political and regulatory uncertainty across Europe is a major issue for all investors, whether we like it or not. Regardless of what country it happens in, the fact that it is happening, the fact that you have had retroactive changes in schemes in Spain and a number of the other states just makes investors nervous. Thank goodness we did not think that that would happen. It used to be that you could say you had a scheme that was underwritten by a sovereign state, and a number of people have had their fingers badly burned because the sovereign state turned out to be Greece, and it was not necessarily as good an endorsement of the creditworthiness as people had thought previously. That has increased nervousness at the moment. I will say it again—that is why it is so important that we get back to a situation where we have confidence in the long-term nature of the regulatory and political framework for energy investment in the UK, but also across Europe.

Ravi Baga: To add to that, in that context, I think the proposals put forward by the UK Government for electricity market reform are fundamental because getting that right will ensure we have the platform that we can invest in confidence, and it significantly reduces the risk that we face in making those very large investments that are needed.

Q198 Lord Renton of Mount Harry: But for you—to be a bit personal about it now—your position is that the French Government owns 75%. You must continue to feel pretty well protected.

Ravi Baga: Not so. All investments have to be approved and meet certain criteria. I do not think it is the role of the French state to be squandering money in other markets so, wherever we make our investments, we have to make sure that those investments meet the appropriate standards and criteria that not only us but our co-investors, and other financiers, will get comfort from.

Rupert Steele: It is fairly well understood that companies are not as wealthy now as perhaps they were a few years ago and there has been a bit of reining back. I think that means it becomes increasingly important for jurisdictions that want investment to proceed to offer a solid and viable framework. For example, in Iberdrola's case there has been a very significant refocusing of global investment towards the UK as being a good investment destination. As I said, we have a plan for 42% of our global investment to take place in Britain. That has led to reductions in investment in other jurisdictions where the environment is not favourable. Maintaining that will depend on EMR producing a robust investment case going forward.

Q199 The Chairman: Thank you. I should say that we have only managed to cover two questions in about 35 minutes, so if we are to get through them all perhaps we need a little bit of momentum.

Q200 Lord Lewis of Newnham: Following on from what you have just been saying, to differing extents your companies are multinational companies with operations in different Member States. To what extent do varying approaches to energy policy by the EU Member States affect your ability to operate? Would you like to see greater co-operation at the EU level, boosting, say, interconnection and improving storage, rather than being restricted to individual national policies? Subsidiarity seems to be a dominant factor in the way that this is being approached, yet would there be a general view of this? There are certain features, for instance, like a national grid across the whole of the European scene, which could have an attractive consequence, particularly in the case of Germany, which has just recently gone from nuclear over to wind and solar. There seems to be dependence there on a national grid throughout the whole of the system, or are these circular questions?

Ravi Baga: The key thing is it does not affect our ability to operate across boundaries. When it comes to generated investment, then the frameworks that exist within regional markets create the signals for the necessary investment. On the broader points you make about interconnection and storage, we certainly do not see interconnection as a panacea. We believe that if you have prescribed interconnection, rather than interconnection that is brought forward because of market arbitrage opportunity, then that would be very inefficient and hugely costly for consumers. If you were to socialise the costs of having a European grid, then you are probably significantly dampening your signals for storage because you will be flattening the prices between peaks and off-peaks and, therefore, there is no value in storage. It would also have a significant detriment on any demand-side response initiatives that may be developed within internal markets.

In terms of the overall cost, having a very large cost of interconnection that is then socialised across Europe is also failing to recognise the difference between firm and non-firm generation. I would describe firm generation as when you flick a switch then somebody is available at the other side to generate the power, and non-firm power is power that is produced when it suits the relevant technology but is not necessarily available when the consumer wants it. To give an analogy: if there is surplus grain in the Ukraine and you want to sell it to the UK market, then I would expect the Ukrainians to hire or buy the lorries to transport it to the UK and to bear that cost. I would not expect that transport to be given for free. In that sense, as long as the costs of interconnection are properly allocated back to those that are benefiting from it, then that would work. Therefore, we need to make sure that we maintain market signals to drive investment in interconnection, rather than have some prescription from central Europe.

Rupert Steele: If I could just have a go at this from a slightly different angle, possibly coming to the same conclusion. The UK power system is not very intensely interconnected with continental Europe at the moment. Experience suggests that interconnectors cannot always be relied upon to produce power at times of UK shortage. There have been times when the UK system was tight when price signals would have suggested import, but the interconnectors have been exporting. In that situation, it is right and proper for the UK Government, and Ofgem, to take the responsibility of looking at security of supply at a UK level and to make sure that mechanisms are in place to ensure that that is delivered. That is why we have been very supportive of the proposed capacity mechanism as part of energy market reform, which we believe will play an important role in keeping the lights on going forward.

Dr MacLean: Our company is perhaps slightly different, in that almost 100% of its activity is in the UK and Ireland but, having said that, we have been taking significant interest in a potential interconnector development between Scotland and Norway. Unfortunately, it

looks like the Norwegian Government is about to legislate to make such commercial investments illegal, which is an unfortunate development because, based on what Ravi was saying—which I agree with—we need to look at sensible commercial interconnection projects rather than simply investing willy-nilly in lots of wires. Here is a project that is being driven by commercial interest, the merchant investment, not an EU Member State but an affiliate, deciding that it does not want its state-run industry to be adversely impacted by such an investment. We need to look at that with regard to interconnection.

There are sensible levels of interconnection and that probably means an awful lot more than we have at the moment will make sense, but they are not a panacea. As Rupert was saying, if you have wires they are only of value to you if you have generation at the other end of it and the flow going in the direction that you need it. Therefore, you have to look at the investment in interconnectors alongside investment in generation. Then, as well as the technical capability to move the power, you need to have the economic drivers allowed to do that. Otherwise you are back where we were with gas, that there is a need in the UK, there is a very high price in the UK, but the gas is not flowing into the UK because of political intervention elsewhere in the chain.

Q201 The Chairman: Mr Baga, while we have you here, perhaps you could help us with something. In France and in Germany—in a very cold winter in Germany the renewables are not operating—how is EDF going to allocate its generating capacity against its domestic need and its ability to sell it into other markets? Do you have a policy view on that you could share with us?

Ravi Baga: I am not aware of any formal policy of allocating generation. We trade our output on the open market and we will continue to do so.

Q202 The Chairman: So it is totally open-market-driven. If the price in Germany is 30% more than the price in France, albeit you are state-controlled, your policy would be to ship that power—to wheel it, or whatever the phrase is—into Germany to supply their needs?

Ravi Baga: Yes. A lot of it will also come down to how the company has hedged its positions. If a lot of that power has already been committed or sold, then we are only able to sell any surplus power that we have. A lot of it will come down to the supply businesses operating in different countries and how well they have hedged their exposure to that.

Q203 The Chairman: Just so we are clear, generally you would say it would be treated as a totally open market. There would be no national policy considerations brought into force because you are state-owned?

Ravi Baga: Not that I am aware of, no.

Q204 The Chairman: Thank you.

Q205 Lord Lewis of Newnham: But you have this duality of problem, namely between energy security and climate change, and these do differ, or attitudes differ in Member States. Does this not influence your problem? Does it not provide you with any problems?

Ravi Baga: I am not sure I understand the question in terms of—

Q206 Lord Lewis of Newnham: If you have a state that is far more concerned with worrying about the climate change problem, the carbon problem, than it is with, say, energy

security, then that would influence exactly what its policy would be as far as its approach to energy is concerned.

Ravi Baga: As a company, we believe climate change is an issue that needs to be dealt with. Therefore, we are keen on ensuring that we deliver affordable low-carbon solutions.

Q207 Lord Cameron of Dillington: Just to repeat, we are an EU Committee. There are a lot of EU directives controlling emissions generally, greenhouse gases, as well as national emissions targets and regulations. I wonder whether the EU policy helps or hinders the overall investment policy, as well as the renewable low-carbon investment in particular. That is the first question. Secondly, bearing in mind the sort of trilemma between cost, security and greenhouse gases, do you think the energy policy should be based on encouraging more investment or encouraging less use or minimising costs at the other end of the spectrum? How do you see that balance?

Dr MacLean: If I lead off with the first part of that, I think EU policy showed, with the carbon and renewables targets, what can be achieved by setting out a clear set of targets for people to invest against. I think the unprecedented levels of renewable investment in recent years, both in Europe as a whole and in the UK, are a reflection of the impact that was achieved by setting very clear targets. You will not always necessarily agree with the targets that are set, and there is always fierce debate around things like the large combustion plant directive or the industrial emissions directive, but once they are set, as long as they are giving that longer-term clarity, they can prove very effective in setting out what needs to be done for investors. To that extent, I think I would say that it is helpful, and it has been particularly helpful for low carbon. It is perhaps why we have been very supportive of moving into a second phase of that, recognising that many equipment manufacturers are now thinking about the next generation of investment they need to make, and they need to look beyond 2020, towards 2030, in order to get there. The European Commission itself has concluded that the sort of success that there has been with the 2020 targets should be seriously considered for 2030. It is perhaps slightly disappointing that the UK seems to be in roughly the same place as Poland on that at the moment in terms of not supporting that, but certainly, from an industrial perspective, we would support it.

On the second part, the poor relation to the debate that we generally have about generation, and how we will provide energy to people, is energy efficiency, energy reduction and energy management. I feel we need to do an awful lot more there. Those things can contribute to affordability, regardless of what unit price you end up with; if you are using fewer units then that is going to be of benefit, not only to domestic users for keeping their lights on, or keeping their homes warm, but critically also for industry in what it is doing. I feel a clearer focus on that side of the equation would be helpful. It seemed almost perverse that we managed to get to a situation where we had binding carbon targets, binding renewable targets for 2020, but we did not have binding energy efficiency targets. It seems to be almost the wrong way round. The more affordability becomes an issue, the more I feel we have to turn that round and make sure that, in the framework that we have, we are setting out demand-side targets and demand-side policies that will help with that affordability, and through the affordability on the commercial side to competitiveness of the industries going forward.

Ravi Baga: To pick up on that, we certainly take a different view to the one expressed on some points. If I just break down some of the European directives and pieces of legislation that you mentioned, they operate quite differently. If you take directives, such as the large combustion plant directive and the industrial emissions directive, they are essentially

regulations. There are no market frameworks associated with them and they were negotiated over a long period of time. Each Member State has a certain degree of subsidiarity allowed to it in how it chooses to implement those regulations. As with the large combustion plant directive, each Member State has some flexibility in how that directive will be implemented in the UK. We welcome that flexibility, because each Member State has its own plant mix. Given the plant mix that the UK has, it was quite important that the directive allowed the existing plants to bridge the gap between where we are today and the development of new low-carbon technologies, and, to the extent that those flexibilities have been secured, they are very welcome.

If we come on then to the carbon scheme, I think that is a great example where a common European approach makes a lot of sense. Unfortunately, the tool that has been designed to deliver that is not working, and therefore we would back and support the UK Government's efforts to try to get that back on track and make it more effective.

Subsidiary targets: the renewable energy target we think is misguided. It has significantly undermined the carbon market itself, and it is difficult to see what you are trying to achieve over and above the broad decarbonisation target. Therefore, we would not support any sub-targets once the overall decarbonisation target is set for Europe.

Rupert Steele: We felt that the renewables target was helpful in getting momentum behind the renewables industry and providing a clear investment framework, which enabled things to be developed at greater scale and costs to be reduced. I agree with Ravi that the carbon market needs to be done at least EU-wide, preferably globally, as the wider you cast your carbon market, the more effective it will be. Some of the other directives—the IED, the large combustion plant directive—have probably not been the most cost-effective ways of addressing air quality issues, to be honest. That could have been left to a greater degree of subsidiarity and Member States being given targets in terms of air quality. I think people would have found more cost-effective and less disruptive ways of doing that, so quite a lot of perfectly viable generation plant is being closed over the next few years because of rigidities in those directives. If we had had our time again, that is probably not the ideal way to manage this.

In terms of the tension between minimising cost and delivering the investment programme, that is clearly a tension. The Government is managing that through the levy control framework, where they are doing an assessment of how much supported investment is needed and is affordable, and that provides a framework in which we can then all proceed. I think that is a very sensible way of doing it. So the Government thinks about the issue, thinks about how much money can sensibly and should sensibly be spent to deliver these important objectives, and sets the money aside. We then deliver against that budget. That is a good way of addressing that balance.

Q208 Lord Whitty: You all seem to be broadly in favour of a decarbonisation target, even if you disagree a bit over other targets. Is there not a contradiction between the European approach of targeting and the UK Government approach of capacity agreement, which is also supported by some other Member States? Are they utterly compatible? I would not have thought so.

Ravi Baga: We would argue that they are compatible. The decarbonisation piece informs you of the costs associated with different technologies, but even when you know the costs of the different technologies it also makes sure that you have the incentives, that you have sufficient capacity built. So we see that the capacity market has the much more focused objective of ensuring capacity adequacy. Whether that capacity adequacy is low carbon or

non-low carbon will be determined by the carbon price, so the two should work in tandem to deliver carbon objectives as well as security of supply.

Dr MacLean: It very much depends on the form of capacity market that is chosen. What is currently being considered in the UK is likely to be able to do that, because it still allows a lot of market decision-making. Other approaches where, for instance, there is central procurement of capacity that is made, that probably is not compatible in the same way. Generally, I think we have to recognise that we have moved from a world where we could invest in energy and we got capacity; we could invest in capacity and we got energy. They have been decoupled now, and we have to value capacity and energy separately. The capacity market appears to be a way of ensuring that there is a value attached to capacity that we do not currently have in the energy-only market.

Rupert Steele: It may be worth emphasising that the privatised electricity market has had capacity mechanisms of one sort or another for most of its history. There was a capacity mechanism embedded in the electricity pool from April 1990 until March 2001, when NETA came in. From January 2005 until 1 January this year, there were free carbon allowances, which have, economically, an almost identical effect to a capacity mechanism. In the 22 years since vesting there have been less than four years without a system of capacity payments, explicit or implicit. During those four years, generators accounting for about 20 gigawatts of plant, including British Energy, TXU, AES, Drax and AEP Energy Services, sold power stations at very low prices, hit financial difficulties or became insolvent. With that history, I think that the UK Government is being very sensible in going for a capacity mechanism.

Q209 Baroness Parminter: Can I ask about the EU energy framework up to 2030 and whether that should be technology-neutral or specific? Two questions: do you think a renewable target beyond 2030 would deliver more investment in low carbon energy; and, secondly, is there anything else you would like to see in the Commission's proposed framework document?

Dr MacLean: I think I made it clear we would certainly be supportive of that. The Commission did some interesting work last year on road maps. What they showed was that, almost regardless of which fairly extreme scenario you took, you came to a mix that had a minimum level of renewables. For the sake of argument, let us say that 50% was where you were going to get to in your road towards 2050. If 50% is what you have in a high nuclear, a high CCS and a high renewables scenario, let us take that 50% out and you could quite easily then have targets at the 50% that gave the clarity that that was what we accept. Then the debate is about whether it is 50% or 75% rather than about zero or 75%. I feel that there is a basis for setting target levels that do not disrupt any market forces, because they recognise that that is a no-regrets level that you could set and if you wished further ambition then that would be possible. It is just taking out of the debate that part which should be taken out.

I would disagree with Ravi; renewables technologies do have benefits as being fuelless technologies, perhaps with the exclusion of biomass. Technologies like wind or like solar use a local source of energy or fuel and therefore, in terms of security of fuel supply and national security, you are in a very different position than you are when you are reliant on a fuel source—whether that be fossil fuel or otherwise—that may come from a different area. There is that benefit of renewables that makes it worth considering having separate targets for renewables, and by that I would specify those that do not require fuel.

Ravi Baga: For us, having further renewables targets is likely to mean that it will entail permanent subsidy and will lead to significant and unnecessary costs for consumers. Europe

should certainly look at what the UK is doing and try to move towards a framework where low carbon technologies can compete on a level playing field.

To pick up on the point on the 2050 road map, unfortunately, in my view, the analysis presented was extremely poor. It did not ask the right question of how the EU could meet its decarbonisation targets most cost-effectively. Instead what it put forward was three ranges of renewables scenarios, starting with a minimum of 40% and moving up to numbers that were much higher, and then seeing how the energy system could fit around those aspirations. The renewables numbers were input assumptions into that analysis.

Even with a very limited ambition for nuclear, which varied between 2.5% to 20% of the total energy in Europe, the scenarios demonstrated that those in which nuclear energy was allowed to contribute presented the most cost-effective scenarios in Europe. Yet, despite that, the EU policy framework does not recognise that in any of the initiatives it has come forward with. If you start with the assumption that you are going to have a very high degree of penetration of renewables, that forces you to think about prescriptive solutions on interconnection, which again will add significant and unnecessary costs for consumers. We think the fewer the targets the better, and what Europe can do best is make sure that the market is integrated, that you have free cross-border trade and let the price differentials between the markets drive the necessary investment that you need.

Dr MacLean: If I can clarify, in talking about targets I am not talking about subsidy in any way, but the opposite. I believe, and have outlined previously, that by giving the clarity to the markets, to the supply chain to invest, that is how you get the costs down. If you wish to have a digression curve that shows how your support is going to go down to zero, then that is also a good way of driving the costs down, because it gives people clarity about what is going to be needed going forward; so almost the exact opposite of that. I would argue that having clear targets will mean that we will require fewer subsidies and, hopefully, for a number of technologies, no subsidy by the time we get to 2020. I would also like to underline that companies like mine much prefer to live in a world of no subsidy where the market is operating, rather than one that is dependent on the political and regulatory regimes that have proved so volatile over recent years.

Rupert Steele: I would adopt a slightly nuanced position on this. The strategic objective must be emissions reduction, and if the EU is going to substantively reduce its emissions in 2050, in the sort of amounts people have talked about, then some sort of target in 2030 is going to be a necessary stepping stone, otherwise people will kick the can down the road and not do anything. That direction of travel is clear, but we need to do it in a way that is supportive of investment and takes account of affordability because we are working in quite a difficult economic circumstance.

There is an argument that, by raising carbon prices to very high levels, you get infra-marginal rents; you get existing low carbon generation receiving much more money than they otherwise would expect and need. That is a good thing if you are an electricity company, but that may not be good public policy to address it in that way. That suggests that something more targeted may continue to have a role and, for that reason, we would not rule out the benefits of a renewables target beyond 2020. It may be that a more indicative target, and giving Member States more flexibility about how they implement it, would be a balanced solution that could have the best impact.

Q210 Lord Renton of Mount Harry: You are three experts. Do you think that at the end of day the EU will get it right?

Rupert Steele: I am inclined to say we should look to their track record in this area and then perhaps not elaborate on that, but that perhaps does not entirely answer the question.

Ravi Baga: I think the key challenge facing the EU at the moment is trying to ensure that it can resolve the issues around the EU ETS, and I think that will provide a pretty good indication of its capabilities in this respect.

Dr MacLean: It is a difficult one because there are probably good and bad examples in the past. There is not a right answer out there. What we need to do much more, rather than trying to forecast what that is and what the best way of getting there is, is to try to influence a bit more what that end outcome should look like, and what the characteristics of it are, and not believe that somebody has a right answer and that there is a single technology, or that there is single approach that is going to be needed in order to get there. My one comment on the EU is that it is a very difficult place for decisions to be taken now, because of the number of Member States with all the differing interests that they have. That will make it difficult for it to come to anything more than lowest-common-denominator positions, which almost by definition will be suboptimal in some way or another.

The other difficulty is that things change. Five years ago before the financial crisis, when most of the debates about the targets and frameworks were going on, we were in a very different world. Things like the emissions directive and LCPD are solving the problems of acid rain from many decades ago but they are creating problems of high carbon and security of supply in this decade. In that context, it is very difficult for anybody to get it absolutely right. I think perhaps we need a bit more flexibility around it, and an approach that recognises that we will never have a single right answer.

Q211 Lord Whitty: Mr Baga said that how the EU sorts out the ETS will be indicative of whether it can sort out anything. So far the track record does not appear that great and, whether you blame the generosity of the system or the recession, clearly some reforms are needed. What do you think should be done about the ETS? For example, do you support the proposals on back-loading? Do you support the possibility of having a European-wide carbon floor price?

Ravi Baga: We have Professor Michael Grubb here, and I might quote from some of the analysis that he has done. So, apologies for that, Michael, I am not stealing some of your work. One of the fundamental weaknesses in the Emissions Trading Scheme is that you have no supply-side adjustments. Most markets have a demand and a supply and you can adjust both. What the first two phases of the ETS have shown is that, having set the cap, you are then helpless to adjust the scheme for any other external circumstances that may arise, whether it is overallocation or whether it is economic recession or such other event. So I think introducing a supply-side adjustment mechanism is necessary.

The question then is: how do you control that supply-side adjustment mechanism? Do you do that by introducing a floor price or is it possible that you can achieve something without having a floor price? A simple adjustment that said every time the cumulative surplus exceeded 10% of annual allocation it would lead to the cancellation of all surplus allowances may be a sort of principle that works, where you do not have to introduce a price. But I think any further refinement of a supply adjustment mechanism will need some consideration of price, because you will need some parameter against which you judge that the market is in oversupply and therefore needs reining in, and price seems to be the obvious one. The problem with having a price parameter is that the debate may become much more entrenched and it may be much more difficult in getting agreement on what is a sensible floor price. Do you then regulate the system so that it just hovers above the floor price,

rather than driving real abatement in the long run? There are some tricky issues that need to be dealt with, but the fundamental issue is that we do need a supply-side adjustment mechanism and price is likely to play some role in determining how that adjustment mechanism works.

Rupert Steele: It depends a bit on what you think the ETS is there to do. If you think it is there to ensure that total European emissions are within a certain trajectory, then it has done what it said on the tin and delivered that at relatively low cost. There will be a question about whether it would have happened anyway, but if that is your objective you can put a tick. If your objective was: has it encouraged people to invest lots of money in low carbon generation then it has had no effect, whatever, in that direction. If you wanted it to have that effect, then you would need to have some method for investors to have some visibility of the price going forward.

An EU-wide carbon price floor would be significantly more credible than a UK-only carbon price floor. A UK-only floor has the problem that if the UK price diverges very substantially from the European price—as it appears to be doing at the moment—investors will start to question the sustainability of the UK floor. A Europe-wide floor is much more likely to be believed by investors. If you could do it on a worldwide basis, people would believe it even more.

Dr MacLean: We would probably support all of that. We think the measures that are being proposed at the moment, with the delaying of auctioning, are a reasonable first step, but it is more one of treating the symptoms rather than the cause of the problem. Ultimately, if we want the system to set a viable price rather than just achieve the volumes, then the volumes in the form of the targets have to be much lower than they are at the moment, in order to see the price going up to a level where it will start impacting on investment decisions.

The two cures of the problem that would create a fundamentally more robust price, which we would support, are very difficult to deliver. Whether that is one of having a much tighter carbon target or whether it is one of agreeing a price floor—and this is going back to the previous question—the reality of achieving agreement on those across 27 Member States is questionable. Hoping that in the longer term we can get a cure to the problem, at least at the moment doing something that is treating the symptoms is helpful.

Rupert Steele: The other thing that might be worth adding is that the UK Government's energy market reform package means that the incentives to invest in low carbon generation will be independent of the success or otherwise of ETS, or indeed the UK carbon price floor. But because of the way the CFD works, the carbon price drops out of the maths and the incentive to invest is independent of the carbon price. That means, at least, that if we cannot solve this problem we can still get on and build the low carbon generation that we need.

Q212 Lord Whitty: At a cost which would be higher than our European counterparts.

Rupert Steele: Not necessarily, because it is targeted. Although the individual CFDs would be more expensive, you would not have the infra-marginal rents for all the other existing things. If you add it all up, it is probably cheaper to put up the price by the amount needed to raise the subsidy for the people you need to subsidise than to put up the price for everybody.

Q213 Lord MacLennan of Rogart: I am finding it a little difficult to work out what industry would regard as the best systemic reform to get the better answers. Dr MacLean has said flexibility is required, but these are choices and they have to be made and you

cannot oscillate between choices to deal with the need for flexibility. I wonder if industry has given any serious thought to institutional change that would assist them in getting their points of view considered. There are obviously national differences that were taken into account by the Commission and the Council but there are technical questions that, it seems to me, may better be addressed by some other non-existent forum in which the conflicting arguments can be considered. I am taking this ETS issue as a peg on which to hang a wider question.

Rupert Steele: As a possible solution, you could envisage a kind of European central bank of carbon that has a duty to adjust the amounts auctioned in order to hit a particular carbon price trajectory. That would be an alternative to fixing the volume and letting the price float. I guess it is a bit like Heisenberg's uncertainty principle: you cannot fix both the volume and the price. One or other of them is going to have to adjust.

Dr MacLean: I hope I have not confused matters by talking about flexibility. The flexibility that I mentioned is simply that we need to be devising something that allows the sort of movement that Rupert was just describing there, so that you adjust things to take into account the realities of where you are rather than the projections that you made five years ago as to where you might be. What I said earlier is that we need the longer-term clarity about what the framework is and what we are trying to do.

The issue with the carbon price is that it is ostensibly a political manifestation. You are trying to create a market around a political objective and I think it is proving difficult. It is proving difficult because, first of all, it is not world wide and, even within the EU, the UK has now created a differential through the carbon price floor with other markets. The ultimate solution has to be that there is a proper recognition of the value of carbon and, if the value or the price is what we want to achieve, perhaps that is what has to be set rather than trying to do it indirectly through the volume. I am just debating that as we go through rather than espousing that as a company position, but it seems the logical consequence.

Q214 The Chairman: Can we move on? Lord Caithness.

Q215 The Earl of Caithness: I want to talk about fossil fuel base energy but, before I go on to that question, could you write to us because we do not have time to go through it? I want more detail, please, on the jobs that have been created and what sort of jobs you are creating, because I am conscious that there were jobs created in Germany in solar energy and then a couple of years later China totally undermined that lot and people who were employed were unemployed. So I would like more detail on that, please. I would like details of what investment and what you consider the future on tidal and wave energy and, similarly, the future and investment on electricity storage, please.

Moving on to my questions, what do you reckon is the future for coal and gas and are you investing? If not, why not? What do you think the future for CCS is?

Q216 The Chairman: All in 10 minutes at the most.

Rupert Steele: I will be brief. Coal continues to be very important in the UK electricity system. It provides an excellent contribution to security of supply, because it is completely independent from the gas market and it is completely independent of the weather, therefore, it is something that you can turn on and off. You can store vast amounts of energy in the yard at the power station and certainly, for a number of winters when the UK has been in a tight situation on gas, it has been the coal plants that have ridden to the rescue by maximising their output for a period to resolve that issue.

The contribution for coal is likely to decline in the medium to long term for environmental reasons, but it will leave an important gap in terms of the reliability of the electricity system. It is important that people recognise that and plan for it and also think a little bit about the speed at which the coal plant is finally withdrawn from the system, and make sure that that is not too fast. We continue to make moderate investments in our existing coal plants to enable them to carry on for their remaining lifetime and to improve their performance.

In terms of gas, gas is inevitably going to play a major part in the energy system for many years to come both directly in its own right and as a generation fuel. We have planning permission for a number of gas-fired power stations. Frankly, in the current market conditions, it is not economic to proceed with constructing them and that will be an issue later on in the decade when some of the coal plants start to close. That may change with a capacity mechanism, and that is one of the reasons why I think Government needs to get on with that.

Dr MacLean: I follow on and agree with what Rupert said on the capacity mechanism. I think it is unfortunate that DECC's view of the critical period is much later than Ofgem in its analysis, or SSE in its analysis has seen. The first capacity payments from 2018 appear to be rather later than we would have said, but if that is the view they have taken then the market will have to take that and hope that they have it right.

With regard to gas, certainly we see the important role of that going forward. DECC's analysis and the gas strategy was quite interesting, because it highlighted again that, almost regardless of which scenario you take going forward, you are going to end up with quite a large amount of gas on the system and the main variable is going to be how much that runs. Is it there primarily to provide capacity and backup or is it going to be there providing energy on the system? As yet that is unresolved but, in terms of the amount of investment that is needed and the amount of plant that is needed, the numbers are fairly consistent across the scenarios.

However, we feel that the debate becomes much easier if we can make progress on CCS, in particular, for that gas because it then means, even in a scenario where you are running that plant much more for energy production, that it is still going to be low carbon. We feel that a shift from coal to gas is sensible in terms of reducing carbon in the short term. Avoiding a plateau that you will get to then, because you are stuck at the gas level, is only achievable if you have the opportunity to put CCS on that. That would seem to be an important option that we need to create because, at the moment, we are not at the point where we have that as an option, frustratingly, after many years.

Q217 The Earl of Caithness: Are you investing in it?

Dr MacLean: We have the only project, together with Shell, at our Peterhead plant for gas in Europe.

Ravi Baga: There are two timeframes that we need to look at. One is if you look ahead to the 2030s and you see a decarbonised system, then clearly we need to be putting all our efforts in getting to that destination. That means encouraging low carbon investment and low carbon generation technologies, and the electricity market reform package is a way of delivering that. Recognising that destination, there is still a very important transition to be achieved and, clearly, coal and gas have a very important role to play in that transition. We must pay it equal attention, because there is no point setting a destination if you fail en route and you have not managed your security of supply. In that sense, coal and gas have a very important role to play.

Beyond that, if we accept that emissions from the electricity sector beyond the 2030s need to be limited to 50 grams then clearly CCS will determine how much fossil fuel can contribute to our future energy mix. In that sense, there is significant importance attached to the CCS demonstration programme. As of today CCS is still a trial technology. We are investing in very small-scale trials. We are not part of the large demonstration project and it is important to see where that gets to. In the meantime, we need to be careful that in securing the transition we do not compromise the destination. We must maintain our efforts in delivering the investment in low carbon as well.

Q218 The Earl of Caithness: Two quick follow-up questions. Given Germany's opposition to CCS, there is obviously not going to be anything at a European level. Is the UK big enough to make the investment for CCS to become commercial viable? The second question is following up on Mr Steele's reply. You have all said that gas is going to be important but nobody is building new gas stations. We are going to have a crisis. What needs to be done to get some new gas stations built and to make that return economic, even though they might not be economic but we need them there?

Ravi Baga: For one, we are commissioning a 1,300 megawatts CCGT as we speak, which should be operational later this year. The other point to make is that there is a symbiotic relationship between the demand and the backup capacity in gas, and the capacity market has a key role to play in managing that. If we accept that we are going to end up with a significant generation portfolio that is intermittent, then that will only succeed if we have the backup capacity to go with it. I think we all recognise that and people will develop options, but we do not need that much more capacity today. I think people will develop options and, when it becomes evident that further capacity is needed, will respond to those signals.

Rupert Steele: The capacity mechanism is going to be key to it. If you look at the spark spread—which is an electrician's way of saying what is the difference in value between the electricity and the gas that you put in to get the electricity and the carbon permits, and all the rest of it—historically that has not supported investment for much of the time. Over the years most gas turbine power stations have not fully recovered their capital costs. If you look at it going forwards, it is not signalling “invest” at the moment. If you want to build one of these, you either have to believe the market will get tighter and prices rise significantly, which has its own interesting issues if you are a retailer, or you have to put in a bid in a capacity auction and get a payment that makes it worth your while to go ahead.

It is going to be a tricky process getting from where we are now. We have the LCPD forcing the closure of a lot of coal-fired power stations, and we have people looking at the market and saying, “It is not worth while to build gas at the moment”. I think that is why Ofgem and others now feel that we need to press on with the capacity mechanism.

Dr MacLean: In terms of new build, Rupert covered it entirely. It is important to recognise, though, that there are also decisions to be made about what existing plant stays open, is mothballed or is closed. Those are equally impacted by these decisions around capacity mechanism. It is important to remember if somebody closes a plant it happens now. If somebody builds a new plant it is probably three or four years before you have the benefit of that. If we are too slow off the mark, there is a real risk that we get too much closure and then we do not have the ability to catch up.

Just very briefly on the Germany point of view, the issue there is about the storage rather than about the capture. There are a number of projects looking at sub-sea storage and looking at hubs in Europe—off Rotterdam, I think—where you could take carbon dioxide to then use the North Sea, which has ideal stores in places where there is then no risk in the

way that there is with underground storage. Potentially, there are routes for removing the carbon dioxide in a way that would make its use in other states acceptable. At the moment that is almost the next problem and the first one is proving the demonstration-scale, technical and commercial viability of it.

Q219 The Chairman: That is a good place to end. We have kept you a very long time, and that is as a result of the very interesting evidence we have heard. Thank you very much, Mr Baga, Mr Steele and Dr MacLean. We are very grateful. Thank you.

EDF—Supplementary Written Evidence

I erroneously pointed out that EDF Energy's parent company, EDF, was 75% owned by the French state. EDF is in fact 84.44% owned by the French State, with the remainder divided as follows: 13.65% owned by institutional and retail investors, 1.84% owned by EDF employees, and 0.7% Treasury owned.²⁴

Jobs Generated by Investments

EDF Group employs some 156,000 people internationally, and in the UK EDF Energy employs 15,000 people.

As part of EDF Energy's planned investment in new nuclear generation, further significant employment opportunities will be generated. Our new build team now numbers some 800 people. EDF Energy's first new nuclear build site at Hinkley Point in Somerset will:

- Create up to 25,000 jobs over the project's construction phase, with 5,600 people on site at peak
- Inject £40m a year into the regional economy during operation, with 900 ongoing jobs over the 60 year operational life of each station.
- Deliver significant benefits to the local economy. During the construction of our first new nuclear power station, we expect around £100m to be injected into the Somerset economy each year. Over the past year we have signed the Section 106 agreement with three Somerset Local Authorities in August, of total value of around £100m to the local community.

In order to develop people in the UK, and locally to our project, we have also announced a series of investments to support these jobs:

- We have announced investment of £1.5 million in a Construction Skills Training Centre, which will deliver more than 1,200 training places, and £3 million in an Energy Skills Centre in Somerset.
- EDF Energy has also announced a further investment of £1.6 million in West Somerset Community College. It includes training in enterprise skills and how to run a successful business, so that people will be prepared for the opportunities from Hinkley Point C.
- We are also in the process of expanding our £3.5 million Nuclear Academy at Barnwood in Gloucestershire, which currently helps train some 2,500 employees each year.
- Separately, we are also investing £15 million to establish a world class training centre for our industry in partnership with Bridgwater College.

²⁴EDF Facts and Figures, 2011, http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2012/EDF2011_Fact-Figures_20121016_va.pdf

Looking across the wider programme of new nuclear investment expected to be made in the UK, the IPPR in a recent report has estimated that this programme of investment could add £5.1 billion annually for 15 years to the economy, supporting some 32,500 jobs per annum (a copy of this report is enclosed for reference).

Current and Planned Investment in Tidal and Wave Energy

EDF Group has a clear strategy to achieve a generation mix that includes 25% renewable generation by 2020. Of this 25%, significant investment is being made in marine power. EDF Group has two tidal stream and wave projects which are focused on demonstrating the potential commercialisation of both technologies:

- **Paimpal-Brehat Array, North Brittany, France**

Starting in 2008, this project is focused on demonstrating the technical, legal and environmental feasibility of a tidal stream array project in French territorial waters. It includes 2MW of installed capacity, comprising of 4 OpenHydro tidal current energy converters. A sub-sea cable was installed in July 2012 and the first device is scheduled to be installed and grid connected in mid-2013. The 3 other devices will be installed in 2014.

- **Reunion Island, India Ocean**

Carnegie Wave Energy Ltd is working with the first CETO licensee and its joint venture partner EDF Energies Nouvelles to deploy a commercial scale CETO wave power converter unit on the French territory of Reunion Island. The technology produces high pressure water from the power of waves via a fully-submerged buoy and pump. This project has been partially funded by a French Government grant of \$5 million, and is the first stage of a larger planned CETO project.

Plans are in place to expand the project to a capacity of 2MW and 9 devices, to be connected to the grid by 2015. By 2017, the project is expected to expand to 15 MW.

Alongside other companies, EDF Energy has also funded the Energy Technologies Institute (ETI) and is currently involved in two marine projects:

- Development of software capable of accurately estimating the energy yield of major wave and tidal stream energy
- Test of performance of a 1MW tidal stream device installed at the European Marine Energy Centre (EMEC; Orkney) in different operational conditions

In turn, this work will help provide a better understanding of tidal stream devices. Through helping produce accurate assessments of the likely cost of energy production from large scale wave and tidal arrays, it will help reduce the uncertainty faced by investors.

Current and Planned Investment in Electricity Storage

EDF Energy has worked on various research projects in the past looking at battery storage, but we are not currently undertaking any new work in this area. At this point we do not see significant market opportunities at an industrial scale.

31 January 2013

Energy Networks Association (ENA)—Written evidence

This response is made on behalf of ENA's Gas Distribution Networks (GDN) members who comprise of Scotia Gas Networks, Northern Gas Networks, National Grid Distribution and Wales & West Utilities.

Energy's contribution to economic growth

The dominant theme of the Commission's Energy 2050 Roadmap is decarbonisation, with a particular focus on renewables. How can energy policy make its contribution to both decarbonisation and to economic growth? In what specific ways can energy drive economic growth in the EU?

Energy Networks Association (ENA) and its members has carried out several studies in the past two years looking at the future of energy use in the UK to meet the governments challenging 2020 and 2050 targets and to ensure that the route to decarbonisation is economically manageable

Both the ENA Redpoint study²⁵ and National Grid's "UK Energy Futures²⁶" scenarios present pathways that meet the UK's 2050 targets, utilising a balance of technologies and fuels that include making best use of what is arguably the most developed and integrated gas network in the world. These scenarios make use of new and emerging technologies that can make the UK gas grid "greener", including Carbon Capture and Storage (CCS), hydrogen and biomethane injection, as well as demand side response and efficiency measures.

Most recently the ENA/Delta Energy and Environment study focusing on 2050 Pathways for Domestic Heat (to be published later this month) and National Grid/Redpoint's Heat Economics Report highlight the importance of keeping a variety of options open when addressing the issue of Heat.

The ENA believes that an energy policy that takes account of each country's' existing infrastructure and available resources can make an effective contribution to decarbonisation. An approach that adopts one solution across Europe is likely to lead to non optimal paths for many countries and is likely to reduce economic growth by imposing higher costs of decarbonisation than necessary

A common EU approach to transforming the energy system

To what extent will a common European approach help keep the costs of transforming the energy system down and assure security of EU energy supply? Where do you see economic growth and decarbonisation benefitting from a common approach to generation, transmission, distribution and storage? And what are the risks?

The UK has one of the most integrated and complex gas network system in the world with over 80% of the population connected to it, therefore while common approaches have merit we need to allow each country to set its own policies based on their individual existing infrastructure mix. In particular the UK should maximise the use of assets that have already been paid for rather than abandoning fit for purpose assets and installing new assets to provide energy from a different energy source.

²⁵ <http://www.energynetworks.org/gas/futures/gas-futures-reports.html>

²⁶ [National Grid Gone Green Scenario](#)

Any approach adopted will also need to consider what is the optimum solution for each member state, and will need to take in to consideration

- The availability of natural resources
- The existing infrastructure (transmission, distribution, generation, production and storage)
- Energy usage and weather profiles for example Spain is different to UK, which is different to Denmark
- Population densities
- Nature of the building stock in the member state

Therefore a common approach is potentially too simplistic or needs to be very high level.

The Internal Market in Energy

The internal market in energy is focused on transmission. Should competition in the rest of the supply chain be given greater consideration? What economic opportunities might arise from such consideration? What risks arise?

Highly developed gas distribution network assets in the UK mean that we need to keep gas in the mix to ensure an economically viable transformation to a low carbon economy.

ENA's Redpoint Report²⁷ demonstrates that **pathways with ongoing gas use could offer a cost-effective solution for a low-carbon transition relative to scenarios with higher levels of electrification**. The baseline assumptions in the report indicate potential savings of more than £700bn over the 2010 to 2050 period – around £20,000 per household or £10,000 per person – with consequential benefits for consumers, the economy, and the competitiveness of GB industry.

Reducing the costs of energy for business and consumers

Energy is a significant manufacturing input and household cost. Is it appropriate to seek to reduce the costs of energy in order to boost EU competitiveness and, if so, how can it be achieved in addition to energy efficiency? To what extent might price reductions jeopardise attempts to decarbonise? What implications, if any, do consumer preferences over the energy mix, such as onshore wind and nuclear power, have for price?

ENA/Delta EE's 2050 Pathways to Domestic Heat study has demonstrated that consumers will not choose high cost low carbon options unless government interventions and policy changes. Historically, all changes in the UK heating appliance mix have required either government intervention (Clean Air Acts, Town Gas to Natural Gas and Condensing Boilers or Customer "pull" (the rapid growth in central heating in the past 25 years). Furthermore this study demonstrates that consumers are concerned by capital costs more than commodity costs, and this impacts their choice of heating appliance, future commodity benefits appear to be heavily discounted.

The National Grid/Redpoint report also demonstrates that it is important that the whole system view is taken when looking at costs not just cost to consumer. For example moving to the electric heat pumps, customer will see appliance cost but there may be significant additional generation and electricity distribution infrastructure required. This is why the hybrid gas/electric heat pump works so well.

²⁷ <http://www.energynetworks.org/gas/futures/gas-futures-reports.html>

ENA's Delta study shows that domestic customers will be primarily driven by capital costs and while non domestic customers may look more rationally at whole life costs. Decarbonisation will not be popular unless it is also affordable and provides energy security. To most people and organisations the order of importance of the energy "trilemma" is affordability, security, and environment. Therefore if fossil fuel prices fall consumers will require further government interventions to move away from fossil fuels but as our study shows, most of targets can be achieved with gas remaining in the energy mix.

Gas

Do you agree with the Commission that “Gas will be critical for the transformation of the energy system”, until at least 2030 or 2035? What mechanisms are required to boost the role of gas, securing appropriate investments, but on the proposed interim basis? Does an active renewables policy require gas in support of it? Should the EU encourage the development of unconventional gas?

There are credible and robust scenarios in which gas could play a major ongoing role in the GB and European energy mix while meeting both the 2050 carbon targets and the 2020 renewable energy targets. Managing CO₂ emissions under these scenarios would require the successful development and roll-out of Carbon Capture and Storage (CCS) technology, supported by the deployment of biomethane injection into the gas distribution network, roll-out of district heating, and / or the usage of combined electricity and gas, dual fuel systems for domestic heating.

All potential pathways to a low-carbon future will involve significant investment in new technology, with its associated risks. Given the level of uncertainty regarding these issues, there appears to be significant value in retaining the option for a ‘high gas’ future.

The costs of maintaining the existing gas transmission and distribution networks are relatively small in comparison to the other system costs associated with a low-carbon transition. Together these findings suggest a compelling economic rationale for maintaining the operation of the GB gas transmission and distribution networks for the foreseeable future.

The UK's gas networks currently provide the bulk of existing heat demand and if, as proposed in the recent DECC Heat Strategy, this load is moved to other networks (namely electricity and district heating), and the UK Government must take into account the seasonality of heat demand and the instantaneous peaks on the electricity systems.

There is also the issue of the significant levels of capital investment required in the electricity networks to meet these peak demands. In the case of district heating networks, under current arrangements, our members see few incentives to invest or become involved in this market. The potential emergence of electric vehicles may further compound these issues in the case of the electricity networks.

ENA is in a unique position to address the needs for a balanced solution as it represents both electricity and gas network operators. Through our various work streams our members are considering the different scenarios needed to meet the 2020 and 2050 targets, and how the electricity and gas networks could be transformed as a result. For example, ENA are coordinating Low Carbon Network Fund projects for our members that are addressing the challenge of an all electric future whilst at the same time our Gas Futures Group have undertaken a study to look at the future of domestic heating.

ENA, as part of addressing the challenge of potential increased electrification are considering how smarter management of the distribution network can mitigate these costs. Our members are working with electricity suppliers to better understand how demand side management, coupled with a smarter network, can reduce the need for large scale distribution network investment that would otherwise be needed.

Gas has a continued albeit changing role in building heat, migrating from a base load to seasonal and peak supply by 2050. Gas with CCS could play a significant role in both decarbonisation of UK electricity generation and conversion to hydrogen (2040 onwards) for industry and transport as emission targets start to tighten.

Gas distribution networks are seeing interest in building small scale gas fired generation. The promoters of these schemes are responding to market opportunities in providing Short Term Operating Reserve to support the electricity system and provide fast response to requirements for short term generation capacity. These connections are typically to the lower pressure tiers of distribution networks and will therefore be deeply embedded in the system. If this generation capacity is required to support the electricity system as an increasing amount of wind is connected then the gas distribution system will need to be maintained for the foreseeable future.

As gas will be required for the foreseeable future then development of indigenous sources of gas makes sense. It will benefit the balance of trade by reducing imports, it may result in reduced prices and it may also reduce environmental emissions by reducing the energy consuming in importing the gas.

Research and innovation

We would welcome views on how the EU can most effectively support research and innovation as catalysts for decarbonising energy and driving growth, and how EU energy policy can be sufficiently flexible to take into account emerging new technologies.

All of our ENA members are actively involved in research and innovation both through the Low Carbon Network Fund in electricity, the current Innovation Funding Incentive and the new Network Innovation Competition/Allowance in Gas.

Our gas members are actively involved in the development of non-conventional gas (predominantly biomethane) injection in to the grid and are working with various trade bodies industry, Government and Regulators to develop this market. There are also studies focussing o the addition of Hydrogen to natural gas, the development of standalone hydrogen networks using electrolysis to store hydrogen from wind generation when there is no demand.

BioSNG is another technology that offers decarbonisation options that are potentially more cost effective than full electrification, and over time offer the possibility to decarbonise some or all of the gas network which would be complementary to electricity decarbonisation.

3 October 2012

Energy Technologies Institute (ETI)—Written evidence

Energy's contribution to economic growth

1. The Energy Technologies Institute (ETI) believes that a successful and affordable low carbon energy strategy can be the core of UK and European energy policy and make a significant contribution to the broader objective of economic growth. However this is only possible if we can make low carbon energy more competitive. This needs a combination of new technologies which can drive down costs, a supportive regulatory regime, and capital to finance the necessary huge investment and firms with the capability to deliver it.
2. The ETI's analysis shows that innovation is vital to help reduce our energy consumption and to deliver our energy needs with a far lower carbon content, at prices which do not damage our competitiveness and in ways that generate broad economic benefits.
3. Our Modelling work clearly shows there is a vast difference in cost to decarbonisation by a co-ordinated and strategic approach rather than via a series of unco-ordinated interventions. One of the lower cost (per tonne of carbon saved) areas of the economy to decarbonise is electricity generation. Therefore, decisions taken in the electricity generation sector have very broad implications for the economy as a whole. When assessing power generation options looking at the wider economic impact and the cost of saving carbon elsewhere in the economy matter. Government's role as policy maker and regulator is clearly critical to determining the cost and carbon saving outcome.
4. From an ETI perspective, technology development is the key to help build the UK and EU's future energy infrastructure. For this new skills will be required to both deliver and develop further economic potential.
5. The ETI recognises the benefit for a public-private approach. Traditionally new industries have needed support in their establishment. In the case of energy we are talking about long investment cycles for which investors require a degree of policy certainty to make investment returns more attractive.
6. There is no single technology which can provide the affordable and secure energy mix the EU needs – hence the need for technology development across a number of areas. New technologies bring us many options, but they do not remove all constraints e.g. Carbon Capture and Storage makes it possible to burn fossil fuels without releasing carbon, but the costs of compatibility and connectivity at the design stage can have a huge impact on ultimate costs.

7. The ETI's work includes many projects to develop and demonstrate technology that will reduce costs, by reducing risk of product failure. This is not the only kind of risk in a new sector such as low carbon energy. Government has a critical role to play in reducing risk by generating policy certainty and a predictable supportive regulatory environment which will encourage the vast investment needed to deliver our objectives.
8. Large scale investment in generating capacity takes decades to pay back. Investor certainty has a great impact on the level and cost of investment of this type. The more risk investors face, the higher the risk premia they will attach to their investment, leading through to higher electricity prices. Government can help to reduce this risk by generating investor certainty through a predictable regulatory regime. Regulatory uncertainty leads to higher electricity prices.
9. Our work to develop new lower cost low carbon energy sources has been made possible by a partnership between government and major energy and engineering firms working together to research and test new technologies, long term funding and a sense of shared purpose. Partnerships between business and government can and are yielding real progress towards meeting the considerable challenge of decarbonising whilst maintaining competitiveness.

A common EU approach to transforming the energy system

10. The Energy Technologies Institute (ETI) carries out two key activities – (1) modelling and analysis of the UK energy system to identify the key challenges and potential solutions to meeting the UK 2020 and 2050 targets at the lowest cost to the UK, and (2) investing in major engineering and technology demonstration projects which address these challenges with the aim of de-risking solutions – both in technology and in supply-chain development – for subsequent commercial investors.
11. In assessing the potential costs and benefits to the UK of any individual future energy technology it is critical to consider the position of the specific technology in the context of the whole, integrated UK energy system. The ETI analysis of the UK energy system out to 2050 is focused through our in-house and internationally peer-reviewed Energy System Modelling Environment (ESME). This is a national energy system design tool, integrating power, heat, transport and infrastructure. Through this analysis ETI can give a sound view on the potential impact of a specific technology – based on underpinning evidence on economics and engineering.
12. From ETI analysis it is clear that the highest value options for the UK to have available to enable delivery of a cost optimised energy system for meeting 2050 energy and climate change targets are improved efficiency in use of energy, UK sourced bioenergy, CCS and nuclear.

13. There are however significant uncertainties around the potential deployment extent and timing of each of these options and, in the event of slow deployment (or non-deployment) of one or more of these capabilities, ETI analysis shows that wind power (and particularly offshore wind) is the marginal cost technology which could be expected to be the most effective solution to fill the resulting shortfall in UK generation capacity.
14. A European version of ESME is also being developed to examine the challenges faced by countries within the EU. Given the size of the EU and the different natural resources and climates identifying potential solutions on an EU-wide basis would be difficult.
15. Although the individual technologies may vary in each country depending on the available natural resources and political influences it will still be necessary to employ a range of technologies in order to decarbonise the energy system in the most competitive manner.
16. The key EU energy policy themes are energy efficiency and increased use of renewable energy sources which align with the UK policy drivers of energy service affordability, energy security and climate change targets.
17. The ETI sees EU policy as generally helpful, unless inappropriate specific actions and targets are developed. There is a risk that citizens could come to believe that addressing climate change is incompatible with the affordable and secure provision of important energy services.
18. There are specific EU actions in addition to efficiency and renewables. Work on the Landfill Directive and action on international transport emissions are key examples. Initiatives such as NER300 include funding for CCS demonstration, which addresses GHG reductions directly. The major gap in both UK and EU policy is the emissions embedded in product flows across national boundaries. An analysis of UK greenhouse gas emissions on a consumption basis shows how important this issue is. Without some action on this, individual progress on climate change will disadvantage energy intensive industries through off-shoring of manufacturing. Action is required at an EU level.
19. The central ETI proposition is that affordability, security and climate change should be the drivers of national decision making within which energy efficiency and renewable energy will have important contributions. Skilful and well-informed EU policy development is a critical enabler, where the most important target is vehicle efficiency standards.
20. A common European approach on a number of issues will be important in an efficient transformation of Europe's energy systems.

Key areas include:

- Action to create stronger more reliable carbon price signals through the EU emissions trading scheme
- Stronger action to integrate energy markets (e.g. in gas and electricity), since deeper and wider markets will open up opportunities for more efficient use

and combination of energy sources and would more strongly incentivise innovation in new technology

- Europe-wide policy to promote the development of more sustainable vehicle technologies, because Europe as a unified market is sufficiently large to incentivise and influence vehicle manufacturers at a global market level.

21. ETI's energy system modelling powerfully indicates the key levers for transforming the UK energy system. These reflect the particular resource endowments of the UK. The combination of energy technologies will vary across European countries – but the logic of taking a system-wide approach is relevant Europe-wide.
22. Closer alignment of European policies could make Europe a more attractive market for investors in EU energy markets. Europe will need to compete for the capital to finance the major investments required.

The Internal Market in Energy

23. ETI's work on energy system modelling clearly indicates the importance of inter-connectors for UK energy systems. It seems highly likely that this will also be true across Europe. Given the variety of resource endowments across the EU, and differences in energy supply and demand through the day it is likely that energy supplies will be complementary and that security of supply and efficiency can be enhanced by making trade across member state borders easier.
24. In future demand side technologies and business models can make an increasingly important to balancing supply and demand. This suggests that broadening the focus of action on the internal market in energy beyond transmission will be valuable. For example, action to harmonise energy market arrangements could increase the scope for competition in demand side technologies and energy efficiency.
25. Europe wide modelling of energy systems would help us to understand the areas where policy reforms would be most likely to offer tangible benefits. ETI is working with its members to develop a Europe-wide version of its innovative Energy System Modelling Environment (ESME).
26. Energy companies face widely differing regulatory regimes across Europe which incentivise different kinds of behaviour. The internal market for energy is therefore a series of interconnected markets rather than a single market and as a result may generate outcomes which appear illogical or paradoxical. Harnessing the potential benefits of greater interconnection of markets needs both physical infrastructure and regulatory co-ordination.

Reducing the costs of energy for business and consumers

27. The key issue is to safeguard EU competitiveness by finding the most cost efficient way to decarbonise. This will be central to maintaining political and popular support for moving to a low carbon economy and critical to raising the finance to pay for it.

28. Low carbon energy sources differ massively in their costs per unit carbon saved. ETI is clear that energy saving and electricity generation are highly cost effective areas for reducing our carbon emissions.
29. Many low carbon technologies require more innovation to get to the stage where they can be ever considered competitive with fossil fuels even with a meaningful carbon price added. However some are already close and many energy efficiency measures can already more than pay for themselves. Some technologies will never be low cost but may have to be added to our energy generation mix eventually if we are to meet our carbon reduction targets. It seems sensible to invest now in driving down their costs as low as possible so that they can be more competitive when we need to call on them
30. Innovative approaches to energy policy will also be needed to ensure that impacts on affordability and competitiveness are acceptable, while allowing price signals to play a role in incentivising energy efficiency and decarbonisation.
31. Clearly the acceptability of different energy sources to consumers and communities is important. In the UK, for example, onshore wind faces constraints arising from public acceptability. Policy action to address these issues should be informed by accurate understanding of the potential energy system value of different sources of energy.

The role of gas in the EU energy system

32. Gas is currently the largest primary energy source in the UK, providing space heating and power generation. Gas is also likely to play a critical role in EU energy systems for the foreseeable future.
33. The future cost and availability of gas will depend to some extent on the global discovery and development of unconventional gas sources. This has had a very dramatic impact in the USA reducing prices dramatically. Although this is an established industry in the USA, it is only just starting in the UK and other countries, (especially China). The current inability of the US to export its significant production surplus as LNG, combined with low production costs, has produced a “gas bubble” locally in the US pushing prices very low in the short term. This may distort long-term expectations for global gas prices.
34. Planning ahead can make a huge difference to the cost of decarbonising gas. Recognising the long-term need to mitigate CO₂ emissions from new-build CCGT plants the ETI see two potential technical solutions – retrofit of CCS capability or conversion to burn hydrogen rather than fossil gas. Consequently, locating new gas generation where CO₂ transport piping infrastructure would be problematic and choosing equipment without a defined upgrade path to burn hydrogen would block both of these routes to low carbon electricity production using CCGTs initially constructed without CCS.

35. The ETI is exploring natural gas as a low cost and low carbon fuel for heavier land and marine vessels. Although it may well be cost competitive, there are challenges around removing unburned methane from the exhaust gases, which may mean that the greenhouse gas benefits are limited. We are undertaking further work in this area to understand the consequences.
36. It is easy to envision a scenario where globally traded gas is a relatively cheap and secure fuel out to 2030 and sometime thereafter becomes rapidly more expensive. This would arise where the growth in demand overtakes the global capacity to develop new reserves cost effectively.
37. Market uncertainties over the future generating mix, price setting mechanisms and changes in the pattern of demand caused by activities such as heating or transport electrification are especially problematic for investors in gas generation capacity. This is because whilst they are low capital cost units they have the highest marginal costs of generation (driven by high operating costs including fuel) and are therefore most exposed to capacity utilisation risk, for example being shutdown during periods of high wind production.
38. Gas fired power generation can complement renewable energy and can be financed without specific policy support. Policies may need to be developed to support investment in generation capacity which is only used for flexible peaking.
39. Our analysis leads us to believe that EU policy should facilitate investment in the enabling infrastructure to promote diverse gas supplies (including unconventional gas) and imports. Promoting deep and flexible gas markets within the EU will help to enhance investor confidence and secure economic efficiency in future. Ensuring that a broad portfolio of energy supplies is available will also hedge EU economies against future gas price risks.
40. In the longer run there will be a need to decarbonise gas-fired power generation. ETI's work points to two potential technical solutions – retrofit of carbon capture and storage or conversion to burn hydrogen rather than fossil gas. Policies should support future development of these approaches (e.g. through siting of new gas generation where CO₂ transport piping infrastructure is most deliverable or through choosing equipment with a defined upgrade path to burn hydrogen).
41. More broadly, European policy needs to enable the development and deployment of carbon capture and storage to support a longer term role for gas within a low carbon economy. For example, recent work by ETI on financing carbon capture and storage suggests that the current framework of the EU CCS directive may be a significant barrier to mobilising private sector capital into this vital technology

Research and innovation

42. ETI's work points clearly to the value of a system-wide approach in informing how to target support for innovation in a portfolio of promising new low carbon energy technologies.

43. ETI's experience also points to the value of partnership between public and private sectors, and taking a strong evidence-based approach to targeting research and innovation efforts.
44. Credible and stable policies, including on carbon pricing, will also promote investment in research and innovation to develop new technologies.
45. While there is a need for strong public policy support for decarbonisation and the development of new technologies, policy should also enable flexible markets that incentivise and reward businesses to deliver efficient energy services to EU consumers and industry.

Background to the ETI

The ETI is a public-private partnership between global energy and engineering companies – BP, Caterpillar, EDF, E.ON, Rolls-Royce and Shell – and the UK Government. Public sector representation is through the administration of the Department for Business, Innovation and Skills, with funds channelled through the Technology Strategy Board and the Engineering and Physical Sciences Research Council. The Department of Energy and Climate Change are observers on the Board.

3 October 2012

ENTSO-E—Oral Evidence (QQ 278 – 304)

Evidence Session No. 15 Heard in Public Questions 278 - 304

WEDNESDAY 23 JANUARY 2013

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord MacLennan of Rogart
Baroness Parminter
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Konstantin Staschus, Secretary General, ENTSO-E, and **Graeme Steele** Chairman, ENTSO-E

Q278 The Chairman: Welcome, and thank you very much for coming. We are very interested in what you are about to tell us. Perhaps I may start with formally doing one or two things. You should have in front of you a list of interests that have been declared by Committee Members. This is a formal evidence-taking session of our Committee. We are taking shorthand notes, which will go on the public record in printed form and on the parliamentary website, and we will send you a copy of the transcript to see if there are any minor errors, which you will of course be free to correct.

We have you for an hour, if that is alright. You have advance warning of the six questions, so we will have to keep up a bit of a pace to make sure that we cover all the ground.

I shall start by talking about interconnections, the progress, the barriers and the prospects. I think that one of your objectives is to promote the development of the interconnected European grid. We are interested in progress so far and the prospects. So far, we have had conflicting evidence, so an authoritative view from you would be much appreciated.

Graeme Steele: Okay. I will assume that we do not need to explain what ENTSO-E is and will go straight into how we would assess progress so far. Transmission system operators, TSOs, have been co-operating with each other across the EU footprint for some time both before and after the establishment of ENTSO-E. As you say, with the establishment of ENTSO-E, that is somewhat more formalised now than it was before.

We have two activities that are probably of most interest in that question. The 10-year network development plan, which we are obliged to produce every two years, looks at

transmission investments across the Member States, particularly at the cross-border level. Other areas are obviously the network codes that we are obliged to produce. We can touch in a bit more detail on both of those as we go through the session.

You are probably also aware that, for interconnectors in particular, there has been for some time a so-called soft target of 10% of interconnectivity across Member States. Whether your view is that that number was plucked out of the air or that it is a sensible number, as time moves on it looks to be a reasonably sensible number. We are making progress towards it. Obviously, some Member States are closer to or beyond that target than others. We are probably making better progress on the co-ordination side.

You are probably more interested in progress on physical assets, which remains difficult. The main challenge that everyone faces on that is the public acceptance or planning and permitting, depending on which term you wish to use. It does not matter which Member State you go to, you will find that there remains a problem with public acceptance and making progress with planning and permitting for electricity lines—whether that is within an individual country or between two countries. It is slightly different if you talking about a sub-sea link between two countries. Certainly for cable, there is not so much of an issue around permitting. There still are some hurdles to jump because you need to build some onshore assets, which is when the planning and permitting problem hits you again.

Interconnectivity between two continental Member States is often just an overhead line that goes across a border. Again, it faces the same difficulties.

Q279 The Chairman: Has progress been slower than you would have thought?

Graeme Steele: There are a lot of investments out there, which we can talk about in a moment. You have already quoted some of the big numbers. It is true that this is potentially the biggest scale of grid expansion since the 1960s or 1970s. Equally, if you think about the backdrop in the 1960s and 1970s as compared to now, the challenges are so much greater. There is perhaps not the same consensus around the public acceptability of what benefits the investments will bring. Therefore, you are in a different world from what we were then.

Q280 The Chairman: With things like burying the cable across the Pyrenees, is the cost factor of that really a significant deterrent? Is public acceptance moving the investment decisions out of reach?

Graeme Steele: Let me start a little on that, and then Konstantin can say a little more about the detail of your question on cost. Simply going to a buried cable solution changes the public acceptance dynamic a little, but it is still there. The construction disturbance caused by building an underground cable is probably the equivalent to opening up an area not much different from a motorway. Clearly, after the construction phase is finished, the visual intrusion is somewhat different, but you will still have to put in installations for maintenance and inspection every few kilometres or so. You also face greater challenges in keeping the assets cool and in their operating range, which you do not face with an overhead line. That will again impact on the cost.

Our view would be that it sounds a straightforward solution, but it is not as straightforward as it might seem. As I said before, if you are talking about sub-sea connections, it is a different debate. Do you want to say something about the cost factor, Konstantin?

Konstantin Staschus: As Graeme just mentioned, we are quite proud of the progress in co-ordination among all the TSOs in Europe, which has been achieved in a very short time. Every two years, our 10-year network development plan has significantly improved

methodology over the previous one. The big worry is the public acceptance. We are hoping on public acceptance that our joint optimisation of the planning Europe-wide helps in two respects. First, it makes clearer that the lines are really needed. If every country planned by itself, the danger of duplication of effort and costs and unnecessary lines would be quite high. By joint planning, we are essentially avoiding that, so the financial and economic viewpoint is much clearer and some questions are taken out of the public discussion.

We also hope to address the overall image of the needed electricity lines in the mind of the population, of the voters, by tying the need for lines in general and individual lines to the overall energy policy goals that, we hope, most citizens support, like the Governments do—namely, climate protection, renewable energy integration but also, of course, security of supply and market integration. For that story to be told credibly and explained, it is almost by nature a European story. We believe that if we explain it on the basis of the 10-year plan results, that can help.

To get closer to the question that you just asked, part of the methodological progress we have made in the 10-year planning concerns very extensive market modelling, which simulates for each country or price zone, hour by hour, for a target year like 2020 the prices that would normally exist in that country, and then from that derives how much the potential for economic benefit for everybody is from transmitting power from the low price area to the high price area. Then you check whether there is enough physical transmission capacity. If not, you can derive the value of new transmission. That is the main driver of our transmission planning methodology; there are other drivers that are less quantifiable. For that one you need to compare the value to the cost. If your investment cost of the cable is five to 10 times higher than the investment cost of an overhead line, the balance of benefits versus costs of the new interconnector is obviously affected. Life cycle costs may be a factor of only about three, but that is still an enormous factor. In the end, if everything had to be cabled, many fewer lines would meet the hurdle and prove economic and much less of the benefit that could be had nicely in climate protection, renewables integration, security of supply and so on would be achieved for the customers.

So that is a very difficult decision. Again, we are hoping that if we explain this logic clearly and people can tie it back to, “Here I insist on cabling, but then I forego this and this renewables and climate protection benefit”, that may be difficult for the individual citizen, so that they do not jump so quickly to oppose us.

Q281 Lord Whitty: In a sense you have covered a chunk of my question. People talk about regulatory barriers to physical interconnection, but you seem to be saying that most of those barriers are what we would call planning barriers—getting the system permitted and approved, with all the public objections that that may entail. Are there any other regulatory barriers? For example, there will be different prices within different national boundaries, and there may be barriers to the way in which you can supply different sorts of energy.

Graeme Steele: Let us move on to that. Notwithstanding what we said about permitting, which is the biggest physical challenge, things are complicated by the fact that with an interconnector asset you have to deal by definition with at least two Member States, and at least two energy regulators in each of those states. If both regulators are quite happy for the investment to progress only if it is done by their methodology and in their system, you will hit another problem. A degree of compatibility has to be found or you will create a regulatory barrier as well. As you well know, not every Member State has the same regulatory regime. Some are in a much more mature state than others. Some regulators are

very independent of their energy ministry. Some are not so independent. Again, that creates differing dynamics. But if the regulators wish to progress and find a solution, they can. The level of interconnectivity that we have demonstrates that there are a lot of active projects out there that are captured and explained in the TYNDP. In a physical project sense, planning and permitting are the most difficult things. The engineering is not particularly difficult. In a commercial sense, the regulatory thing still sits there as a problem to be overcome.

Q282 Lord Whitty: In both those categories, are there examples that you could give us—without revealing any commercial secrets—of things that have been delayed or have not gone ahead either because of the public acceptability and permitting dimension or because of regulatory incompatibility?

Graeme Steele: I can think of a couple. Probably one of the best examples of the permitting and planning problem is the interconnection between France and Spain. This would be around the Pyrenees area. For many years—

Konstantin Staschus: 30, I think.

Graeme Steele: For almost 30 years you have had a lot of acceptance between the TSOs that it would be sensible to make the reinforcement across the border. It had a lot of political momentum behind it, at regional government level on both sides of the border and indeed at national government level, but the degree of public acceptability made it impossible to make progress. We are talking broadly about the Perpignan area of France, down the coast into Spain. Interestingly, there is a six-lane motorway there, and a high-speed rail link to link the TGV with Barcelona. Those were big projects with a big impact footprint. The electricity asset would have gone in a very similar corridor. The other two did not seem to have a problem with acceptance, while the electricity investment attracted all the flak.

Q283 The Chairman: Was the resistance the same on both sides of the border?

Graeme Steele: Yes, pretty much so.

Konstantin Staschus: You have public opposition from affected villages, basically, all over the continent. There are some differences between countries, but in many countries opposition is much too strong. Spain and France are two examples, but Germany is another. The transport of the extensive wind energy installed in the north of Germany—more than 30 gigawatts—to the load centres in more southern parts of Germany, utilises routinely the surrounding networks to the west and east, for example in Poland and the Czech Republic. Of course, Germany has been planning to build north-south lines in its own grid to have more of that power, according to physical laws, flowing within Germany and to keep the overall network more available for the international trading of electricity. But public opposition has delayed this for many years already.

The Chairman: Do you wheel that power round through Poland and the Czech Republic and down to the south?

Graeme Steele: It is not so much that it is wheeled as that it wheels itself.

Q284 Lord MacLennan of Rogart: How enthusiastic were the generators, EDF, in France and across the Pyrenees?

Graeme Steele: That is a difficult question for us to answer in some ways, but if you look at it from the point of view that at a state level the French Government were very firmly behind it, that gives you a clue. In no sense, from our experience, was there any sort of

generation issue stopping that. If you look at it from the point of view that it may have been of interest to be able to access the significant French nuclear assets, particularly when the project was first examined, I would doubt that there was something like that behind it.

Q285 Lord Whitty: Do you have an example of other forms of incompatibility?

Graeme Steele: Let us go on to the more regulatory one, as this probably gets close to your domestic area of interest. Most EU regulatory regimes treat interconnection exactly the same as onshore transmission assets. The UK is the obvious exception to that—it is not the exclusive exception but it is the most evident one. Historically it has had a more merchant approach to interconnector investment—again, not exclusively so, because you have seen some merchant investments in Italy and in a few other Member States as well—but it is not a predominant rule, whereas it has been a predominant rule in the UK.

Q286 The Chairman: Can you define a merchant investment for us?

Graeme Steele: Absolutely. Essentially, if you are in France and you want to build a line from, let us say, Calais to Paris, that will be part of the regulatory asset base in France and it will be ultimately paid for through RTE, the French TSO's tariffs, by consumers. In other words, it is socialised. If you then look at how the interconnector between France and England is treated, from the French end it is treated in exactly the same way. The cost is broadly socialised and it is regulated within that socialised model, whereas if you look at it from the GB end, the interconnector investment is not part of the regulatory asset base in Great Britain; it is a separate investment, and the investment is regulated but it is not socialised. So the risk/reward ratio is different. The UK model suggests that the interconnector is then only built on a merchant or more commercial basis, where the investors takes the view that the potential revenues they could earn from selling capacity in that interconnector sufficiently cover the risk of making the investment.

Q287 Lord Renton of Mount Harry: What does “socialised” mean precisely?

Graeme Steele: In simple terms, it just means that the end consumer pays, but it is also based on a premise that it is of benefit to the end consumer as well. Any interconnector project, be it on a socialised basis or a more merchant basis, broadly has to cover the same test in the sense of benefits and the taking of risks. In the socialised model, the test will be: is there a benefit to the end consumer? If the answer to that is broadly yes, then it is deemed reasonable that the consumer should cover some of the risk of that investment. Clearly, if it is in a non-socialised world, then consumers are probably getting some of the benefits but are not exposed to the risk. So it is a question of balance.

Q288 Lord Whitty: But leaving aside who pays, there is no difference in the overall cost benefit.

Graeme Steele: In a simple sense, I would say that there is no difference, except that on one model if consumers are getting a benefit they are carrying part of the risk. On the other, they are not; they are getting the benefit and potentially not carrying the risk.

Konstantin Staschus: That affects how we need to do our 10-year plans. We need to keep it open to one TSO or third-party investment, and we need to have a non-discriminatory methodology to evaluate this. So we feel very strongly that the costs and benefits of the kind that I described earlier need to be calculated, in this European view, in the same way. Then, whether a certain line is built with one regime or another becomes a secondary question.

Graeme Steele: But all that said, just to balance things out, the UK regime is being reviewed by Ofgem at the moment. You will know that there are lots of potentially new projects for interconnection to and from the UK, but they are awaiting the outcome of that review with great interest.

Q289 The Earl of Caithness: Is it because of the UK regime that there is now difficulty with interconnection between Scotland and Norway, and that Norway is introducing primary legislation to make that more difficult?

Graeme Steele: I think that it does not really matter what the project is, to be frank. The fact that you have what appears to be certainty at one end and a degree of uncertainty at the other end will cause a problem to any project. Whether you feel that it is right or wrong, it is fairly evident what the regime is at the Norwegian end of that link. It is less clear, because of the ongoing review, how things will be treated at—to use your example—the Scottish end of that link. Investors, in our experience as TSOs, like certainty, and anything that does not give them that certainty introduces doubt.

Q290 The Earl of Caithness: We have had evidence that projects have been cancelled because of this.

Graeme Steele: That could well be the case. We do not have members directly involved in that project, so we are only seeing the same public information that you and other colleagues may be seeing. But regulatory uncertainty of that sort does not help projects to progress.

Q291 The Chairman: I am conscious that we can keep you for only another half an hour, and we have four questions. We need to maintain a bit of pace. Lord Renton.

Q292 Lord Renton of Mount Harry: I am not quite certain to what extent you have already answered this question but I have this note here that says that your 10-year network development plan mentions the need for a €104 billion investment in electricity transmission projects, which is one part of the €1 trillion investment that is required in the energy system as a whole. How is that working? Do you consider that the required electricity transmission projects can be financed, and how? Should they be financed, and by whom?

Graeme Steele: We do not believe that financing per se is the problem, and I will explain why. Yes, it is a big number; both numbers are very big. But from what we can see and what we hear from our members, financing itself is not the issue. There are parties who are prepared to back transmission investments. We then come back to the point we have just talked about—as you say, we have partly addressed already—that it takes you back to what the regulatory regime is and whether certainty can be demonstrated to the potential investor. So we get back to the previous question to a great extent. From what we can see, there are parties that are prepared to provide finance. Indeed, we have seen new financial players in a number of Member States, most notably Germany, with at least one of its TSOs having a significant financial investor. Looking forward, we would say that, because of the size of the investments involved, it is quite likely that that sort of model could continue and could develop. We do not think that financing per se is an issue.

Q293 Lord Renton of Mount Harry: Is the European Investment Bank involved in this? Do they have a regular role?

Graeme Steele: Yes, most TSOs are interested in EIB money, for a couple of reasons. First, it is an attractive source. Secondly, the leverage benefit you get from EIB money is quite significant. If you have a new project that has even a very small percentage of EIB funding, that in itself provides a comfort level to other investors to make the investment. For both those reasons, it is of huge significance if you can secure it. Therefore a lot of projects will be very keen to secure EIB funding.

Q294 Baroness Parminter: How do you see, and what is your vision for, improving interconnection and delivering a more sustainable energy system? In particular, can it deal with some of the unreliability and intermittency that surrounds some of the renewable energy systems?

Konstantin Staschus: We think that it can contribute a lot. We know that the energy sources that contribute greatly to sustainability are partly distributed—such as, perhaps, solar photovoltaic on rooftops—and partly concentrated in certain regions, such as near or even in the North Sea for wind power. That then would be far from load centres. The latter clearly means that more transmission is needed because you are generally further away from the load centres than the traditional generation sources were. Renewables are actually driving 80% of the investment needs that we have identified in the 10-year plan. That is a quantitative example. They are not the only driver for this 80%, because most investments have multiple benefits, but they are one major driver for 80% of the investments.

The second reason is that renewables fluctuate: the sun does not shine at night and unfortunately only a little in January, as we are experiencing; and the wind is also volatile—sometimes it is fully there, sometimes half there and often not at all. That then means that transmission lines that are transporting renewable energy somewhere else may not be as loaded over time as the traditional system caused loading of transmission lines. So, there is a second reason why you might need more transmission overall for the future system.

The third reason answers more your direct question on the security of supply. If you try to picture an overall system with a bigger and bigger contribution from renewables that are fluctuating—hopefully different kinds of renewables—you will see that different corners of Europe make especially strong contributions but at different times. When the wind blows in the Mediterranean, it may or may not blow in the North or the Baltic Sea; when the sun shines in certain regions, the wind may not blow and vice versa. So designing a system with as little expensive generation investment as possible—meaning as few reserves as possible—requires that you shift the power from whichever corner a natural resource happens to be abundant in at a particular hour to another corner in Europe where it happens not to be abundant. And the relative cost contribution of transmission towards the end consumer price is much lower than the very expensive renewable energy investments. So it is the cheapest way, the most affordable way, to reach an overall system of acceptable reliability. Therefore, for a future system based much more on renewables than today, the internal energy market logic that led us to go after a Europe-wide market and Europe-wide free trading holds even more than in the conventional system for these three reasons. A strong grid is needed even more than in the conventional system in the European market.

Q295 The Chairman: How far can you wheel power without it dropping?

Konstantin Staschus: It depends on the voltage level. That is why we have different voltage levels. If you are trying to transmit power with 400 volts in the plugs, you do not get very far before you have losses and voltage drops, meaning that nothing arrives. That is why we step

up the voltage to medium and high voltage—and, right now, to 400 kilovolts—to go distances.

Q296 The Chairman: What is the economic distance to ship it at? I want a really straight answer to that.

Konstantin Staschus: There is no really straight answer, but it is certainly in the hundreds of kilometres and might even be in the thousands.

Graeme Steele: Transmission grid losses are considerably smaller in percentage terms than distribution losses as you get lower down the voltage. So, basically, the more you can increase it the better economics you get out of the transport. Again, with some of the big assets that are being talked about at the moment—some of the long-distance onshore assets that Konstantin was talking about in Germany, for example—distance-wise that is probably comparable to hooking up Norway with Britain. So you are talking hundreds, if not getting on to nearly a thousand, kilometres for some of these lines.

Q297 The Chairman: There is a slight suggestion of people saying it is sunny in Greece and windy in the North Sea and we are going to ship in the night. There is a slight misrepresentation in the distances.

Konstantin Staschus: For 400 kilovolts. But we have a research study focused on the architecture of the future grid, which, depending on the outcome of the study, might imply an overlay grid with a different voltage level. We are not sure at this point whether it is truly needed, but we see the potential of going another step as other countries have done. Brazil, the United States, China and India use 750, 765, 800 or even 1,000 kilovolts. Then, with very low losses and low voltage drops, you can go even further distances. So, depending on whether these visions become true—and we want to study them carefully, based on the TSO know-how—this could be an option.

The Chairman: In China people can put 800 kilovolts through—as high at least as the United States. They are already doing it.

Konstantin Staschus: They have 750.

Graeme Steele: And the Russians do as well.

Konstantin Staschus: It is 765, actually, in the US. We have seen them.

Graeme Steele: Yes, we have seen some of those assets.

The Chairman: You must be running some in North America.

Graeme Steele: We (that is National Grid) do not go up to that level. We are mostly distribution in the US.

Q298 The Earl of Caithness: Following on from our discussions just now, if you were to upgrade those lines, could you do it on the existing system or would you have to build a new super-grid?

Graeme Steele: Let me perhaps begin to answer that in a general sense, and Konstantin can come in with more detail. Linking to those two questions, we probably need to have a discussion about what we mean by a super-grid and an overlay grid. Again, going back to your comment, there are lots of diagrams from lots of organisations that make this look simple. The study that Konstantin has referred to is one where we are trying to say, “Well, if you try to look at it in a bit more detail, how can you try to get something that you can build

up from the bottom that would begin to justify some sort of overlay grid?” I think you can see the beginnings of what you could term an overlay grid, even within some of the larger Member States, Germany being the obvious example—maybe you have seen that it has published a study where it has four or five DC corridors.

Konstantin Staschus: Four, and then three will be built.

Graeme Steele: So again, as I said earlier, these corridors cover quite long distances—500, 600 or 700 kilometres plus—to some extent, performing almost the function of an in-country interconnector. Again, that is not that dissimilar from what is being looked at in GB in terms of the sub-sea bootstraps between Scotland and England. It is the same principle; they just happen to be offshore rather than onshore. There is a debate that needs to be had around whether we start with an answer and work back, or try to work up. If you do the latter, there are then some interesting questions about whether it would make sense not to build point-to-point interconnectors but to build something that was capable of being joined in to another offshore and eventually another onshore network. That gets you into the north seas grid discussion, as well: do we end up with lots of point-to-point cables, or might it make more sense to at least leave an option open for some of those longer-distance cables to go into at least another country—not just, let us say, between Scandinavia and Britain but maybe a link down towards the northern part of the Continent as well? Konstantin, do you want to provide a bit more engineering detail behind that?

Konstantin Staschus: Maybe just a couple of sentences. This research study, which has kicked off already, has received EU funding and is scheduled to go on until 2014, which we think for these kinds of questions is early enough. The next 10-year plan will look towards 2030, but that will probably not be enough to answer the architecture question of an overlay grid, DC or AC, overhead or cables or whatever. Therefore we are looking forward to 2050, where of course the scenario space must be wide open. Other than that, we are going to try to have an open eye to technological developments such as DC breakers, to mention one example, and then use similar methodologies to those that I have described for the 10-year plan to see what scenarios for the distribution of resources, Europe-wide or even beyond, we might be able to imagine, and how they might drive transmission investment. Then, if you do have a higher voltage level, that may or may not be less acceptable to the population; after all, they then carry much more power over a single corridor, and you do not need to commit as many corridors.

Q299 The Earl of Caithness: The difficulty for us doing this report is energy security. The UK is looking at capacity mechanisms. Your route for transmission would actually produce cheaper energy prices and be less costly than a capacity mechanism, but it does not seem that we are going to get your information in time.

Graeme Steele: I guess that, as Konstantin said, this is a longer-term thing at the moment. Clearly because it is longer term we have to think about what the steps will be along the way to get us there. Yes, we are aware that a number of Member States are looking at capacity mechanisms, which raise their own discussions. It is likely that any capacity mechanism would have to be compatible with the market. The question of how such mechanisms are also compatible with generation from another Member State will also have to be considered. We saw that you were talking to the Commission before us, and clearly that is something that one would expect that they would look very closely at.

Q300 The Earl of Caithness: Quickly, another question is whether you could integrate wholesale and retail markets better to make them more competitive.

Graeme Steele: I guess that primarily you need to get the market players' view on that a bit more. We are there to facilitate the market, which Konstantin will come on to in a moment. A lot of the work that we are doing on the network codes side, on market rules and on getting better compatibility among those play into that space. Our role is facilitation rather than dictating the solution in that sense. Therefore, the detail of your question is probably better addressed to the market players. Our network codes are looking particularly in that area. You will probably also be aware of initiatives such as the North-West European market coupling exercise, which would bring a goodly chunk of the European market under one umbrella. That is something that, again, our members are closely involved in and that we are closely following within our markets activity within ENTSO-E.

Konstantin Staschus: I will if I may broaden a little on the network codes. They do not only address technical connection and operational issues. Three out of our nine most urgent network codes, which become European regulations directly applicable to all that they address without transposition into national law, address market issues for all timescales from long-term forward markets via day-ahead to intra-day and balancing markets. They are founded on a very strong consensus among Commission, regulators, us, and all the different representatives of the market parties on how this wholesale market should function most effectively. The power exchanges, in close co-operation with the TSOs, are key players there to make this market coupling or price coupling work. For example, currently, the project North-Western Europe, covering Great Britain, France, Benelux, Germany and all Scandinavia—a big chunk of the European market—will very soon be using precisely the same wholesale market mechanisms in a very efficient way, and we are hoping to extend that to the rest of Europe in 2014 or thereabouts. So the network codes define how this works on the wholesale level, and at the same time there are reasonably clear rules on how the retail markets interact with them and growing consensus on how that works and on the detail. The ultimate, rather challenging, step for the next years is going to be making sure that all these retail markets fit into the wholesale market super well, also under the heading of smart grids. If you are after more consumer control, more consumer consciousness and more consumer demand response to help balance our fluctuating renewables, this integration of retail and wholesale markets needs to be very fancy, with a lot of communication back and forth all the time. At ENTSO-E, we also support the European standardisation efforts for the IT data exchange to make that happen. We feel that it is absolutely necessary, just to be able to keep balancing the growing amounts of renewables, that this smart grid approach works, but other players have the lead role in standardising it and we are crossing our fingers that it comes early enough for our purposes.

Q301 Lord Renton of Mount Harry: Is Russia involved in this too? Is it getting more involved in the work you are doing?

Graeme Steele: It is showing a lot of interest in the work that we are doing. Again, how it becomes involved feeds more into its relations with the Commission, and if it gets into technical questions we occasionally get invited along to those discussions. How that plays out is largely a political question, as far as we are concerned. That needs to get to a resolution first. As with any external party, we would need to think about what getting involved really means, because it probably means getting involved in a bidirectional way and therefore a lot of EU market rules, to pick an example, having to apply to the third party outside the EU as well, which it may not be that keen on. It is a sort of swings and roundabouts thing, really, as to how it would play out. We get involved when we are invited to get involved, but it is as part of the overall EU-Russia dialogue at a very high level, if I can put it that way.

Konstantin Staschus: There is a technical interface in the Baltic states.

Q302 Lord MacLennan of Rogart: We heard that the North Sea Countries' Offshore Grid Initiative benefited considerably from the input from your organisation, ENTSO-E. Two facts were stated in a recent report from the NSCOGI that surprised us. One is that during the 2020s, offshore renewables generation will hardly increase, and the other is that carbon dioxide emissions will be flat during that decade. I do not know whether that had anything to do with input from you, but are you able to interpret those assumptions?

Graeme Steele: Why don't you start, Konni? I'll come back on that.

Konstantin Staschus: That work was done by one of our regional groups. For the system development issues, we have six regional groups that cover the different parts of Europe. This was the regional group North Sea. The visions for the future that provide the basis for that work were extensively debated at the more political, high-level group in the NSCOGI effort, and were endorsed by the Governments involved there. So the analysis that our TSO members did in the regional group of ENTSO-E needed to build on those assumptions that the Governments set for gigawatts installed in 2020 versus gigawatts installed in 2030. From what we have seen compared to how much is planned to be achieved until 2020 alone, the difference until 2030 does not look so very ambitious, but those were the assumptions endorsed by the Governments. The results and planning reflect that. My understanding, although I am not involved directly in this, is that it is because of the unease over whether those assumptions, in particular for offshore wind gigawatts in 2030, are realistic or should be more ambitious, that sensitivity analysis has recently been run. I understand that that will continue to be made for the coming year. Then it remains to be seen what results we get back.

Graeme Steele: As Konni said, a lot of that data was taken at a snapshot in time. If we look at where a lot of Governments are now, things have changed quite a bit. We are expecting there to be some further work. I believe there is a NSCOGI programme board tomorrow where that is one of the topics that will be debated. If you look at it against the reality of where we are today, as Konni said I think some of those inputs would be somewhat different if you were to run the analysis now. Perhaps we are in a moving process to that extent. We are very keen to stay involved in the NSCOGI's work but it is a ministerial initiative so we can only be involved if they keep inviting us to be involved, which luckily so far they have.

Q303 The Chairman: Among the investors in this market, you mentioned that one of the German TSOs had a financial question. What was the nature of that?

Graeme Steele: Konni should be explaining this as it is closer to his former home patch, but I will have a go and he can correct me if I get it wrong. What basically was the old East German grid was owned by Vattenfall. Vattenfall chose to sell that grid, in effect to unbundle it from a vertically integrated structure, in 2008. The grid was purchased by Elia, the Belgian TSO, in partnership with a Canadian firm called IFM, which provided some of the finance as a partner for the purchase of the network. Something very similar has also happened in Germany with the sale of E.ON's former gas grid, Open Grid Europe, with a wider consortium of financial players that ranged from Macquarie to a Canadian firm—the usual players. That had an even more complex structure; I think the partners share about 1.5 hours of common business time each day or something because they are in so many different time zones. So there are examples of this around. It is not uncommon.

Q304 Lord Whitty: I have an overall question, in a sense. Of the interconnectors that you think it would be viable to build, what proportion do you reckon will be built and what proportion will be stopped by the planning and regulatory problems?

Graeme Steele: Are you thinking of any in particular?

Lord Whitty: No, I was not. Your members have a total in mind—something approaching a super-grid; technically you are correct—that they think, economically, could be built.

Konstantin Staschus: Since they have all gone through the test that I was describing, they are economic; they have benefit for the customers. From that perspective, we are hoping, especially for the 10-year plan, which is a very short time horizon for this kind of planning, that all or almost all will be built, because we know that they are needed. If your question is how much delay there will be, we would probably be significantly less optimistic. Already we know that of the 500 projects that we identified in our 2010 10-year plan, when we looked at them again in 2012 to see how much progress we have made we found to our dismay that one-third were already delayed compared with the original schedule. The delays are a major problem, but we are hoping very much that all or almost all will be built.

Graeme Steele: So if you have some that have less of an onshore nature to them than others, they probably have a better chance because the permitting hurdles are not so high.

Lord MacLennan of Rogart: You said in answer to an earlier question on this point that you were really looking for one regulator.

Graeme Steele: Let us just clarify that, because it is a very important point. I do not think that we are saying that. I think we are saying that if the correct—whatever that word means—level of co-ordination and co-operation could be found between the existing Member State regulators, I do not think we would see a reason for there to be an overarching European regulator. The current Agency for the Co-operation of Energy Regulators ACER could well provide the framework to do that; there is no reason why it could not. Equally, there is no reason why the regulators always have to act as a group of 27. Konni talked about the various regions that exist. At the risk of stating the obvious, if fewer countries are involved you can make progress more quickly, particularly if you think of the north seas as an obvious example, where everyone is basically dealing with the same issue—generation in the northern part of networks, demand centres in the south. It is basically the same problem for everyone. We think that much can be achieved by better co-ordination and co-operation. If you were to push down the single entity route, you would probably delay things even further, because it would take so long to get to that point.

The Chairman: That is a nice note to end on. Thank you very much; that has been extremely interesting. It has given us a very interesting end to our day.

European Climate Foundation and Confederation of UK Coal Producers (CoalPro) —Oral evidence (QQ 104-117)

European Climate Foundation and Confederation of UK Coal Producers (CoalPro) —Oral evidence (QQ 104-117)

[Transcript to be found under Confederation of UK Coal Producers \(CoalPro\) and European Climate Foundation](#)

European Commission—Oral evidence (QQ 60-70)

Evidence Session No. 3.

Heard in Public.

Questions 60 - 70

WEDNESDAY 21 NOVEMBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
The Earl of Courtown
Lord Giddens
Lord Lewis of Newnham
Baroness Parminter
Lord Plumb
Lord Whitty

Examination of Witness

Philip Lowe, Director-General for Energy, European Commission

Q60 The Chairman: Mr Lowe, you are very welcome. Thank you for coming to see us today. We are looking forward to this session. If I could deal first with a few formal matters, you should have in front of you a list of interests that have been declared by Committee Members. This is a formal evidence-taking session of the Committee and full shorthand notes are being taken. It will also go on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript, and you will be able to revise it in terms of minor errors. The session is on the record; it is being webcast live, and will be available subsequently on the parliamentary website. I know that you would like to set the scene for perhaps three or four minutes with a few opening comments, and then we can go into the questions.

Philip Lowe: Thank you very much for this invitation. I realise that the European Commission has not submitted written evidence, but we are always prepared to, depending on the timetable you have in front of you for your work.

Perhaps I could start off by answering implicitly the last question you are going to put to me, which is: to what extent is the legal basis for action on energy policy in Europe sufficient? We believe it is quite sufficient. The Lisbon Treaty contains a comprehensive article on the objectives of competitiveness, security of supply and sustainability, and also emphasises the

need for solidarity between Member States in respect of security of supply. Equally, it emphasises the areas where Member States have exclusive competence in determining energy mix and how they exploit their indigenous resources.

That said, the whole purpose of a European policy is not to divide competence but to try to see whether there are things that can be done in common and that make sense for everyone and add value to what is a national energy policy. In that sense there are certain growing areas where the common interests of all 27 Member States are getting stronger, particularly in the analysis of the situation of most of our Member States from the point of view of energy supply. Whereas a decade ago there were significant indigenous resources in fossil fuels, oil and gas, in a number of European countries, that is no longer the case. In those countries that rely heavily on nuclear energy, it has become clear that the modernisation of the fleets of nuclear calls into question the idea of cheap nuclear electricity. All Member States of the European Union, and its neighbours, are confronted with the similar challenges of providing safe and secure energy at affordable prices for consumers and competitive prices for business.

If you look at the IEA's *World Energy Outlook* published this week, in which I have taken a good part in the work that concerns the Commission, we are facing an increasingly competitive situation. When I say "we", I am not referring to the EU as a political group but simply the European countries as a whole, because we have neighbours who share the same challenges. We are faced with world markets in energy and commodities where Asian growth is taking an increasingly large share of fossil fuels. We are bound to be faced with increased volatility in price, and continued instability due to political conditions in some of the producing countries. Even in those areas where there is increasing exploitation of oil resources, it is on an unconventional basis and therefore likely to be higher in cost.

The expansion of gas and oil production in the US could lead to US exports, but it is likely that they will be for the benefit of Asia, given the price differentials. Faced with this relatively hostile climate, the EU's original strategy of creating a Europe-wide integrated and interconnected market open for business and new entrants and new technologies is even more justified today than it was 10 or 20 years ago, allowing a dynamic of competition not just through new entrants but competitors already in the market. While we cannot claim in any way, as in mobile telephony or air transport, that this sort of market across Europe is going to reduce prices, because there is an underlying tension in the world at the moment between supply and demand, it is certainly leading to a containment of wholesale electricity prices to a level of under 5%, whereas commodity prices for coal, oil and so on have been rising strongly.

The second outstanding and long-standing objective of EU countries is to diversify its sources of supply outside Europe, in particular in gas. If pipeline gas remains the most competitive objective for Europe, reliance on one source of supply is not advisable. That is why there is emphasis, even though it is now on a much more commercially realistic basis, on the development of a pipeline to the Caspian region: Azerbaijan, eventually Turkmenistan, and perhaps southwards towards Iraq.

At the same time, we are committed to fighting climate change and containing growth in CO₂ emissions. At European level "we"—in the sense of all Heads of State and parliaments as well—have established binding targets for 2020 on the reduction of emissions, and on renewables as well as a move towards an indicative target to make better use of energy. That framework is relatively stable. The Commission's view is that it would be wrong to call into question that framework, because already 2020 is quite close. Individual Member States have made their own choices about energy mix and the type of renewable energy they use.

Virtually every type of energy and technology used in Europe is detested by people in at least one Member State. Public acceptance—the social dimension, which is the subject of one question by a member of this Committee—is very high on the agenda, almost higher in terms of the implication in energy policies at European level than the notion that there is national sovereignty in this. It is more an issue of democracy. In all countries, whether it is Austria and Germany with nuclear or the UK, where we note with increasing interest that onshore wind is very unpopular and, pylons are unpopular. Underground cables are, however, very expensive.

We need to continue the challenge of meeting the climate change objectives of 2050.

In Energy Road map for 2050, which you have probably seen, we have tried to identify the things that effectively will be “no regrets” options for all Member States and give a predictable framework for companies to invest in.

Whichever scenario is chosen at national level, we are bound to have more electricity in our energy systems if we want to meet the CO₂ climate objectives. We are bound to use more renewables, probably more than 50% on average in energy consumption in the European Union as a whole. That immediately brings into question the issue of smarter infrastructures at transmission and distribution level to allow not just suppliers to optimise their delivery but for systems operators to manage demand in a flexible way in the interests of consumers. This requires equal efforts to give industrial and individual consumers the information which will enable them to get the best deals they can.

At the moment there is a lot of emphasis from IEA on what the framework should be after 2020 and a concern that we should get the balance on the one hand right between competitiveness of energy supplies and their affordability, and on the other hand sticking to the carbon objectives.

The IEA's *World Energy Outlook* places emphasis on the increasing dependence of Europe on energy supplies from outside the European Union but also on the high level of electricity prices at the moment compared with elsewhere. The effects of US exploitation of gas and substitution of gas for oil in electricity production have resulted in a reduction in CO₂ emissions in the United States and an increase in CO₂ emissions in the European Union.

Is this a result that should make European companies or politicians blink? We believe they should not blink because we are in a process of transformation. That being said, we have to find the right framework for investments in generation that is cost-effective and does not rely on subsidy in the long term. Nevertheless in the shorter term we still see the need to promote energy efficiency, better infrastructures and provide a framework for investment in low-carbon generation that gives the necessary assurance to investors. You can reassure investors by giving them a subsidy on a permanent basis, but ultimately we have to develop a much more market-oriented system.

Q61 The Chairman: I was going to ask question nine at that point, so you have dealt with most of it. We have the Lisbon Treaty and the Commission's view on this, but would you like to comment on Member States' differing views on these things and the way they see it?

Philip Lowe: As far as analysis of their own energy situation—the competitiveness and affordability of energy supplies for consumers—governments across the European Union are extremely concerned, including the UK Government. There have been various responses to that. Traditionally, in France there has been a concern that consumers should be protected against market forces by regulating prices, but in regulating prices you distort the market so significantly that you never get the dynamic of competition that could lead to a reduction in

prices. In the end, on the French side there is a move, along with conformity with our own single market legislation, to make sure that prices are deregulated.

In Germany and France there are different ways of looking at energy mix. The energy mix in Germany has changed significantly already, and a very large volume of solar voltaic and wind capacity has been installed. Does that mean there is not a shared vision of an interconnected and integrated market in Europe? No. Already, 17 national electricity markets are interconnected. The level of interconnection between the UK and the continent and between Spain and Portugal with the major continental markets is low, but ultimately by 2014 we see that interconnection increasing significantly.

When Germany initially withdrew some nuclear capacity in 2011, it became a net importer of electricity for several months, but when there was a cold spell earlier this year in France, during which the highest level of electricity consumption was for heating purposes, Germany again became an exporter to France. If you look at the variations in flows of electricity across the intercontinental systems, it is no longer possible to speak about a national policy for electricity generation without taking into account what is happening in the rest of Europe. When Germany increased its wind capacities in the north, it resulted in unplanned loop flows through Poland, the Czech Republic, Hungary and Austria and back up again into Germany, with the result that a number of generators in those countries were very unhappy that there had not been sufficient co-ordination and, if necessary, compensation due to the lack of infrastructure in Germany, which should have contained those flows.

There is an increasing concern. Everyone wants to benefit from this wider market, but there is also a consciousness among governments in particular that they must do something to protect their consumers and security of supply. Our concern is that you should do it but in a way that takes into account the impact on your neighbours and exploits the opportunity of co-operation with your neighbours. Whether they are in the European Union or, like Norway and Switzerland for the moment, outside it, there is a genuinely practical advantage from Europeanisation in a continental sense of the use of energy. We see an increasing convergence of policies, notwithstanding the difference of public acceptance on energy technology.

On energy efficiency, we produced a proposal this year and got it adopted by the Member States and the European Parliament. Portugal and Spain voted against energy-efficiency measures because they said they were too expensive. We pointed out to them and others—I think that is why we got the piece of legislation through—that if you calculate making better use of energy only through the amounts you get from insulating roofs or windows first of all, you completely ignore the opportunity cost of making better use of energy.

Q62 Lord Lewis of Newnham: What about the position with the grid system in Europe? If you are interested in the transfer of energy from one country to another, the natural opportunity of doing this is the grid system. On a previous occasion when we were discussing Germany we were told that the concentration on renewables, particularly wind and solar, which is the point you have made, is going to put a much bigger imposition on Germany for a grid system. You implied earlier that there was a natural reaction against pylons. As you pointed out quite correctly, burying the stuff is very expensive. How do you see this? It seems to me that this must be one of the initial problems that needs to be dealt with, because if you deal with it, there are other problems you can solve. If you do not solve it, you are creating problems in other directions.

Philip Lowe: There are two parts to your question. First, already with 15% to 20% of electricity covered by wind and solar in Germany, there has not been a problem of system stability in that country. There is a smaller margin compared with previous figures, but it has not been a problem. Secondly, in the wider European sense—this is why we have an electricity co-ordination group set up among Member States—there is a recognition that the bigger the grid, the more likely it is you will be able to manage diversified sources of energy across that grid by different technologies, and in terms of weather, supply conditions will be different according to where you are producing the energy and demand conditions will be different when you are consuming it. I referred to the winter spell of last year when the UK was exporting electricity to France, but, if you look at it purely nationally, you have the impression that it is some kind of national export, but this is a natural working of the market.

As to the second part of your question, there will be a need to develop infrastructures and, particularly in transmission and distribution with renewables, more flexible ones and almost certainly expensive ones. The purpose of our current proposals on infrastructure, which are being negotiated between the Council and Parliament, to agree with everyone what the major strategic lines of interconnection need to be. You do not need to connect everything in Europe. You need to connect things that make a difference to people, whether it is the Norwegian-UK line or the latest Irish-UK line. The focus should be on distinct priorities and a limited number of projects of common interest so you can explain clearly to everyone at national, regional and local level why they are necessary, and submit them to a permit-granting procedure that is not the average 10 to 12 years in the European Union—by the way, for the Spanish-French connection it is 30 years—but three years. It looks as if the Member States of the European Union will finally agree on a binding deadline between three or four years, based upon the best practice in several Member States, instead of having serial planning authorisations. All planning procedures should proceed in parallel and one authority in the end should be responsible for the final decision and that one decision being appealable. The same philosophy seems to us to be reflected implicitly in some of the UK Government's proposals this week. If energy projects are sufficiently important to keep the lights on, to contain prices and use low-carbon energy, those three arguments need to be articulated far more in the public. It should be possible to reduce the planning period for these investments.

Finally, it is worrying that national regulators are restricted to purely national objectives. We do not necessarily need a European regulator. We have a European agency (ACER) in Ljubljana to co-ordinate national regulators, but sometimes the national regulators disagree as to how much money operators can earn on these interconnections. Why? Because they are all paid, quite rightly, to optimise the benefits for their own consumers. We have had many situations where, for example, a systems operator in Germany wants to deliver greater volumes of cheaper gas to Denmark, but the German regulator has refused to allow the operator to earn more than 5% on the investment because there has not been a cross-border cost benefit of the projects, which is already the case in the Nordic area among Sweden, Finland and Norway. Europe in some senses—I am not talking about political Europe—does not learn from itself; it has some very good examples of what can be done if it just listens to itself rather than other models, for example Australian and American.

Q63 Lord Giddens: Maybe you could answer briefly because we do not have that much time. You said that we were running out of what we had 10 years ago. How does that relate to coal? What is your comment on the role of coal in Germany's future planning? To me, Germany seems to be a very divided country in that respect. You drive past windmills

Philip Lowe: CCS has been discouraged by the availability of coal in significant volumes from many sources and also a low carbon price.

Lord Giddens: But we can apply it to gas as well as coal.

Philip Lowe: Except that in Europe there are no planned demonstration projects in CCS for gas at the moment, which is a great pity. In respect of coal, it is still playing a very significant role in the energy mix in several countries. I say “in several countries” because the use of coal is not only one of national policy; it is a rational commercial decision. For the moment it is the cheapest way to produce electricity. In relation to long-term low-carbon objectives, a significant amount of this capacity will have to be withdrawn before 2014-15 because of environmental regulations on large combustion plants.

Lord Giddens: We know about that.

Philip Lowe: That will kick in. If people in Europe want to move towards a low-carbon economy, at a certain point, there has to be a degree of constraint on the most CO₂-polluting fossil fuel, which is coal. The countries that still have large coal and lignite production and coal-fired capacities are Poland and Germany. If a significant number of coal-fired power stations are phased out due to environmental regulation, we believe we shall see a rebirth of investment in gas rather than coal as a complement to renewables, which also seems to us to be the logical way forward. The wider use of gas in transport and heating is also an opportunity for European Union Member States to meet the low-carbon objectives, at least in the medium term—the milestone of 2030-35—by substituting coal with gas and getting at least half-way there. But there will be some resistance certainly at a political level in Poland at least, whereas in Germany it is likely that the commitment to the low-carbon economy targets will progressively evacuate lignite from the system.

Lord Giddens: I wish I could be as optimistic about Germany.

Philip Lowe: As I work for a German commissioner, you can imagine that what I have just said is relatively—

Q64 Lord Giddens: It will be interesting to see what happens. To me, the single, easiest way of cutting emissions is to close down coal-fired power stations, beginning with lignite and then the others. I am supposed to ask you a question that is very important to our inquiry. Perhaps you would comment briefly because there are so many others who want to speak. Europe is now desperate for growth. How far in the next 10 years, say, can energy investment generate net new jobs and kick-start growth, whether it happens through the orthodox mechanisms of the Commission or in the eurozone as some kind of decision that eurozone countries take to support the southern countries in promoting growth there?

Philip Lowe: At the moment a lot of investment in the energy sector is checked by the instability in the markets generally and in the eurozone.

Lord Giddens: You refer to “uncertainty” in your report.

Philip Lowe: Yes. Long-term institutions that would normally be investing in infrastructures in particular are not doing so. Under the hypothesis that the eurozone or the EU as a whole manages to provide greater stability in financial markets, there are three areas where there is a reasonable basis for optimism about job creation and growth possibilities. The first is infrastructure, where European regulation, but also national initiatives, are trying to bring private investment back into an area that, as far as transmission and distribution are concerned, offers steady returns with little risk and can produce major investment recovery in a number of areas. You will remember that under the European recovery plan of three years ago, there was a sum of €4 billion for investment in this kind of infrastructure.

Secondly, as you probably noticed from the impact assessments on energy efficiency measures and renewables, as far as energy efficiency is concerned, even simply meeting what we have actually proposed and has been accepted by Council and Parliament as the basis for the improvements should result in about 1 million extra jobs, simply because it is so job-intensive in the building sector and elsewhere.

Lord Giddens: Do you mean insulating houses?

Philip Lowe: Not just insulating houses but simply putting in systems, as well as improving product efficiency and the replacement of boilers and ventilators on a more energy-efficient basis. One tends to think about building improvements only in terms of windows and roofs, but there is a huge industry out there waiting to provide energy services both to individual families and small businesses.

As to the third area, the renewable energy sector already employed in Europe 1 million people in 2010, and that is based on the achievement of about 10% of renewable coverage of energy consumption. If you imagine the achievement of 20% and the acceleration of investments for the future in renewables, whichever ones any individual government or company wants to pursue, there is a substantial benefit. Some of the estimates are that there are 3 million extra jobs there. So infrastructure, energy efficiency, renewables and the smartness of grids and introduction of metering will stimulate considerable economic activity. For example, the replacement of meters is very job-intensive; it takes people on the ground to do it. In this area the installers and everybody else need to be trained and know about the advantages of it.

The Chairman: We have about half an hour and a number of questions. We have a lot of your material already and have studied it, so if we can just nip through those, it would be enormously helpful.

Q65 Lord Cameron of Dillington: You have already explained the trilemma facing us, particularly the problem of cost. You may already have answered this, in which case say so, but do you have anything to add on the question of boosting investment in order to reduce the energy costs of our manufacturing sector, particularly when we are now facing competition from America as well as the Far East? I think America will be the big issue in the future.

Philip Lowe: The first thing to say is that any company that is conscious of a significant proportion of its costs coming from energy should have an incentive to improve its use of energy. Even if it cannot work out exactly how much a kilowatt-hour costs, it is in its control to mobilise its own resources and energy services companies, or contracting companies, to work out how to use energy more efficiently.

As far as competitiveness of wholesale prices in electricity is concerned, the issue is: how can the whole system—generation, transmission and distribution—produce the results that

make electricity prices affordable and competitive? That is difficult to do without having a clear vision of how investments in generation can be encouraged on the best basis. Every government needs to look at the level of incentive to invest in low-carbon generation and how it should be done with the least need to intervene with public money, although it may sometimes be necessary to do so, whether for renewables, nuclear or in other sources of energy.

There is definitely a need to make sure that any public money in this area—as you can imagine in Portugal, Greece and Ireland, for obvious reasons—is spent in the most cost-effective way, with first of all the right incentives to private investment. But secondly competition itself, together with the availability of electricity through interconnection, and demand response mechanisms should ensure that we use energy in a way that benefits from the lowest tariffs. Industry can benefit substantially here yet the reality is that EU Member States continue to recognise that they need to reduce CO₂ emissions. This is leading in the short term some degree of lack of competitiveness of our industrial base compared with the US and, certainly, China and India. Some commentators say that is because of the carbon price and renewable levies. At the moment that is so, but if we get those impositions reduced to a cost-effective level—we know that renewables will be rolled out without subsidy in a reasonable period—this period of transformation, although it leads to some lack of competitiveness on an energy basis, will lead to more stable and sustainable sources of energy without subsidy on a low-carbon basis in the long term. Those who invested in the carbon bubble earlier will find that their situation will be less secure. That may be optimistic.

The Chairman: That leads to Lord Plumb's question on the whole area of innovation and technology; it probably feeds in quite well.

Q66 Lord Plumb: Good morning, Philip. It is good to see you again after all these years. Your hairstyle has changed, I think, since then. I think you have answered my question to a great extent. The key to investment has to be research, innovation and infrastructure. There are three questions we put to you. The first is whether you have a vision for guaranteeing sufficient investment in the sector, recognising that a lot of that has to be private investment rather than public procurement for pilot deployment and commercial roll-out. Building on the suggestion of a road map, what concrete actions do you think could be taken to leverage the necessary finance, including through the European Investment Bank and European Bank for Reconstruction and Development? The third question is about the objectives of the commercial banking sector. Are they sufficiently aligned with those of the Commission and Member States as regards decarbonisation?

Philip Lowe: I think we would want to make a distinction between generation capacities and infrastructure development on the one hand and the specific support of technology, particularly pre-competitive development, on the other. I pointed to the need to try to simplify the regulatory environment for infrastructure development to ensure that the permit-granting period is shorter, that regulators provide a common framework and we are clear on the priorities. Projects become bankable as a result of that. There may be some projects in the area of infrastructure that are not in the end bankable, at which point we think that nationally and at European level particular projects may need to be financed from public funds. All these projects are likely, if they are of common interest with some bankability, to benefit from loan finance from the EIB and EBRD. We believe that in certain circumstances either grants or other innovative financial instruments will be necessary to kick-start some interconnections in countries that have relatively low consumption but are dependent on a single source of gas or electricity, for example from Russia.

Lord Plumb: In your opinion are there too many projects?

Philip Lowe: The present regulations on trans-European networks have produced a fairly ludicrous situation, where there has been a kind of auction for how many projects of common interest you could get on a European list. You get 600 projects but none of them leads to the major interconnections being built because they are all based on national priorities. That is why you need focus leading at most to 150 to 200 projects overall in the European Union, built up on the basis of initiatives taken by promoters and governments in specific regions. This is not something you can do top down immediately. You can have a strategic view at European level, but for example, the North Seas Countries Offshore Grid Initiative will happen when bilaterally and trilaterally countries around the North sea and Ireland and France get going with certain connections and start to realise that offshore wind farms can be better managed through a grid connecting them all, rather than simply by having a spoke system or connection to individual countries. A lot is dependent on commercial and public partnership to build up incrementally the things that are necessary and provide that degree of predictability to the private sector that is necessary for it to come in. But the EIB can also contribute with loan finance and the Connecting Europe Facility, if there is any money in it after the next few days of discussion in Brussels, could provide some grant funding and some innovative forms of funding.

In the area of energy technologies generally we need to put considerable effort into areas such as electricity and second generation biofuels. These are covered under certain national programmes but also under the present framework for the research programme of the European Union and the new proposals under Horizon 2020, Horizon 2020 allows a significant increase in our energy research and innovation expenditure in the EU budget. There was a major effort two years ago to establish a Strategic Energy Technology Plan. When the original research budgets for the European Union for the period 2007-13 were drawn up, we were not in an energy crisis and did not have a climate change challenge. So virtually no major priority was given to energy. The SET-Plan was an attempt to mobilise public and private funding monies for researching major issues like biofuels, storage, smart grids and so on. It has not resulted in any major reorientation of national research budgets. Only EU and private funds support the SET plan in a significant way. Horizon 2020 looks as if it might provide a better framework for stimulation of the technologies I have referred to.

CCS, had a major priority in the SET-Plan but, has not been able to generate sufficient co-funding at national level. And private companies have said, “We are not prepared to take that risk, even to go to the demonstration phase, unless national governments help us.” That is a major headache. We will produce proposals on that at the beginning of next year simply to raise the alarm bells. If you do not have CCS in the system somewhere, it is much more costly to get to 2050. If you do not get demonstration projects going at all in Europe, they will inevitably get developed in China, India, Australia, Canada or the United States, and we will have to buy the latest CCS technology. The two areas of the present European budget discussions that unfortunately look to be under severe pressure are the Connecting Europe Facility and the Research budget. But they are the ones of greatest relevance to the future of the energy systems in Europe and keeping electricity prices at a reasonable level.

The Chairman: That has been very helpful. Let us now move on to ETS.

Q67 The Earl of Caithness: When ETS was introduced it was presented as one of the great ways forward to decarbonise. It has been one of the EU’s great failures. Is there a practical way of resurrecting it and making certain it works in the future?

Philip Lowe: First, I would be loyal to my institution in saying that the ETS system, at least in concept, has been a successful one, but the way it has been applied has not yielded the results, partly because there was a diversion of certificates from outside the EU into the EU, with the result that we were awash with carbon certificates. Proposals have recently been made at least to try to backload some of the existing certificates up to 2013. What is more important is to develop a framework for the period 2020-30 that effectively would probably involve a more restrictive target and lower cap, and then you get a higher carbon price. I express a personal opinion and hope that I do not incur the wrath of all the commissioners in the European Commission. A high carbon price would of course be a very effective investment signal for low-carbon technologies. But it may not be sufficient on its own. I think it was wrong to assume that it would be the only instrument that would be necessary to transform the economy. Therefore, some stimulation of renewables from a very low level has been necessary, and will continue to be necessary in some form after 2020. And further regulation on energy efficiency is likely beyond 2020 because it is just not being taken seriously enough. If we want to meet the 2050 goals in Europe or anywhere else, we have to double what we are doing on energy efficiency now. We have not influenced them particularly, but the IEA's *World Energy Outlook* puts that at the top of its list of the things governments in the world should be doing.

The Earl of Caithness: Do you think there ought to be a floor price for carbon as part of the strategy for 2020-30?

Philip Lowe: The honest answer is we do not have that strategy agreed yet in the Commission. We have promised that we will produce a new strategy for the period up to 2030 at the beginning of next year. As to carbon pricing, it is difficult to do it at a national level on a sustainable basis unless you are going to isolate the national electricity market in particular from those of your neighbours'. Certainly, a carbon floor price has been chosen by at least one, if not two, Member States as an interim measure pending a wider and more restrictive carbon-pricing regime across the European Union. Effectively, it is one of the only measures where we can see coal-fired capacities in particular being gradually forced out of the system. That has to come in the end. Whether it is a very restrictive cap or a carbon floor price across the European Union, further measures will be necessary to 2030 and beyond. Otherwise, we will be locked into a system that will not allow us to reach the two-degree climate change target.

The Earl of Caithness: Would you agree, therefore, given the way you have summed it up, that ETS was a good concept but there was bad implementation, and is that not the same as carbon capture and storage?

Philip Lowe: They are two different types of problem. The idea of a cap and trade system in principle as a market-based instrument has the advantage of being at least technologically neutral and should in principle have given, alongside some regulatory measures, a very clear sense of direction to investors. This has not happened because the availability of certificates was way above what was required, and we have had an economic recession. The impact assessment for the 2008 energy and climate package of the European Union assumed an ETS price in 2012 of between €35 and €40. That is a completely different world from €6 to €8. Whether it is a failure of the system, it is I repeat that today's carbon price results from a combination of the economic recession, generosity of allowances in the initial ETS phases plus the impact of certificates transferred from the Climate Defence Mechanism into the European Union. It was not a success for that reason, but we disagree that the system itself could not be made a success. It can be made a success if it is run properly; and it would certainly be a success if it applied to more than 11% of the world's emissions, that is the

EU's present share. For 2030 our estimates show that we are likely to represent only 4% of global emissions. In our reassessment of what the ETS and climate and energy policies should do in the longer term, we have to be very conscious of how the rest of the world is going to react. The political and economic environment in the world today is not consensual. It is competitive.

CCS is a different challenge, in the sense there was a clear view from the IEA, Commission and other bodies that if CCS was available it could make a significant contribution to reducing CO₂ emissions in a cost-effective way. It has run up against a series of obstacles. First, in certain countries it is very unpopular. In Germany they failed to transpose the directive in full because of opposition in certain Länder to the idea of storing CO₂ underground. Secondly, it has come up against sheer economics. Companies have said that it was impossible to make CCS a commercial proposition given the present carbon price. Although this is a reasonable reaction from a private company's point of view, what is missing is that investment in CCS is strategic for Europe. It would preserve European companies' options for the future in the industrial and energy sector. It would be extremely dangerous to arrive at a situation, which we appear to be arriving at in the next six months, where only one project in the industrial area is going to go ahead in the demonstration phase, in France, but applied to a steel plant that is going to be closed in two or three years' time, and there is only one other on the continent of Europe, in Rotterdam, that looks like going ahead. It is partly due to the lack of willingness of Member States to focus on a limited number of projects but not necessarily in their own countries. I would not say it is a sad story yet, but certainly ETS is not to be resurrected. But it has been in intensive care, but it is not to be resurrected; it can be made to work effectively. As for CCS, the alarm bells should start ringing; otherwise, we will be absent from this technology.

Q68 Lord Whitty: Going back to the market, this paper, which has only just been agreed, although it is written in the Commission's usual upbeat way, is quite concerned about the divergent approaches in different countries. Does that mean you are looking for more European co-ordination of regulation and other interventions either through ACER or, for example, the new electricity co-ordination group referred to here? Does it mean that things like national capacity arrangements, which the British Government and others are quite keen on introducing, are regarded by you as sub-optimal and there needs to be some override of that at European level?

Philip Lowe: We are trying to say—I am not sure we have said it in a sufficiently clear way but hopefully the message will come across—is that, if you believe it is to every country's advantage, both those inside the European Union and with its EEA partners—to have an open, interconnected and integrated network in electricity in Europe. We should be careful not to re-establish mechanisms at a national level, which are exclusive to national operators. National capacity mechanisms for example should be introduced only if all other alternatives are not available or are less attractive. A capacity mechanism, must surely be justified because of a fear of outage and system inadequacy. But is there any analysis of interconnection possibilities? Is there any opportunity to exploit storage possibilities in neighbouring countries? Is there any analysis of how the grids can be made smarter in order to allow for more flexible demand response?

The consultation paper we have launched as an annex to the Commission's Internal Market Paper basically says that we are not taking a positive or negative view about it markets for the moment. But we are posing a series of questions that should be put, before a national capacity mechanism is put into effect. Why are we sceptical about them if they are purely national? If you finance capacity at a national level and restrict it to national generators, that

is a barrier to entry. It is going to keep people out of the market. It may be possible in the UK, with four or five major players, who in principle could compete to provide the competition based on several technologies. But—as a former Director-general of Competition if you can, I am conscious about the prospects for competition elsewhere in Europe. If for example you have a capacity mechanism in a country with an 80% market share in electricity and it is proposing to introduce that capacity mechanism and pay for capacity, who is going to provide the capacity? Of course, it will be the biggest player. Instead of creating a dynamic of competition, you have frustrated it.

That said, in Ireland and other countries there are capacity mechanisms. Dieter Helm suggests in his book—he has also been an adviser to us—that there is no reason why the capacity mechanism as such should be socialised. It is possible to have competitive tendering for electricity between suppliers and put the burden on them to ensure there is 100% delivery. Otherwise the assumption is that “everyone can deliver what they want into the grid, and that governments have to pick up the tab and finance capacity mechanisms.” In Germany, some advocate the need to provide public funds to finance coal-fired and gas-fired power stations in order to complement variable renewables. This risks compounding a market failure with a government failure. If you have to intervene in the market to ensure reduction of CO₂ emissions, and subsidise renewables there must be a better way of organising the market than leaping in with public money subsidises back-up capacity based on fossil fuels. Once you organise a subsidy scheme—I use “subsidy” in a general sense; I do not mean to say it is state aid—it is very difficult to stop it.

Q69 Lord Whitty: There is a more basic question about the internal market, which is: if we adopt all the measures proposed, for the consumer or business as a price taker, what is the balance between the measures that you take and the world market, certainly in the medium term, for oil, gas and coal, which is setting a large proportion of the cost make-up of the price? If the Russians and Norwegians set a price, all the benefits of the internal market could be overwhelmed in terms of prices to consumers.

Philip Lowe: Surely, the purpose of a market is for the price to be formed on the basis of a balance between supply and demand, with nevertheless a dynamic of competition in that market. If there is only one supplier—or two suppliers who may have an agreement between themselves—I am not saying they do, but there is a natural tendency to do that—there will be exploitation of consumers. Surely, the whole point of an open market in which there are several players, with the possibility for new entrants to come in, is that no one from outside the European Union can exploit the situation through his or her unique market power. To take the example of Gazprom’s objections to the Third Package of internal market legislation, we continually point out to our Gazprom colleagues and friends that they are the most significant and competitive source of gas around the European Union. The availability of all the pipelines in Europe to supply that gas can only be to their benefit; indeed, they have been increasing their market share in the United Kingdom quite significantly, not with Gazprom pipelines but through trade swaps and with the use of other people’s pipelines. That is the fundamental principle of leaving the networks open.

The Russian point of view on the Third Package is that they should be allowed to keep their control of the networks in Eastern Europe. This is no good. If you are playing in Europe, you play by European rules. The European rule is: allow people to compete, and if you have the minimum degree of contestability, you can avoid the situation where you become the victim of volatile prices of oil and gas which are largely determined by only one or two suppliers. At the same time—this is the benefit of renewables and nuclear—if you can develop indigenous resources, equally you also have a source of contestability.

Q70 The Chairman: That is the perfect point at which to stop. It has been very helpful. Sadly, we did not cover all the ground. There are three other questions. If the Commission could write to us and answer those, it would be most helpful. Thank you very much.

Philip Lowe: Absolutely, if you just tell me the three questions or e-mail them to me.

European Commission—Supplementary Written Evidence

I. A Technology specific approach

a) When do you think a decision on possible 2030 renewable targets (and possibly beyond) might be taken?

With a Communication on Renewables²⁸ published earlier this year, the Commission has initiated a discussion with Member States and other stakeholders on the most suitable policy framework for renewable energy post-2020. The Commission will propose in 2013 a general framework for EU energy and climate policies in a 2030 perspective, which is expected to give further clarity on the role of renewables post 2020.

The discussion on the Commission's proposals will help to determine whether a future framework will include targets and, if so, in what form. Any such target would have to be endorsed by Member States in Council and the European Parliament.

b) How do you respond to those that argue that a technology neutral approach is better than a technology specific target intended to boost investment in renewable energies?

Experience so far has shown that technology-neutral approaches do not necessarily produce the most economically sustainable results as such approaches risk to overcompensate investments in more mature technologies, hence creating windfall profits (The initial, technology neutral UK ROCs Scheme illustrates this point). A successful renewable support policy will have to ensure a well-balanced mix of technologies, both for reasons of cost efficiency but also grid stability.

This means that, while support for some technologies can be phased out post-2020, technology-specific policies for less established technologies, such as marine energy, and possibly also offshore wind, may still be appropriate. Of course, technology-specific support policies do not necessarily have to include targets.

c) Is there a danger that, in picking a “winner” such as renewable energy (which can be intermittent and require time to introduce), the market will rely on low cost, carbon intensive, options to bridge the gap, rather than invest in Carbon Capture and Storage (CCS) for example?

EU policy does not pick technology winners. The aim is to offer a stable, broad framework for the move towards a low-carbon economy, respecting the market as much as possible, which includes CO₂ emission trading (ETS), support for renewable energy, CCS, Energy Efficiency and nuclear research and safety. The NER300 funding programme is also aimed at CCS as well as renewable energy.

It is for EU Member States to determine their precise technology mix - including the decision of whether to pursue CCS as a technology option in their future energy mix. Recently, Member States appear to have become more reluctant to invest in CCS

²⁸ Communication – Renewable energy: a major player in the European energy market (COM (2012) 271 final).

demonstration projects. The Commission will try to inject new impetus for CCS with a Communication planned for early next year.

Finally, the Roadmap 2050²⁹, the Commission's modelling exercise on possible decarbonisation pathways, delivered one clear message: No matter what technology scenario will be chosen, renewables will always have to be among the "winners"! Even if we were to opt for "more nuclear" or "more CCS", our scenarios conclude that the share of renewable energy in 2050 will have to be at least 50 % of final gross energy consumption if the 2050 CO₂ emission target is to be met.

d) What lessons can be learned thus far from the German energy transformation, including the issue of intermittency of renewable supply and its impact on neighbouring Member States?

Experience in some Member States with substantial amounts of variable renewable energy sources in their power mix (such as ES, DK, IE, DE) has shown that the integration of average shares of 15-20% of variable sources – with up to 60-70% at certain times of the day – is technically feasible. However, it requires the grid infrastructure to evolve at the same speed as the expansion of renewable capacities. Otherwise issues arise around loop flows (where neighbouring countries get flooded with surplus electricity) and power frequency (when excess electricity is fed into the grid), as in the case of Germany.

EU policies to increase cross border interconnection and trade should help to balance different renewable sources over wider geographical areas (in which different weather patterns affect both generation and consumption). This should increase security of supply when renewable generation is too low or too high, and also help to diversify supply and converge electricity pricing.

Finally, what emerges from the German energy transformation is that, in practice, the only way to introduce high levels of renewable power safely and reliably is to coordinate it with your neighbours. Essential resources, such as the North Sea offshore grid, will only work in collaboration with all countries around the North Sea, including the UK. The success of the German renewable strategy will – at least until the availability of more storage technologies – also depend on access to pumped storage hydro stations for example in Austria and Norway.

2. Interconnection

a) How significant an impact will the recent Regulation on trans-European energy infrastructure have on the development of an integrated grid with effective interconnection?

The fact that the infrastructure will increasingly have to be planned and built across national borders calls for better coordination and planning at European level. The massive investments needed over the next decades (over one trillion Euros for energy generation and transport by 2020 for all of EU) against a background of low growth or recession in most EU countries calls for coordination of investments.

²⁹ Communication "Energy Roadmap 2050" (COM (2011) 885).

The proposed Regulation³⁰ aims to focus public and private investments on a limited number of strategic connections and projects with cross-border impact, to streamline and accelerate permit granting procedures for these projects and to ensure that national regulators act together to create favourable conditions for the projects to be financed. The proposed Connecting Europe Facility could also provide public funding from the EU budget in justified cases (with 9,12 billion Euro available for 2014-2020), as well as new financial tools to leverage the money of private investors.

b) To what extent are there cost savings to be achieved in operating an integrated energy system through well connected EU energy infrastructure? Does the Commission have estimates of the potential savings for individual Member States?

Cost savings can be obtained through optimised coordination of generation, network and demand management. The impact assessment accompanying the Commission proposal for a Regulation on infrastructure³¹ also estimated that the full delivery of the needed trans-European infrastructure would have a cumulative effect of +0.42% of GDP and 410,000 additional jobs over the period 2011-2020.

3. The social dimension

The Commission's Roadmap recognises the social dimension, but is vague in solutions, observing that citizens need to be informed and engaged in the decision-making process, while technological choices need to take account of the local environment. What work has the Commission done to analyse the social dimension and to identify specific ways to tackle it?

The Commission has long recognised the importance of the social dimension. Vulnerable consumers are specifically protected in EU legislation. In 2007, we established the London Forum as a citizen's platform for energy policy with a focus on consumer rights. This work is continuing, and we would like to broaden its scope into other areas of energy policy. The Commission is also concerned to ensure that civil society has an effective voice in important policy proposals. For example, the proposed Infrastructure Regulation sets out rules on enhanced transparency at an early stage and requires the participation of citizens before the project developer submits his permit application. Finally, consumer rights and their actual enforcement are highlighted in our new Communication on the Internal Energy Market³².

7 December 2012

³⁰ Proposal for a Regulation on "Guidelines for trans-European energy infrastructure" (COM (2011)658).

³¹ Impact assessment accompanying the Regulation on "Guidelines for trans-European energy infrastructure" (SEC (2011)123).

³² Communication "Making the internal energy market work" (COM (2012) 663).

European Commission— Supplementary Oral Evidence (QQ 254 – 277)

Evidence Session No. 14 Heard in Public Questions 254 - 277

WEDNESDAY 23 JANUARY 2013

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
Lord MacLennan of Rogart
Baroness Parminter
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Philip Lowe, Director-General, Directorate General for Energy (DG Energy), and **Eric Mamer**, Deputy Chef de Cabinet to Gunther Oettinger (European Commissioner for Energy)

Q254 The Chairman: Welcome, Mr Mamer, and welcome back, Mr Lowe. Very nice to see you both. We are very grateful for you taking the time to come and talk to us today. Just a formality: we should have given you a list of interests that have been declared by our Committee members.

Philip Lowe: We have that, thank you.

The Chairman: Good. This is a formal evidence-taking session of the Committee. We are taking notes and a transcript will go on the public record and on the Parliament website. Of course, we will send you a copy and you can revise any minor errors. We have a couple of hours, fortunately, so we have time to work our way through the many questions that we have shared with you. Would either of you like to say anything about the position generally, or would you prefer to go straight to the questions?

Philip Lowe: Just very briefly—and this is referred to in a number of the questions—this is probably the year in which the European Commission can still make proposals and potentially legislate on those proposals by the end of the year, given that the European Parliament will be re-elected at the beginning of 2014 and there will be a new Commission at the end of 2014. One clear priority, which is already in the Commission's intentions, is not just to update its policy on energy and climate compared with 2008 but to issue a Green Paper by the beginning of April, which will be discussed in both the Environment and Energy Councils on 22 and 23 April. Following the debate on that Green Paper, which will come up

with a number of options both on the energy aspects and the specific climate aspects such as the future of the European trading system, the intention of the President of the Commission and his colleagues is to put forward legislative proposals before the end of the year if they are appropriate.

The original package for 2008-09 contained the consolidation of the European trading system proposals, plus measures for the promotion of renewable energy. Since then, we have also been able to pass legislation on improving energy efficiency. That package led to the objectives for 2020, which we have discussed before. The pressure from political circles and industry is to say, “That it is all very well, but the horizon for energy investment is a lot longer than that”. We responded to that 18 months ago, as you know, by producing an Energy Road map to describe the implications of meeting CO₂ emissions targets for 2050. But industry and stakeholders in general have said to us, “That is not enough and you must tell us what you want to do post-2020, towards 2030”. It is on the basis of options for the next 10 years beyond 2020 that we will be concentrating our work. That has required us to start updating the reference scenarios: that is, what has been the impact of present policies? What is the impact of policies that have been decided since 2008? What are the market developments around shale gas and the coal market, and the development of CCS? It means that we will have to have a Green Paper adopted by the Commission by 27 March in order to meet the deadlines. That is quite short, but if we slip in that timetable we risk not having the public debate in a useful time-period. National policies are being discussed and adopted in parallel and are complementary in most cases.

There are also other issues relating to the move towards policies necessary to make the market work effectively. We know that the market design proposals in the UK are on the table now, aspects of which have an impact on the rest of Europe. In France, there is already legislation not just to change the energy mix but to promote support to the capacities that may be necessary with a high level of renewables in the system. So alongside the Green Paper proposals, we will be looking at issues such as support to capacity markets. There is already a consultation process under way on the reform of the ETS system. As you know, that requires an initial stage assessment as to whether it makes sense to backload some of the volumes of certificates that are presently in the system. The view in Brussels is that the market has probably already discounted that and that what really counts is the capping of CO₂ emissions in the longer term. Those are the ongoing initiatives which you should be aware of.

Perhaps I could mention one thing, which, from the questions, appears not to be as clear as it might be. You refer to the social dimension of infrastructure development. Unfortunately in a European context, the expression, the social dimension tends to be associated always with employment issues, whereas the words “public acceptance” are very much the ones that people understand in relation to energy infrastructure and technology. The European Council of Ministers and the European Parliament recently reached agreement at the end of last year on a regulation to facilitate both public and private investment in infrastructure for the energy sector, of which the first achievement is to get agreement on some strategic priorities, whether it is the Northern Seas grid or north-south connections in electricity or gas. The second aim of the regulation is to make sure that our national regulators actually agree on what the priorities for cross-border infrastructure are and support these projects. The third aspect, which is probably the most important in relation to what you call the social dimension, is how we get the permit granting procedure streamlined to avoid the average 10 to 12 years of delay between the conception and implementation of projects. We had proposed three years for priority projects. In fact, at the end of the negotiation, Council and Parliament have agreed to three and a half years.

There are many obstacles in implementation on the way to achieve that. We have proposed, based on the best practice in a number of member states, that there should be one competent authority in each member state responsible for ensuring that a project of strategic interest is processed through the planning procedures in a way that converges on one single authorising decision rather than a large number of authorising decisions in parallel, which has usually led to tensions and delay, and then one opportunity at the end of the process for an appeal against that decision, instead of 30 or 40 initiatives to do it. That assumes at the start that the consultation of the public on issues of environmental and local impact is done in an intelligent way, which may or may not be the case in all member states of the European Union. In certain regions of the European Union, municipalities may have different approaches as well. So we cannot say that the richer and more developed countries are necessarily better at this than others. This regulation will be implemented in 2013 and shall make an enormous difference to that challenge of getting things done on a streamlined basis. That is all I wanted to say at the beginning to tell you what is going on.

Q255 The Chairman: Eric, do you have any general observations?

Eric Mamer: Yes, very briefly. Thank you for providing the opportunity to bring evidence to the Committee on EU energy policy. We welcome that very much because 2013 is a very important year for us in terms of devising policy in the energy field—not just for the coming two or three years but, as Philip said, possibly for the decade after 2020. I noted with very much interest that the session is about decarbonisation and economic competitiveness. That for us is the right way; it is the focus that we also give to our thinking about energy policy. We have a third dimension, also mentioned in the treaties and key for the implementation of a successful energy policy: the security of supply. We see the need to ensure complete coherence in the medium and long term between our objectives of decarbonisation as they were set in the climate package in 2007-08 and the competitiveness not just of the energy sector but of the whole European economy. Whereas it was perhaps easy to portray or to think of both terms as being entirely consistent back then when the energy package was decided, in view of the crisis that has since unfolded since this has become much more complex. It is something we want to focus on so as not to lose the value of the decarbonisation objective, yet to make sure that competitiveness issues are neither forgotten nor get in the way and have their right place. It is the appropriate time to discuss these issues.

Q256 The Chairman: Thank you. I am just thinking about timetabling. We have 10 questions, so if I nod to people a bit vigorously, could we move on? With 10 minutes for each we might cover the ground, with a few minutes at the end. Perhaps I will kick off. This is about CCS. We have been struggling with CCS. We have heard the very positive theoretical views and we have found it very hard to see any practical progress in it. We have heard from a number of witnesses about the slow progress, and arguably the absolute lack of it in many ways. Yet if you look at the UK government strategy from December, CCS is really quite central to it, so what is the Commission going to do to push it forward? How much does the Commission feel it can act, and how much does it need member states to act? Where should that balance of responsibility to take this forward lie? We are particularly interested in understanding more about the German position to CCS and why there is the resistance.

Philip Lowe: The background is that, following 2008, the Commission proposed and had adopted legislation to promote carbon capture and storage, and, in the European recovery programme in 2008-09, €1 billion of European money was committed, pending on First

Investment Decision on several projects. We also had envisaged in the receipts from ETS revenues, the NER300, that there would be some projects that would benefit from the revenues available. In the first call at the end of this year, following the assessment made by the European Investment Bank, in reality no projects for CCS have been approved and awards made, although it is possible that in the second call in 2013 we may get some financing for CCS.

The first thing to say is that the Commission wants to raise the alarm bell on this, and we have prepared a comprehensive paper on CCS. CCS can make a very cost-effective contribution to the energy mix in the pathway to a low-carbon economy. Indeed, the IEA concentrated its 2010 World Energy Outlook precisely on the contribution which carbon capture and storage could make to achieving climate change. I hope that everyone will see our own paper quite soon, because it contains a comprehensive analysis of problems facing the CCS. These problems are linked amongst other factors to the lack of investment incentives and signals, of which the ETS price is one. It is low and therefore not effective as a stimulus to reducing CO₂ emissions in the atmosphere. In addition, the capacity of companies generating electricity to use supplies without the need to think very much in the longer term about CO₂ emissions has led to some degree of short-termism about the issue. In the impact assessments for the climate change package and the energy package 2008, you find assumptions of ETS prices between €35 and €45, and as you know it is €35 or €6 at the moment.

Low competitiveness in terms of the incentive from the ETS price has combined with some degree of public concern about the technology itself. As you know, the issue of public acceptance—the social dimension—is important for everything, whether it is transmission infrastructure or the data privacy in smart grids. With carbon capture and storage, the main concern in Brandenburg and other German Länder was, “we don’t like the idea of storing CO₂ underground”. They don’t mind or don’t know about storing natural gas underground. Berlin has massive storage of natural gas under itself—so you could blow up Berlin overnight. You cannot put a match to CO₂. Even the psychology of storing something that is waste has produced a very strong opposition in Germany to the technology.

Lord Renton of Mount Harry: Is that not historical?

Philip Lowe: It is connected with the same cultural concern with nuclear waste and storage as well, which is maintaining the purity of the environment. This concern influences all political parties in Germany on this. So the moment the CCS directive which we had proposed was supposed to be transposed in Germany, it did not actually get transposed in a way which ensured that carbon capture and storage could actually be promoted. It left some degree of veto of the länder parliaments on what could be achieved. That was a major frustration, because it was precisely in those Länder where there was a potential for storage, but there was considerable opposition to it.

One would think that the ROAD project in Rotterdam offers better conditions for success. In the North Sea there are offshore sites for storage which will overcome the public acceptance problem. But the third thing to mention, as well as the ETS price and the public acceptance issue in Germany, is the fact that there is not enough solidarity among Member States and promoters about which demonstration projects should go forward or not. Our own Commissioner very much hoped that, even if the technology was not supported in Germany by public opinion, German companies as well as public authorities could support the demonstration project in Rotterdam. This is unfortunately not the case.

Q257 The Chairman: We can see the aspiration, but what we cannot see is where we will be in seven or 10 or 20 years' time. Given that 35 years is in the plans, we have a disconnect. We are trying to get a realistic assessment of the contribution of CCS, in a timeframe. For example, we cannot get a demonstrator going, although there is money available.

Eric Mamer: The paradox is that there are demonstration projects ongoing elsewhere than in Europe. We have been pushing for it significantly.

The Chairman: Where would you direct us to where one has been proven, that has not been—

Philip Lowe: Alberta.

The Chairman: Is it just starting or has it been running for some time?

Eric Mamer: Do the Norwegians not also have some demonstration projects?

Philip Lowe: The Norwegians have two pilot projects. But it is essentially Canada and the US that offer the best potential, on the basis of existing projects, to extend them. There is one argument that says, "Well, okay, Europe is not in a position to back these projects now, but maybe we will just wait and come back to it".

The Chairman: So it is not a technology issue, it is an issue of political will.

Philip Lowe: It is a political will issue.

Eric Mamer: And business case.

Philip Lowe: Because it is connected very much with the issue of public acceptance of storage, maybe some more time to raise awareness of it is necessary. That is partly why we want to produce a paper on it, to just say, "Okay guys, we are in a situation where in fact at the moment coal is being, in the short term, used marginally more than other sources—certainly more than gas—and if we are going to maintain the contribution of coal to the energy mix in Europe, but meet climate change objectives, surely you need CCS". That is one of the paradoxes of the German situation, where there is absolutely no commitment to CCS, but there is a market-driven—but not socially driven—demand.

I noticed that, in the question, you related support for lignite and coal to employment interests. There are about 20,000 jobs in the lignite sector in Germany and the lignite industry claims there is a total of about 80,000 related jobs. But I believe the major issue is not jobs, but price and costs. The fact is that the three companies concerned—one American, one Swedish and one German—find that producing electricity with lignite, but without CCS, is the most profitable way they can run their plants in the present circumstances. That is markets operating and you cannot do anything about that.

Q258 The Chairman: That leads us on to coal.

Lord Cameron of Dillington: You have slightly answered my question in a way. You seem to have slightly changed your mind in that you said previously it was only going to be a blip and that regulations were going to weigh down on the coal industry and prevent such emissions.

Philip Lowe: What I said then is still valid because, by 2016, a lot of the capacities that are being used presently, in particular for lignite—which, by the way, produces three times more CO₂ emissions than gas and all sorts of other environmental pollutants—will face the issue of conformity with the environmental regulations on large combustion plants, although –

there are few plants that have been built that are in conformity with the regulations. The other thing, which I mention in relation to what I have just said about CCS, is that public opinion interest groups, NGOs and the civic community in Germany are very active and are continuing to frustrate any plans for increases in coal capacity. Yes, there is a complete incoherence, when it comes to the question of the present level of ETS prices, or alternatively a carbon floor price, to encourage low-carbon generation, but do not underestimate the factor of public acceptance.

Lord Cameron of Dillington: On the other hand, you are not going to get any reform of the ETS system, it seems from the evidence that we have taken today. Floor price? Forget it. Poland has 90% of its energy produced from coal and is being very vocal in the whole debate. Are you going to get the regulations that you have just been speaking of? Are Poland's coal and energy-generating industries more old-fashioned than the new German power stations?

Philip Lowe: Absolutely. As David Cameron said this morning, we have to cope with diversity in the European Union.

Lord Cameron of Dillington: But can you get anything done?

Philip Lowe: The legislation concerned, if we need to put it through, is agreed by qualified majority and not by unanimity. Poland opposed the presidency conclusions on our road map for 2050, because that was an issue of unanimous adoption, but one has to take into account the reality that the Polish energy mix is heavily dependent on coal for the moment. In contrast to other countries, including Germany, the employment question is an important one for them. There needs to be a degree of transition in that. But if you look at it from the point of view of the average achievement of the European Union, of course other countries are much more on track. Poland will always be the outrider in this discussion.

Lord Cameron of Dillington: Yes, but it has very few other options, that is the trouble, apart from Russian gas, which it desperately does not want to depend on.

Philip Lowe: Yes, and as most of our eastern European representatives tell us, "It is all very well you going on about renewables in energy security, but for us, if we do not have Russian gas and you cannot make sure that there is Norwegian gas or LNG coming in, it is either nuclear or coal"—and nuclear has its challenges as well. Yes, there will be outriders and a massive debate and Poland will be on the periphery of that debate, but the European Union has to accept that it cannot move Poland faster than structural changes in the economy can enable it—as in the shipyards, too. When we dealt with state aids to shipping construction in Poland, the timetable largely lagged behind what was happening elsewhere.

Q259 The Earl of Caithness: Will Poland be able to secure a blocking minority, bearing in mind that it was a Swedish state firm that built a lignite plant in Germany? It seems to me that you have a blocking minority among those four countries.

Philip Lowe: I do not think that you have that blocking minority numerically.

The Earl of Caithness: With a bit of arm twisting, you could get some others.

Philip Lowe: Several companies in Europe are competing in a number of different countries, thank goodness, which means that there is an internal dynamic of competition. Vattenfall's corporate objectives include contributing to a low carbon economy. They will obviously be respectful of the host country concerned and the implications for employment. They have also put some investment into installations which conform to the industrial combustion objective. But I stick to my view that beyond this very short term, the impact of these

environmental measures on coal-fired capacities, plus a lack of public acceptance of a continuation of lignite production, will exercise a downward pressure. I am not alone in that, because the IEA says the same thing.

The Chairman: So you think that coal burn will drop over time?

Philip Lowe: Do not forget that coal burn is not a uniquely European phenomenon; coal dominates energy consumption worldwide in electricity production. There has been an increase and there will probably continue to be some increase this year and next year in coal burn. But, provided that we put the right legislative framework in post-2020 for a move towards a low-carbon economy, which includes looking again at the ETS objectives, unless the European Member States want to abandon the 2050 objectives, they have to take seriously a move away from coal, particularly lignite, or alternatively a move towards CCS.

Q260 Lord Whitty: You have already mentioned the social dimension. This question is about the social dimension in general, of which I think there are three bits. One is, as you mentioned, public acceptability. That seems to apply whether to wind farms in Northumberland, on which we had a Question in the Lords last week, to nuclear power stations or to CCS in Germany. There is a big question there whether your proposals on planning are likely to override or deal in some way with those objections. There is the employment issue. If Lord Giddens were here, he would be pressing the case on net employment creation from moving to a greener form of energy. We need to be clear on that. I am not sure whether the Green Paper will cover the employment dimension. Thirdly—this tends to be what people in Britain mean by a social dimension in energy policy—there is the fuel poverty dimension, whereby a significant proportion of poorer families are paying unsustainable prices for their fuel. Therefore there are demands for a regulatory and social system to deal with that. I am not sure whether the Green Paper will cover that aspect of the social dimension.

Philip Lowe: Can I deal with that in reverse order, and then Eric can come in? First, the existing European legislation, particularly in the second and third internal market package, specifically allows Governments to define what are vulnerable groups of customers, and to regulate prices in relation to those vulnerable groups.

The Chairman: How many countries take advantage of that?

Philip Lowe: The progress in including that definition in the transposition of European legislation is slow. Only half a dozen countries have defined it.

Lord Whitty: The UK Government are about to change the definition.

Philip Lowe: There is complete recognition that what is called in French *précarité énergétique*, or fuel poverty, fully justifies Member State intervention. What we object to is when a Member State of the European Union regards the whole population as vulnerable consumers, because then the market will not work at all.

Eric Mamer: Or parts of industry.

Philip Lowe: Therefore, the first step in doing anything about fuel poverty is to define who you think is vulnerable. The parallel objective is to make markets work for the benefit of industrial and individual consumers. If you look at the report we published last year on the European internal market in energy, you will see that a lot of progress is being made at the wholesale level, but there is much more to be done at the retail level. In many countries the level of competition at retail level is very low, and we need to promote that. It would be helped enormously by smart meters, because then you get information to consumers about

how much they consume and how they pay for it. But that will take a number of years to get going.

On the issue of net employment creation, the UK Government in 2007-08 were very keen to show that the green economy would create jobs. The European Union used the same language in the energy and climate change package in 2008/09. It is certainly true that the infrastructure requirements of the energy transformation in Europe, with a high level of renewables, a need for smarter infrastructures to manage demand and supply, and smart meters, will be highly labour intensive, particularly at the distribution level. There are all sorts of estimates about numbers. Up to 1 million jobs could be created. The energy efficiency proposals are also labour intensive because they relate to buildings and the construction industry in general, and measures that generally require the intervention of a lot of skilled people. There are always caveats to be made, but the energy transformation should contribute significantly, in a macroeconomically recessionary situation, to a recovery, particularly because investors want to find a sector that they trust. Energy is an area where returns are perhaps not as exciting as many hedge funds and private equity people would like, but they are steady because people have to use energy to live and to produce goods. So that is the argument on the employment issue.

The direct employment issue relates to whether we want to preserve conventional industries because we want to retain jobs. Coal subsidies will be phased out—finally—by 2018. We are talking about Poland, Germany and Spain. The lignite industry in Germany claims that it is unsubsidised. We do not believe that; we think that there are some tax incentives that support it. Nevertheless, the political impact of that employment argument is not significant.

On public acceptance generally, we share your caution about saying that the latest EU regulation on infrastructure development, which requires the fast-track nomination of the competent authorities, will not be successful unless a lot more information is given to the general public about why it is necessary to build certain strategic links, what would be the opportunity cost of not building them and what would be the impact on electricity prices. The Commission held a seminar for its Commissioners last Friday. One of the conclusions was that there would be a specific discussion on electricity prices as a major factor determining competitiveness. I am making this link because in terms of persuading the public, we must demonstrate through analysis that not doing certain things would have very high costs.

Q261 Lord Maclellan of Rogart: Following on from what you have said, we have taken a very large amount of evidence about the problem of investment. We have taken evidence from the private sector, including EIB economists and so on. We have also had it suggested that there is a lot of money lying dormant in the private sector, and that that money needs to be released to start up the activities that would make a great difference to the recession. Do you think that this is a good time for that kind of investment? If so, how can the European Union indicate that there will be a sustained policy to encourage investment? You have already mentioned the 2030 issue. It seems that the Union is desperately held back by the disparity in the views of national Governments about what they want to do. In those circumstances, are you inhibited from investing in technologies that may not be favoured by some countries but could, in the objective view of the Commission, make a major contribution? We have discussed CCS. It seems that that is inhibited by the disparity of views about it. There may be other technologies that do not arouse public opposition. The overall question that I am trying to get at is: what can you do to stimulate investors?

Philip Lowe: I think that we have to distinguish between providing a favourable climate and framework for private investment in projects on the one hand and the research effort vis-à-vis new technologies on the other. In respect of investment in infrastructure, we also need to distinguish between transmission and distribution infrastructure and generation infrastructure. We tried to make it clear in the Road-map 2050 that, irrespective of the national scenarios of energy mix, there are certain no-regrets options that should comfort investors that investment in certain things would inevitably be worth while. We said, as part of the no-regrets options, as a conclusion from that scenario and modelling exercise, that if we are serious about the 2050 objectives, but we stick to the need for the maintenance of competitiveness and security of supply, there will be more electricity and a high level of renewables in any scenario and there is a need for very smart infrastructure at the transmission and distribution level.

Certainly in the area of transmission and distribution, it should be possible to unlock funds, where institutions have been hesitating to invest because they do not know precisely what the advantages would be. It was for precisely that reason that we proposed the infrastructure regulation to facilitate not just public investment but private investment and to make clear what the permit-granting procedures would be, what the timetable would be to reduce that planning risk and to make sure that our regulators, whether Ofgem, the Bundesnetzagentur or the French authority, agreed to promote, to provide the right regulatory framework to facilitate the projects, and to finally make clear what the strategic priorities are for those interconnections. We feel that we have made two not insignificant contributions. First we have said “This is the Road-map”, and “These are the no-regrets options”. We are going to have to complete that with a more precise vision for 2030. And Secondly, we have also got this agreement on the promotion of transmission and distribution infrastructure in the new Infrastructure Regulation.

Where the financial investors are right—as Citibank said two years ago, and as KPMG said is all very complicated—is on generation, where renewable support schemes are national and of varying quality in terms of their effectiveness and where there is political uncertainty as to their future.

Q262 Lord MacLennan of Rogart: Is that not because so many of them are incorrect?

Philip Lowe: Yes, we have carried out a consultation on best practice in support to renewable and publish guidelines on best practice support of renewables. After all, we are only supporting renewables to make them competitive without subsidy in the long term, not to subsidise them permanently.

The Chairman: So when are you going to publish that?

Philip Lowe: Around April or May.

The Chairman: And are the clear differences all emerging?

Philip Lowe: Absolutely. You can already say that between feed-in tariffs, feed-in premia and quota systems, there is generally the view that the feed-in premia methods have been more successful. A more predictable European-wide framework for national support schemes to avoid the problems that Spain, Portugal and others have had in terms of retroactive changes that discourage investment.

Nevertheless, there are some big challenges ahead. The general economic recession is not creating an environment in which people are going to invest in new capacities unless they know that they are going to be used. As long as the opportunity exists for using residual coal-fired capacities, in particular, there is a some degree of reluctance in the investor

community to go anywhere near this in Europe. Invest in coal-fired capacity in China and you know that it is going to be used and that you will make money out of it. In Europe, investment in gas-fired CCGT plants should be profitable in the medium term. Our contribution through the Green Paper and the subsequent legislative proposals will in particular be to give some certainty as to the direction of the ETS price. At the same time, we need to bring some degree of discipline into the way in which any kind of generation investment is supported. After all, if you move from 2% of renewables in energy consumption to 20%, which is 35% in electricity, you cannot say that national subsidies in one country do not affect what is going on in another country. It is nonsense.

Eric Mamer: And, indeed, some people are trying to say that they should be able to get subsidies from Member States different from the one where they are producing—from where they are investing in.

Q263 The Chairman: So is there a state aid issue with subsidies?

Philip Lowe: Absolutely, it is a state aid issue. There has always been a legal problem because a particular decision of the European Court of Justice declared that some support schemes were not legally state aid and therefore they could not be subject to state aid discipline. The frontier between what is and is not state aid is becoming eroded by subsequent Court of Justice decisions but, basically speaking, there is no one in the electricity industry who does not believe that we need more discipline in this area. We need more discipline in public intervention because, after all, as I told you before, 17 of our 27 markets are coupled—power exchanges are coupled—so it is no longer possible, if you look at flows, to talk about a national market in electricity. It changes from day to day across the continent.

The UK is somewhat isolated because the power of interconnection is lower. Coming back to the financing issue I think it is going to be very difficult immediately for us in the next six months to see a real new inflow of money into generation investments. However, hopefully, if the Commission produces its legislative proposals following the Green Paper, and the various Governments concerned also confirm their intentions—the UK on strike prices, France on the different support mechanisms which it is proposing, Germany on its energy change legislation—that should, by the end of 2013, provide a much better environment for investment. You can already feel some appetite from financial investors to go back into this area.

As far as R&D and innovation are concerned, it is a pretty crazy idea—I say that as a former director-general for competition—to subsidise the operational costs of the application of a technology which is already competitive. If you look at the perspective to 2020, onshore wind and solar photovoltaic have reached a level of cost per unit which means that, by 2015, it will almost certainly be possible to operate without subsidy provided the costs of ensuring the system's stability are also taken into account. You cannot have efficient, low-cost renewables without an efficient, intelligent system to deal with variability. The next question is: should you go on with subsidies for certain new technologies and will that help investors to plan for the future? Our view is that—Dieter Helm has already implied this in some of the evidence that he has given—in an ideal world where the market worked perfectly, just setting the ETS price and then letting companies choose the technology they wanted could ideally produce the right result. However, at the moment, given the predominance in a number of countries and across the European Union of the use of fossil fuels, even with onshore wind and solar in our view it would be in the interests of the long-term competitiveness of European Union countries and of security of supply, to diversify as far as

possible—to let all flowers bloom. Therefore, it may be necessary to continue to give some incentive—even at an operational cost level—to certain technologies which so far have not got their costs down. In the UK, offshore wind is alternately loved and hated. It is loved because you probably mostly cannot see it; it is hated because at the moment it is potentially as costly as nuclear.

Q264 Lord Renton of Mount Harry: I can actually see it in Scotland, but it is way out and we do not know whether it will ever happen.

Philip Lowe: The answer, surely, is that if the argumentation for supporting these technologies makes any sense, it must be that we invest heavily at the beginning to get costs down but there must be a point at which that has to be reviewed to see whether you can get to that stage, unless the cost is justified entirely on security of supply grounds.

Lord MacLennan of Rogart: In parenthesis, do you look at the decommissioning costs of those systems as well? Are they included in the projections?

Philip Lowe: I think that everyone around us and around national Governments is very anxious to make sure that we do an analysis on the basis of a level playing field, which is why, by the way, the green lobbies in Europe are very anxious for us to make proposals on nuclear liability.

Lord Renton of Mount Harry: That goes back some way, does it not?

Philip Lowe: Yes, there is a provision in the Euratom treaty for the Commission to make proposals for the regulation of liability for nuclear incidents. It is an ambitious proposal, which will not necessarily meet with a great deal of enthusiasm either on the part of Member States or of different Ministries in Europe because the issue of liability is a very complex one.

Q265 Baroness Parminter: I think that you have answered my question. Since we saw you last we have seen Dieter Helm, who made his argument about putting money into emerging sustainable technologies, as opposed to already proven but possibly expensive technologies. I think that you, like the majority of evidence-givers, have rejected his argument.

Philip Lowe: Dieter Helm advised us on the Energy Road-map and he is a very important contributor to the debate. But the result of what he was saying is that in the short term we would probably just use more gas, which cannot be the long-term low carbon objective. Here, the United Kingdom Government and Parliament, on the one hand, and the European Union's institutions, on the other, are at one: it cannot be the long-term aim if you are serious about climate change. We want to be serious about competitiveness but also about climate change. If you want to do both, you cannot blink because there will be higher costs in the short term. But in the longer term you will benefit—and, by the way, the benefits are evident in terms of the development of indigenous sources of supply. People forget that it is not just because there are wind turbines and solar, which are all green and lovely and are going to save the world. In fact, these sources of energy do not require any fuel, and they are here in Europe.

The Chairman: Can I take us back to the investment question? Given that capital now is global and that you made the point that while you can invest in a power plant in China and be pretty confident of ongoing demand, you would be daft—I do not think you said that, but we have had a sense from other people that one would be hesitant—to invest at the moment in a power plant in Europe, what do you think the market is looking for as rates of

return on these things? We have found it quite difficult to get anybody to give us a straight answer. People are slightly elusive about this. What is the annual rate of return that it would bring forth? We know that there is this wall of money, but nobody has ever told us the price of it.

Eric Mamer: We would be in charge of the markets if we knew that.

The Chairman: Yes, you would be a hedge fund.

Philip Lowe: We have had a number of seminars or private discussions with the financial institutions precisely to try to identify the things which we could do now in order to influence what they were doing. That led to the Energy-Road map 2050 and to the decision to go for a Green Paper to identify mid-term options up to 2030. It also led to the proposal for a new infrastructure regulation to facilitate both public and private investment. The first thing that the financial institutions said to us before we get on to rates of return was “Listen, Commission: you are naive. We are not going to invest in at least 12 of your 27 Member States until the sovereign debt problem is dealt with”. I am not mentioning the banks concerned. They are all global banks but there were also a number of European-based banks. They said, “Listen: we are not messing with our shareholders or our pension contributions. If you do not solve the sovereign debt problem, your energy problem is not of interest to us”. That was an important precondition.

The second thing is that, since the 2008 financial crisis, generally speaking the risk-free rates of return for transmission and distribution infrastructure have gone up from something like 4% to 6% to something like 7% to 9%. The risk premium is a function of the sovereign debt and other sectoral and company related indicators of risks. The next question, whether it is for infrastructure or generation, is: what rate of return could they gain beyond that basic, stable rate? The financial institutions are very keen on markets. But they are also keen on predictability, so if they get a subsidy which is guaranteed for 20 or 25 years, they will take it as if they had never eaten before. That is why they are so worried about the predictability of support schemes. They like subsidies. The hedge funds and private equity therefore launched into wind and solar at the beginning, because they were looking for around 15%—they gave us these figures—and they are now a bit shocked if the return is below that.

There are also some new constraints for financial investors on the supply side: first, their stakeholders tend to want to ration funds according to the target sectors. So there is a new constraint: “Don't spend more than X on the energy sector”. Secondly, they say, “Tell us exactly how long we can be absolutely guaranteed the rate of return you promise”. Hedge funds and private equity seem to be withdrawing somewhat as they see that the whole process of government support to renewables, for example, was meant to be a one-time major investment, not a permanent subsidy. On the whole now, the real issue is getting the long-term institutions to re-engage with the energy sector, which for the moment they are reluctant to do, partly because the rate of return expected of pension fund managers seems also to be around 15% risk-free. There is a degree of disconnect from reality here.

Lord Renton of Mount Harry: But do you not in a sense expect that all to be so at the moment? That is on the view that there will be change and it will become a belter, then suddenly it would go down from 15% and then to 8%. In a way, that is what life is like.

Philip Lowe: I think you are right. It was interesting that recent reports on the Spanish situation are that there has apparently been a recovery of inward investment into Spain. Even though the risk premium in Spain is very high. But ultimately, if there is no alternative to going lower than 15%, they will take it.

Lord Renton of Mount Harry: When you are in an area like this, where there is risk but also potentially a lot of money, it is always going to be overdone one way or the other. That is life.

Q266 Lord Whitty: We have been comforting ourselves that €1 trillion is hardly here nor there over the next 20 years, given the size of the GDP. However, given all these constraints and uncertainties, and the overlaying of the financial crisis, do you think £1 trillion is deliverable?

Philip Lowe: There are several preconditions for money to start flowing again, of which the two major ones are, first, the economic recession and, secondly, stabilising sovereign debt. Then you get into the more specific micro obstacles. I noticed that one of your written questions refers to transmission systems of the operators themselves being an obstacle to getting the money. I cannot believe that. The National Grid went to the market about two years ago and the reaction of the market to the National Grid, as far as I can remember was, “Oh, you never told us that you would need more money. You are just supposed to provide a dividend”. I think we are getting back to some degree of normality in the relationship between the financial sector and energy, where energy remains one of the most attractive destinations for long-term investors.

Q267 The Earl of Caithness: Can I ask you to say a little bit on your plans for shale gas? What are your plans and are you proposing a communication or draft legislation?

Eric Mamer: There will be a framework proposal by the end of the year to look at all the conditions under which the exploration and exploitation of shale gas, from the point of view of the environment, climate and energy policies, can be carried out in a sensible way. The important dimension is to see that it is not environment, climate or energy that is in the lead but that it is really a common effort. My Commissioner’s position on this is extremely clear. He recognises that there are considerable environmental aspects that need to be taken into account but that Member States should definitely not close the door to the possibility of future shale gas extraction if the conditions from all those different perspectives are right. We are not saying that they are necessarily at the moment. We are not saying that no extra work needs to be done in terms of ensuring that the exploration and exploitation can be done as safely and with as minimum level of environmental consequences as possible.

It is also a relative question. You need to look at shale gas not only on its own but also compared to other sources. We were discussing coal for quite some time. It would be ridiculous to continue burning coal and, at the same time, saying that shale gas is entirely out of the question. We have to put things in balance. Our proposals, I think, will come out in the second half of the year.

Philip Lowe: In answer to your question as to whether it would be only ideas or legislative proposals, we are actually in the stage of impact assessment for the moment. This assessment is based upon the results of five different studies: on environmental impact, on climate change impact, on whether we need extra regulation to cover exploration of unconventional gas beyond the existing hydro-carbons directive and on trade impact. So the Commission is taking shale gas seriously. Our Commissioner is rather keen that Europe should take a quite positive attitude to the development of indigenous shale gas. However, it has to be recognised that the conditions in Europe are substantially different from those in the States.

The Earl of Caithness: Given those conditions, and the potential regulation which will inevitably surround any extracting of shale gas, in whatever form it comes out of the ground,

what is the potential in Europe for the development of shale gas and are we not threatened with being left behind by the rest of the world? We are already left behind by America; when China and India get going, will we not be the expensive energy part of the world?

Philip Lowe: The companies most active in exploration and in calculation of both technical and commercial exploitation of reserves are US companies. They saw considerable potential in Poland and France. After the initial explorations in Poland they came out with rather sober conclusions about the commercial benefits of extraction. France and Germany, potentially, will have to assess very carefully whether they are prepared, as Eric says, to balance the benefits and costs of exploitation against the benefits and costs of exploitation of other sources of energy. If we do not have any indigenous source of gas in Europe, it would be an illusion to think that the additional supplies either from east Africa or America are going to fundamentally change the costs of energy—certainly of gas—in Europe. This is because pipeline gas from Russia, Norway and Algeria remains the predominant and most economical source of gas. Norwegian companies have shown a considerable degree of flexibility on price and conditions in relation to world trends. I think industrial consumers in Europe are satisfied with that. Gazprom is less willing to envisage that degree of flexibility but it is moving in the same direction. What is the alternative? The Commission's impact assessment on shale gas would certainly enable Member States that have moratoria to look again at the situation if there is indeed considerable potential.

Eric Mamer: The debate is also about whether it is the right time to start exploiting it if, at the same time, you have shale gas exploitation right across the world which is having a positive impact on gas prices. Perhaps it is not to the extent that we would necessarily like, but nevertheless it is exerting downward pressures on gas prices. We can keep our reserves until another point in time. There is also another policy option on the table, and in that sense there can be a debate.

The Earl of Caithness: Another policy result of that is that Germany just becomes the dumping ground for cheap American coal, which does not do our climate any good at all.

Eric Mamer: No, it is true that that is a worrying development, but as you quite rightly said yourself, would we be extracting shale gas in Europe under the same economic conditions as in the US, and therefore would European shale gas attract the same extremely low price as we could get for imports from the US? That is a very debatable point, and it is why we are so interested in the current and ongoing debate in the US about the possibility of it exporting shale gas to the EU.

Philip Lowe: Shale gas in the US is exploited with the benefit of oil recovery. Having seen the analysis we have made, I would be cautious. The general expansion of LNG volumes outside the European Union will certainly have a positive impact on the competitiveness of gas in Europe and the exploitation of indigenous resources could be even more positive. However, the Commission has its impact assessment in progress. It has just held a debate on competitiveness and has identified electricity prices as one of the major key issues. It will have to come up with some proposals that reflect the general concerns about security of supply and competitive pricing.

Q268 Lord Renton of Mount Harry: On a totally different subject, I understand that the Commission included in its 2013 Work Programme a commitment proposing a climate and energy framework all the way for the period up to 2030. Is that going ahead, and if so, when is it likely to appear? Presumably the major purpose of this is to make potential investors feel more secure.

Philip Lowe: What is referred to as the Climate and Energy Framework is in fact the Green Paper which we will produce by May. In fact, the target date for adoption of the Paper by the Commission, according to our President is 27 March, so that the Environment and Energy Informal Councils which will be held at the end of April can take a look at it. In May, the European Council may adopt some preliminary conclusions on the options for the way forward.

Eric Mamer: If I may just add, there will be an orientation debate before that, although it still has to be confirmed. The way we are proposing to move forward in terms of a two-step approach will be, first, a Green Paper that will be the subject of a public consultation followed by proposals either of a legislative or a non-legislative nature at the end of the year. This is something that needs to be agreed by the College.

Philip Lowe: That is right. They will have an orientation debate at the end of February, and then if the President's instructions to us are clear, we have to produce the Green Paper by the end of March. There will then be the opening of the public debate on the package, and we should be producing proposals in the autumn.

Lord Cameron of Dillington: So the publication of your report will overlap a bit with the timing of our report. I wonder if there is any possibility that we could see a final draft copy—in secret.

Philip Lowe: Contrary perhaps to Whitehall, the Commission is pretty transparent, intentionally or unintentionally, so I am sure that your secretariat will get access to a copy.

Q269 Lord Renton of Mount Harry: Is it too hopeful to think that it will be possible to arrive at a consensus among Member States on the future framework?

Philip Lowe: It was a much easier debate in 2008. I have a rather bitter memory of that year because at the time I was in charge of rescue aid to the banks. However, that is for another Select Committee; in fact, I have talked to it about it. All three of the elements to which Eric has referred, competitiveness, security of supply and attention to sustainability issues including climate change, will be important in this debate. It will not simply be a debate about how we save the world.

On the different views among Member States, as we referred to earlier, there are obvious differences in the capacity of each Member State to move towards an objective that is not only in its own interests, but also contributes to the collective objectives. In 2009, it was quite difficult to achieve a consensus on what the contribution would be in terms of increases in renewable energies. You will remember that the UK Prime Minister signed up to an objective at the national level which others regarded as too ambitious at the time. It was presented in the tabloid press as a target being imposed by Brussels and I think that the same arguments will arise over CO₂ emissions targets. Notwithstanding the European position as a whole, which is that developed countries have to make the greater effort in combating climate change, there will be a substantial degree of divergence among the countries that are catching up economically compared with those that are already mature. There will also be influences in terms of the speed of their capacity for change. The eastern European countries made major contributions in the initial instance by closing down a lot of industry that was heavily polluted, but in order to support their economic growth, they need to develop new capacities. That is important.

On energy efficiency and making better use of energy, our view would be that people should be less worried about burden sharing because everyone needs to do it. It is in their own interests as well as Europe's. We need to double our efforts in that area. There will be a

very difficult debate on energy, but I am sure that the high priority being put on it will unite in many ways the 27 or 28 Member States, including Croatia, as opposed to financial issues which somewhat divide them because of the differences for example between the eurozone countries and the others. National debates in all our countries are more or less converging on the same issues. Some time ago there was talk about cheap nuclear electricity in France, until it was discovered that in fact the nuclear fleet would have to be renewed and that costs money...

Eric Mamer: I am not sure that the message has gotten through entirely.

Philip Lowe: Not entirely, but the French Court of Auditors has certainly made it clear.

Lord Renton of Mount Harry: And it will come up towards the end of March?

Eric Mamer: The Green Paper will simply launch the debate. A lot will depend as well on how the questions are set in the Green Paper. It all depends on whether the onus is put on, simply, the reintroduction of an approach which was decided before the economic and financial crisis. In which case the answer to your question is that it would be very, very difficult to get an agreement among Member States on binding targets. But if the Green Paper correctly shows that the objective is to reconcile the objectives of climate change targets in a fashion which is economically sustainable, including for those countries, as Philip was saying, that will have a harder time—which are perhaps growing more quickly for the moment but also have less means to invest in these technologies—then we have a better chance. The trick, in my view, is really to make sure that we do not oppose the two goals, and that we find ways of setting the targets and sharing the burden in such a manner that none of the Member States has a feeling that they are losing out.

Lord Renton of Mount Harry: In a word, you want to seem fair.

Eric Mamer: Yes, to seem fair and efficient, from an economic point of view.

The Chairman: I suppose that we should push on to innovation.

Q270 Lord Maclellan of Rogart: We heard in the field of agriculture some time ago that innovation could greatly add value to the industry. We wonder if innovation in the systems for delivering energy could have a comparable effect in promoting efficiencies in different parts of the supply chain. If that is theoretically possible, how could the Commission help to make it practically achievable?

Philip Lowe: As to new technologies and their application the strategic priorities set out in the new Infrastructure Regulation are not limited to specific network improvements such as the North Sea grid or the South-West, North-East electricity corridor. There is a clear priority for smart infrastructures, including smart meters. The aim of the Regulation as I have said previously to facilitate both public and private investment. We have proposed in the European budget, as well, a so-called “Connecting Europe” Facility with the aims to use European funds for projects which strengthen security of supply and/or competitiveness and are innovative. There is a definite push towards the smarter end in the application of existing technologies under the existing Framework research programme 7, we also have a programme called “Smart Cities and Communities”, which is, encouraging consortia of industry to link up with cities to promote the most innovative ways of using energy, water and transport, in a way which is most sustainable and cost-effective.

Lord Maclellan of Rogart: Have you had written responses to these proposals?

Philip Lowe: The “Smart Cities” initiative has already been the subject of a call for tender, and a number of consortia have already chosen this activity. Just to put this into perspective,

in Europe there are about 300 projects for integrated use of energy, transport, water, et cetera. It is quite a fertile field for development. You know, we have something which is much lighter called the Covenant of Mayors, under which 4,000 cities have committed themselves to achieving and going beyond the 2020 objectives for sustainability of projected emissions and increased energy efficiency. It is not controlled by us; the cities have just developed their plans on their own. Grenoble, Birmingham, Dublin, everyone is in there looking for the very best ways of using resources. Beyond that, the research and development programmes of the European Union in the energy area are covered by something called the Strategic Energy Technology plan, which was agreed between Energy Ministers two years ago. They agreed that national and European resources should be devoted to certain key areas. One is smart networks and grids, and another is storage technologies. A third area is second-generation biofuels, to get away from those biofuels which are causing land-use issues. There are several other areas, but those are the main ones. We will be producing a paper updating that plan in the first half of this year. It has a nuclear element to it—primarily related to safety issues but, nevertheless, it has a nuclear element. Our general impression from this area, beyond issues of system technology and advanced biofuels, is that we are not exactly looking at new technologies but the innovative application of these technologies in an integrated way.

Eric Mamer: Their dissemination.

Philip Lowe: Here it is a question of getting the right mix of what is happening at a corporate level, at national level and at the European level. There is no monopoly in the support for individual schemes for support for innovation.

Q271 Lord MacLennan of Rogart: Can I ask a related question that is perhaps slightly off the wall? Where do you get the advice from in these matters? It is mostly highly technical stuff. Do you have advice coming from sources that are not in some way committed commercially to selling something? Do you have independent, scientific technological advice that you can draw on?

Philip Lowe: I will have to go a bit into the plumbing of how it is done.

Lord MacLennan of Rogart: It is very interesting to me.

Philip Lowe: It is not very different from what happens at national level. We have in the Commission, for example, a research and development directorate-general, a directorate-general for information technology—DG Connect—and ourselves (DG Energy). I will just limit myself to those three for the moment but they are not the only ones concerned. Naturally, any programme that the research and development directorate produces is overseen, certainly by a committee of national representatives but almost always by a combination of independent researchers, commercial interests and government interests. This is virtually the same mix that we have in our areas. We share with the research and development directorate-general the management of support to energy technologies under the European budget. We do that more or less half and half. We do it with about a third of the staff that they do it with, to answer the question, but that is another argument we can have.

In addition, on the information technology side you can imagine that the word “smart” is virtually in front of everything they do. They are very much our partners in that. I fully understand the underlying question here: how partial is the advice that you get? Take the example of smart grids. We have a taskforce on smart grids that has this tripartite element to it (independent experts, commercial interests and Governments). We also have experts

on data privacy and on interoperability. And we have experienced standard-setting bodies (CEN, CENELEC...). Ultimately, we have to produce interoperability standards and that has to start with the identification of the most acceptable standards. So you can imagine that the commercial interests involved are very strong. Sometimes that has worked very well in the history of the European Union, for example on GSM standards for mobile phones. In the area of smart meters, there has already been some substantial progress on certain functionalities. Data privacy is a much more difficult issue to deal with.

The general complaint I hear as director-general from experts outside is, “You have too many expert groups around and too much advice, and you waste our time because if we are going to come to Brussels we have to do something serious and not just stand around listening to our colleagues. We have heard them before and we do not know what to do about them”. As I understand it, that is the general Babylonian impression of Brussels: that it is full of experts sitting there in working groups talking about the number of angels on the head of a pin. At the other extreme officials can also be accused of making proposals in an ivory tower without a proper consultation process. But I honestly do not think that is true in the energy area, where a lot of people advise us on technological issues such as renewable energy. In the area of smart systems that allow interconnection and chips in appliances for you to optimise the way in which you use energy in the home, these things are being discussed every day here with a wide range of experts. They are very interesting and offer huge potential. Probably the world would be definitely poorer if they did not exist, but on the other hand the general criticism is, “What is all this with people talking together? Does it produce anything?”

The Chairman: That is quite a thought there. We have two more questions. We have Professor Grubb here. It might be wise to go through, at a steady pace, the next two questions and then, if we may end the formal session, perhaps while Professor Grubb is here we could ask him to interact a little bit. He is only one of the experts you referred to but it might help.

Q272 Lord Whitty: Just to take you back to interconnections because you touched on that here and when we were in London, I think you said that there were problems about getting more interconnections or using current ones properly because of the attitude of national regulators. We also had a view that this was the transmission operators’ problem, rather than one of regulation. You mentioned the French and Spanish connection—or somebody mentioned it today. What are the real barriers to more interconnection and the efficient use of interconnection in current and immediate circumstances? What is the overall supergrid ambition of the Commission in relation to creating a fully interconnected European market, or at least interconnected submarkets?

Philip Lowe: First, interconnection is not an objective per se, but the reality is that a larger network usually offers more security of supply, more choice and more flexibility in all circumstances, particularly when you have intermittency in the system with renewables. As I mentioned in London, the percentage of interconnection capacity compared with generation capacity varies considerably in the European Union. It is probably the lowest as far as the UK and Ireland are concerned, primarily because they are islands. Connections with the Continent are being strengthened but interconnection is still relatively low compared with the degree of interconnection, which is up to 20% or 30% between Belgium and the Netherlands, and Germany and elsewhere.

With regard to the obstacles to interconnection, I disagree with those who say that the transmission system operators are presenting major obstacles. There can of course be

commercial disputes between them—these are the people who are making money out of transporting gas and electricity. Given that gas, for example, is not indigenously produced but brought in from elsewhere, it would be unlikely that anyone would want to frustrate the transport of gas; they want to promote it. Our national regulators are of course co-ordinated at a European level through a new agency ACER. But national regulators are in the end paid to optimise the benefits to national consumers. It is the purely national focus of cost-benefit analysis that causes some degree of creaking in the works. I think I told you in London about a project to invest in a compressor in the north of Germany so that the gas into southern Denmark could be increased. In this case the German energy regulator (Bundesnetzagentur), said that the maximum rate of return that the transmission system operator could earn on the project should be limited because there was not much benefit to German consumers. As is already the reality in the Nordic area between Sweden, Norway and Denmark, what we need is a combined analysis of the costs and benefits on both sides of the borders, and an indication of who pays for what according to the benefits that are to be achieved. That is and has been the major regulatory obstacle from the point of view of the Ofgems and the Bundesnetzagenturs and the others.

The second regulatory aspect is the permit-granting issue, where there has to be some degree of compatibility and symmetry between the timetables of those approving something on one side of the border and those approving something on the other. There have been frequent examples where one Government and one set of authorities have gone ahead but the whole project cannot go ahead because there is slow progress on the other side. Those are the two major obstacles. I do not rule out that there are also commercial disagreements between the TSOs themselves, but to say that it is predominantly their fault is not true.

Eric Mamer: You also have public acceptability issue in certain cases. When you think of the links between France and Spain across the Pyrenees, it is clear that the regulatory—

Lord Whitty: Is that public acceptability or EDF acceptability?

Eric Mamer: No, it is public acceptability. People were dead against anything that would cross the Pyrenees above ground. Therefore, in the end they are now building connections below ground, which are seven times more costly.

Philip Lowe: You are right that it is not the transmission systems operators, it is the suppliers who have commercial interests, and they are not particularly interested in increasing the interconnection capacity if it means the door will be opened up to another competitor.

Eric Mamer: But if you have a higher share of renewables it is going to become unavoidable anyway for everyone so that will play in favour of more interconnectors. That is a medium-term development.

Q273 Lord Whitty: You are saying that interconnection is a means rather than an end. There are concepts within the DG of supergrids and regional supergrids in the north-west of Europe, for example.

Philip Lowe: As you know, there is an organisation called the Friends of the Supergrid. They are all very enthusiastic about and do good work. But when it comes down to it, you do not create a grid by starting off building a massive grid. You start it off by building one spoke and one axis of it and you have to justify each incremental part of it. What we are developing in the analysis of these projects is a criterion that any part of a potential scheme, such as the North Seas Countries Offshore Grid Initiative, would be 'grid-ready'; that is, capable of being part of something bigger. You are completely right that there are one or two gurus, who are

colleagues, who draw lines across maps. You have to have some vision of what the potential is. But the reality is you have to start off from smaller projects which make sense of the ground.

Lord Whitty: Incremental not Napoleonic.

Philip Lowe: Incremental, with some overall vision; that is you must ensure that you know what grid-ready means: is it possible to join up the connecting lines of the wind farms on the north-east coast of the UK with those for wind farms linked to the coast and optimize use of the combined generation and transport capacities? There are some quite interesting studies on this. They are going quite slowly for the North Seas Countries Offshore Grid Initiative. But in the context of the continental schemes, for example, north-south connections in electricity from Norway down through Germany to the south, this is a very serious project and requires sections of it to be done in stages. All this is going to happen but it is not going to happen in one great lump; it is going to happen by a lot of people doing a lot of things, with people being proud of achieving one bit of it.

Eric Mamer: Perhaps one further comment. It is not only a European problem; it is within Member States that you have this sort of issue. Germany is a case in point.

Q274 The Earl of Caithness: Can I just follow that up, because we received evidence not long ago that Norway was going to introduce primary legislation that would make interconnection much more difficult. Have you heard of this?

Philip Lowe: That would be surprising.

The Earl of Caithness: It surprised us. It was one of our suppliers.

Philip Lowe: I attended a conference of the Norwegian federation of Industry a fortnight ago. I spoke after the Prime Minister as well as with the president of the IEA. One thing that the Prime Minister particularly emphasised was the strengthening of interconnections, both to Germany and the UK, which are two major projects. It may be that detailed aspects of the regulation will need to be looked at. But I had a meeting on these issues with our colleagues in the Norwegian Economics Ministry, and that was not raised as an issue. Perhaps they did not want to raise it. I will take note of what you said and see what we can find out. At the moment, on the contrary, Statnett, which is the Norwegian transmission systems operator and is public, is promoting these projects very substantially.

However—I now remember what this is about—several operators would like to lay down merchant lines or private lines. At the moment, Statnett has persuaded the Norwegian Government that it should have the exclusive right to the interconnectors. I am sorry that I did not pick that up at the beginning, but that is what it is about. I talked on the same day to Statnett about it, and it said that it was extremely difficult to carry out a cost-benefit analysis for both ends of the interconnection without an overall view about the development of the grids around the North Sea and Norway. Statnett's view is that this cannot happen unless it is involved. Whether that involvement means that it should have an exclusive right to carry out the investment is the issue to be raised. Sorry to react so late at first. That was what it was about.

Q275 The Earl of Caithness: I have two quick questions for you. One relates to the definition of renewable energy, something that we seem not to have got quite to the bottom of. When you and Member States are looking at this issue, does it include biogenic and non-biogenic municipal solid waste, or does it not?

Philip Lowe: I was quite intrigued by this question which you submitted earlier. The definition of renewable energy in the 2009 directive does not explicitly include solid waste. The renewable energy directive defines “energy from renewable sources” as meaning “energy from renewable non-fossil sources, namely wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases”. It is specified that “biomass” means, “the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste”. Apparently, according to the directive—and this is legislation decided by our Member States and Parliament—individual Member States can define other forms of energy as renewable. However, for statistical reporting purposes, any additions are not counted in the assessment of their contribution to the agreed renewable targets. However, that does not mean to say that it could not be supported, even under our research programmes, if there was a viable product.

The Earl of Caithness: But it would be reported separately.

Philip Lowe: Yes.

Q276 The Earl of Caithness: My third question, so that I am clear on this, goes back to the timetable. You are producing the Green Paper and aiming for legislation by the end of the year. Is that agreement on legislation, given that you are going to have a new Parliament and so on? When is going to be the end date for getting the legislation down?

Philip Lowe: First, as Eric has emphasised, we still have to get the confirmation of the College of Commissioners that they agree with the concept that there should be legislative proposals before the end of the year. I assume that that is the case, because the end of this year is effectively the last moment at which legislation could conceivably be looked at by the European parliamentary committees before the break-up of the parliamentary term before the election in April or May. Making legislative proposals any later than the end of this year would infringe on the prerogatives of the European Parliament and the new Commission. That is why there is some degree of urgency among a number of Commissioners, including the President, that if anything is going to be done it has to be done this year. If we miss that target, it is quite clear that there would be a considerable degree of delay before any final adoption of the proposals. And even if there were legislative proposals by the end of this year, it is still rather difficult to imagine that the new Commission would be willing absolutely to put them into effect—to agree with them at First Reading or Second Reading at the Parliament and Council in the autumn of 2014.

Eric Mamer: I think that the new Commission will have to reconfirm anything. That is the understanding with the Parliament. But if a piece of legislation has not been adopted by the end of the legislative period, although from a legal point of view the new Commission could simply carry forward, my understanding is that the proposal as it stands is supposed to be reconfirmed, so that will take some time as well.

The Earl of Caithness: So if it is not done by the end of the year, we are looking to 2015 at the earliest for this?

Eric Mamer: Yes, but I think that the point is really sketching out in detail what the Commission thinks would be the right way forward. It is a policy debate. Then indeed it would be important to have proposals that fleshed things out, but the real question is whether it is possible before the end of the year to give stakeholders a clearer vision of what

the Commission believes should be the way forward up to 2030—and, by the way, whether 2030 is the right timeframe.

Philip Lowe: A lot of stakeholders will ask we want to get legislative approval on post-2020 measures as early as 2014 when there are six years to go before 2020 and we do not even know whether we are going to achieve the 2020 targets, and we do not know what the market developments will be in the meantime. So there will be some pushback in the other direction. On the other hand, as Eric mentioned, the precision and strength with which the Commission puts something on the table is aimed to reassure everyone that there is a sense of direction, and that despite the uncertainties, but this is more or less the way forward. This strategic vision beyond 2020 will accompany the implementation of national policies. For example, if you look at the UK Government's proposals and legislation in progress at the moment, in practice they will not be implemented until 2016-17 in any case, and the same is true of some of the other proposals made by other Member States. The important thing is to update the strategy that was originally there in 2008 and national and European decisions are grounded on broadly on the same analysis. **Eric Mamer:** To add one thing on that, this is also linked to the debate on structural measures for ETS, even though those structural reforms are supposed to be aimed not at 2030 but at 2020. So you can see that it is very much about ensuring that we give out a coherent message about the different tools that we have and how they are working now and will work in future.

Philip Lowe: We should be clear there that the legislative proposal resulting from the Green Paper will include whatever is to be done on ETS.

Eric Mamer: Yes, exactly. We made sure that those two debates were taken together, even though in terms of timescale ETS structural reforms have to come before anything linked to 2030.

Q277 The Chairman: That is tremendous, thank you. We have come to expect a high degree of learning and insight from you, and we have certainly achieved that today. It has been a bit of a marathon but we are very grateful.

Philip Lowe: I hope it has not been too tiring.

The Chairman: Not at all; on the contrary, I think that everyone has been very stimulated. I thank you, and formally close the meeting.

European Economic and Social Committee (EESC)—Written evidence

Energy's contribution to economic growth

- I. The EESC acknowledges that the **Energy Roadmap 2050** sets a scenario-based policy framework for the substantial decarbonisation, security of supply and the competitiveness of the energy sector in Europe by 2050.
 - I.1. The decarbonisation of the European Union's energy system can be a competitive asset in the medium and long term.
 - I.2. The energy transition will provide opportunities to breathe new life into the European industry's value-generating activities and will help to review more sustainable ways of production and consumption.
 - I.3. The connection between competitiveness and research and innovation needs is important to the EESC. In this respect, additional investments will boost growth once a coherent and consistent market framework across Europe is in place, where particularly the collaboration between Member States, support for smaller business and clean technology development should be encouraged.
2. How can energy drive economic growth?
 - 2.1. The Committee acknowledges the need for **changes in the energy production mix** of the Member States and of the move away from fossil fuels, as those put the EU in a financial and economic dependency situation, being exposed to the highly competitive and volatile global energy market.
 - 2.1.1. Economically, the cost of renewable energy has constantly declined but remains more expensive than conventional methods.
 - 2.1.2. The EESC is convinced that the transition to local sources of low-carbon energy will be less costly for Europe than the maintenance of an energy system dependent on imports.
 - 2.1.3. A system of dispersed energy sources will stimulate the local economy and job creation while simultaneously making the public more energy-conscious. The transition to a low-carbon economy must promote the development of new 'green' jobs, as employment in the conventional fossil fuel production and distribution cycles will decrease.
 - 2.2. The Committee asks the European Commission and Member States to address without further delay the current failure of **ETS** to provide stimulus to a massive expansion of new greener investments in Europe.
 - 2.2.1. In the short run this could lead to energy price increases and extra costs for consumers, businesses and governments.

- 2.2.2. In the long run the consequent implementation of a reformed Emission Trading Scheme (ETS) will make the EU economy more resilient and competitive in the world than the business as usual approach would.
- 2.3. **Energy efficiency** is linked to competitiveness, security of supply and combating climate change.
 - 2.3.1. The Committee is aware of the fact that energy efficiency is a promising business sector. The EESC believes in the virtuous combination of the commercial interest on the one side, and the low-carbon impact on the other side: the massive roll-out of energy efficiency products services will help slow down the rate at which finite stocks of fossil primary energy sources are used up and will influence their price and thus promote sustainability.
 - 2.3.2. The EESC suggests boosting the role of the Energy Efficiency Fund in terms of sources and the criteria for awarding funding.
 - 2.3.3. Energy Efficiency is not very sensitive to price signals, which means that other policy measures are needed to impose and enforce higher energy efficiency standards.

A common EU approach to transforming the energy system

- 1. The Committee agrees that the majority of challenges and opportunities identified in the Roadmap are to be addressed at a **European level**. It also recognizes that the objectives of a common energy policy can only be pursued insofar they are fully consistent with the operation of the internal market and compatible with environmental protection. The integration of a European energy market is not an objective per se but **an essential means** of realising overarching goals such as competitiveness, security of supply, and the sustainable use of limited energy resources.
- 2. The EU must avoid all market distortions and offer a platform for **exchanging best practices** and **capacity building**. Moreover, the EU instruments for financing energy efficiency projects must be applied.
- 3. **Burden-sharing** will be an appropriate approach in order to achieve the overall decarbonisation goals that need to converge in firm and coherent European action.
 - 2.1. The EESC is well aware that the energy situation varies greatly between EU Member States, which means that for some the decarbonisation goal will ask considerably more efforts than for others; the recent example of the Polish reservations against some of the Roadmap objectives has illustrated the resulting differences in policy approaches.
 - 2.2. The Committee sees the establishment of burden-sharing principles and cost allocation of large infrastructure programmes between countries as necessary requirements in the transformation of energy systems. It has therefore granted its full support to the Connecting Europe Facility proposal of the European Commission, that is currently still under legislative negotiation.

3. Across Europe, energy has too often been portrayed as an issue of purely national interest and national independence. However, the interdependence between Member States in the field of energy has never been so strong in political, economic and technical terms. The EESC has suggested the creation of a fully-fledged **European Energy Community** and the set-up of a **European civil society forum on energy** as constructive steps for progressing in concrete terms towards the goal of Europe's sustainable energy future.
 - 3.1. The foundation of a mutually beneficial European Energy Community can be a trigger for the much needed strong European action in areas such as energy efficiency, innovation, market integration, harmonizing fiscal measures and incentive systems, reform of the ETS, and coordinating plans for integrated Europe-wide smart grid and energy storage systems. Sovereign choice about energy supply and a consistent European energy policy are compatible and achievable only in this context.
 - 3.2. This integrated European Energy Community, if established early enough, can guarantee that the transformation is driven forward co-operatively. In the meantime, regulators and energy operators in the Member States should be strongly advised by the European Commission to establish effective co-operative mechanisms, such as ACER that still has to mature its working methods.
 - 3.3. The EESC recommends the set-up of a European civil society forum to discuss the key issues of the energy transition. The creation of a European Energy Community, which should comprise this forum, would allow all stakeholders to focus on both the concrete and strategic dimensions of energy and on the changes that are required for achieving the aims outlined in the Roadmap.
4. There is a need to assess how the costs of energy efficiency measures are passed on to consumers and to mitigate the repercussions so that it does not become more difficult for consumers to access energy.

The internal market in Energy

1. The EESC suggests that groups of Member States from a particular geographical region coordinate their respective energy mixes, infrastructure and market rules in order to share benefits of the various sources of energy at their disposal. **Inter-connection and harmonization** would improve the resilience of the fragmented national markets to fluctuations in production and consumption, and would help ensuring security of supply.
2. Through the above-mentioned **European Energy Community** European action in the area of coordinating plans for integrated Europe-wide smart grid and energy storage systems could be achieved. (cf. supra)
3. **Burden-sharing principles** and cost allocation of large infrastructure programmes between countries play a great role in the transformation of energy systems (cf. supra).

Reducing the costs of energy for business and consumers

1. The Committee calls for the **protection of consumers and businesses** from the impact of higher energy prices and from unfair competition from regions outside the EU

which are not subject to the same legal constraints. Structural funds can be helpful support schemes but are not intended to create unequal competition between countries and regions internally.

2. It is essential that Europe's civil society is fully involved through structures and permanent dialogue on all strategic plans discussed at EU level. The **involvement of all actors concerned** will legitimize the move to a low carbon economy and the part that everyone will have to play.
- 2.1. Experience shows that communities can be brought to accept the need for change and the costs involved in transformations if they are fully engaged, do not believe themselves to be disadvantaged, and can see and accept the reasons. The national governments have to play their part in the development of tools that let all parties concerned participate in the changes, as well as clearly set and explain the objectives and steps.
- 2.2. Launching a broad information and awareness-raising campaign about the various transition options, the central role of infrastructure and new consumption behaviours is also suggested by the EESC as it appears essential for obtaining public acceptance. Consumers must be convinced of their role in a lower carbon future, and cooperative partnerships with the public sector as an important agent of change should be encouraged.
- 2.3. The EESC suggest that the European Commission monitors the strategies of Member States to guarantee consumer interests and the implementation of low-carbon technologies based on cost-efficiency.
- 2.4. Local ties are important in the involvement of the public, and the Committee recommends giving firm support to local and regional initiatives, as these are often innovative, devolved and democratic.
3. The EESC has suggested the creation of a **European Energy Community** and the set-up of a **European civil society forum on energy** to fully engage civil society (cf. supra).

Gas

1. The Committee wants to stress the fact that the development of shale gas may carry significant **environmental risks**.
2. The EESC suggests a **detailed stock-taking** of the EU's internal gas resources.
3. Gas can be used as a **temporary substitute** for the most polluting sources of energy, but should have a limited role as a transition fuel on the road towards more sustainable low-carbon energy sources.

Research and Innovation

1. The EESC stresses that **early progress** can accelerate the introduction of new technologies, lower their prices, avoid expensive new investments in short-lived carbon-intensive plants and generate momentum for the necessary changes.

- 2.1. Investments in clean technologies can offer a competitive advantage in the global race for leadership in the field of a green and low-carbon economy.
2. The EESC therefore welcomes the Commission's initiative to establish and promote **European innovation partnerships (EIP)** under the Innovation Union flagship initiative, which are geared towards organising the European research and innovation cycle in a more effective way and reducing the timeframe for innovations in the market.
 - 2.1. In order to conserve human resources and not waste time and money, in future consideration should be given to achieving a higher degree of effectiveness. To this end, measures must be better coordinated, evaluated regularly and implemented consistently.
 - 2.2. There must be close ties with stakeholders at national, regional and local level with a view to taking account of particular national and regional features. At the same time, the importance of the global dimension of current challenges must not be overlooked.
3. The **SET Plan** submitted by the Commission deals with the main current measures aimed at achieving the vital, linked objectives of climate protection and security of energy supply and at maintaining Europe's international competitiveness. The Committee fully supports the proposed investments and measures and the underlying assumption that no form of low-carbon energy can be excluded from the future European energy mix.
 - 3.1. The Committee is, however, extremely concerned that the expenditure this will require from the Commission, the Member States and private industry is still massively underestimated. The Committee therefore recommends appropriate financing plans supported by the Commission, the Member States and industry be drawn up. Until then other sources of financing should be mobilised.
 - 3.2. In order to allow the Commission to perform its coordination function efficiently, appropriate R&D programme structures should be established by agreement with the relevant stakeholders. For its part, the Commission needs experienced, internationally recognised and committed experts who are active in their areas of specialism and who are fully committed to the success of the programme which they are coordinating.
4. The EESC asks the European Commission (EC) to continue to back the activities of the existing **European Technology Platforms** (ETPs) and improve exchanges both among themselves and with the relevant European institutions.
 - 4.1. ETPs can make a major contribution to implement European policies. Specific priorities have been defined to boost innovation in the public and private domains. Examples are the Resource and Energy Efficiency in Process Industry (SPIRE), the Smart Cities (jointly with the SET plan) and the EMIRI (Energy Materials Industrial Research Initiative).
 - 4.2. The EESC congratulates the ETPs on their role, as a link to demand-side innovation tools which complement Research & Innovation (R&I) actions and accelerate market up-take. ETPs are also key to the deployment of R&I results.

3 October 2012

European Investment Bank—Oral evidence (QQ 157-170)

Evidence Session No. 7

Heard in Public

Questions 157 - 170

WEDNESDAY 12 DECEMBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Giddens
Lord MacLennan of Rogart
Lord Renton of Mount Harry

Examination of Witnesses

Simon Brooks, CB, Vice President responsible for the United Kingdom, European Investment Bank, **Nicholas Jennett**, Director, New Products and Special Transactions Department, European Investment Bank and **Cheryl Fisher**, Director of Energy, Projects Directorate, European Investment Bank

Q157 The Chairman: Mr Brooks, thank you very much for doing this for us. We have Ms Fisher and we have one more, I think.

Simon Brooks: Mr Jennett.

The Chairman: Mr Jennett, thank you. First, I thank you for doing this. We are very keen to hear your views and we are grateful that you have taken the time to give them to us. Perhaps I may just deal with the formality first, which we have to do. You should have received from us a list of interests that have been declared by Committee Members. To remind us, this is a formal evidence-taking session of this Committee. We will take full shorthand notes and they will go on the public record in printed form and on the Parliamentary website. We will send you a copy of the transcript and you will be able to revise it in terms of minor errors. Finally, this session is on the record. It is being webcast live and will be subsequently accessible via the Parliamentary website.

I do not know how you would like to do this. I do not know if you would like to make a general positioning statement. We were discussing this earlier. Perhaps you would just help us with one thing we are unclear on, which is what the source of funds is for the EIB and then perhaps take some general points before we go to the questions.

Simon Brooks: Lord Chairman, certainly I will do that and, if I make a few opening remarks, I think that will become clear. It might help you and your Committee if I just mention briefly who is present with me. As you said, Mrs Fisher is here. Mrs Fisher is Head of the Energy Department of the European Investment Bank and she is in charge, in particular, of the

technical appraisals of energy projects but also our policy position relating to our energy lending. Mr Jennett, who is also with me, is a specialist on the more innovative forms of the financial products that we are able to offer and some of your interests, I think, will call him into play.

Lord Chairman, as regards the European Investment Bank, as you know, it is a public sector bank owned by the Member States of the European Union. The UK owns 16% of it. It exists to pursue the agreed objectives of the EU Member States at an EU level. The funding, which was a point you asked about in particular, comes from our borrowings on the international capital markets. So our equity is provided by the Member States, but all the loans we make are financed by borrowing, as I say, from the international capital markets. We are a triple-A-rated institution, which means that we can borrow on very good terms. Because of that, we are able to make offers to our clients at a favourable rate of interest and, particularly important at the present time, we are able to lend for long tenors, which is something that is increasingly difficult to get from the private banking market.

Our general policy is that, since we aim to act where the private sector market is weak or absent, we are aiming to pass on to our customers the financial advantage we command in the markets. We keep back only what we need to cover our costs and ensure the financial sustainability of the bank, which is basically a stand-alone institution. That is who we are.

Perhaps I may say a few things about our activities in the energy and climate action sectors, which are closely related, just to give you and your Committee an idea of the sort of scale at which we operate. The last year for which we have complete figures is 2011. We signed loans in that year for energy and energy-related lending of €12.8 billion, of which €10.8 billion were in the EU. Clearly, the remaining €2 billion were outside the EU. That is the normal sort of split. The UK picked up about €1 billion in that year. For climate action, which, as I said, is very closely related but not quite the same, our lending in 2011 was about €18 billion, of which €2 billion were outside the EU and of which €2 billion came to the UK. We are reckoned to be quite a big operator in these markets.

The Chairman: That is very helpful.

Simon Brooks: If that is sufficient by way of introduction.

Q158 The Chairman: Absolutely tremendous, extremely helpful. If we may then go to the first question. Building on what you just said: how, within your total lending, do you identify priorities and what goes to energy and climate change? How have you arrived at that, and how have those goals been set?

Simon Brooks: Certainly. As I said, our priorities derive from objectives approved at the European level by our shareholders. Our governors are, of course, the finance ministers of the Member States; so there is coherence between what is agreed for the European Investment Bank and what is agreed by the Council and Parliament at the European level.

We divide our efforts into six general areas which include: supporting small and medium-sized enterprises; and the cohesion of the European Union—that is, addressing the unevenness of economic development, in particular the catch-up in the new Member States to the east of the Union. We also have an environmental objective, protecting the natural and urban environment. Our fourth priority area is promoting innovation through investment in R&D and human and social capital. It is quite important to note that although we are known for our infrastructure investments, we have moved out of simply investing in hard infrastructure and are also investing in human capital and research—if you like, soft infrastructure—which we consider very important for the development of the European

economy. We have a priority on linking up regional and national infrastructure, both transport links and, indeed, energy transmission links, which is a separate priority. Finally, the area which is of most interest to your Committee today, we have a priority on competitive and secure energy supply for Europe. Those are the six priority areas that we have agreed with our governing bodies.

In addition, we have an overarching aim to provide 25% of our lending, at a minimum, towards climate action. That cuts across a number of sectors and a number of areas. It includes, for example, in the energy field, renewable energy, but in the innovation field it would include financing, research and development and innovation projects in companies to benefit the climate. It is a cross-cutting theme, which is why it is not considered to be one of the six objectives on its own.

As you may know, Chairman, the shareholders have agreed—and this is in the final processes of Parliamentary approval across the European Union—to increase our capital by €10 billion. On the back of that, we will aim to lend an extra €20 billion in each of the next three years. The four key areas where this incremental lending will go are: innovation and skills to improve the function of the EU economy; more for SMEs; some more for strategic infrastructure, including, in particular broadband; but also of particular interest to us today is what is called resource efficiency, which includes not only improved power generation but also further action in the water sector and so on.

Our goals come from European-agreed goals and we aim to finance appropriate projects across the 27 Member States in pursuit of these aims. Of course, not the same project is doable in all Member States.

The Chairman: Thank you. That is most helpful.

Q159 The Earl of Caithness: Thank you for that. I need you to be a bit more specific about your criteria for energy-related projects. Given that we have had quite a lot of criticism about your lending for the installation of new lignite plants, could Mrs Fisher tell us more about your criteria and what support you do give?

Cheryl Fisher: As Simon has just explained, our energy lending priorities reflect those of the EU, in particular our lending is focussed on supporting renewable energy, energy efficiency and energy security of supply. We screen investment projects submitted to the bank, to ensure they are consistent with its energy lending policy objectives as well as ensuring they are technically and economically feasible.

Q160 In the context of coal of our support for new lignite or coal power generation projects, projects need to be compatible with the EU's energy and climate objectives, and beyond 2030 unabated coal projects might not be compatible with the EU's 2050 energy road map, which the Commission has recently put in place. For this reason unabated coal projects, we have a set of evaluation criteria which are designed to ensure that the projects we finance are consistent with the European Union's current policy objectives. Let me make a distinction, if I may, between coal fired projects that are power only and those which produce heat and power, because there is a slightly different methodology for combined heat and power. For power-only projects our criteria is designed to ensure that projects that we finance are economically viable and involve a reduction of at least 20% of the carbon intensity of the project and are carbon-capture ready, so that at some point in the future, when hopefully CCS has reached a stage where it has been commercially proven, the projects that we finance can be retrofitted in order to capture the carbon produced by

Q161 By having this criterion about a reduction in the carbon intensity we can ensure that the projects we finance are consistent with the EU's 20-20-20 targets. This policy was put in place in 2007, which was when the 20-20-20 policy objectives were put in place by the Commission. At the moment we are going through a policy consultation to see how we should amend and review or update our energy lending policy more generally and in particular these criteria to reflect recent policy developments (such as the 2050 objective noted above).

You mentioned that there has been criticism of our financing of coal-fired power projects. In fact, we have financed only five coal or lignite power only projects since 2007, and of those five, all dated from 2007-08. The criteria we have put in place are restrictive and do ensure that the energy projects that we finance are consistent with 20-20-20 objectives.

I put on one side combined heat and power, and the reason I did that is because combined heat and power projects, of themselves, can lead to a very significant improvement in energy efficiency. When we look at combined heat and power coal-fired power stations, therefore we look to ensure that they are fully consistent with the EU's directive on energy efficiency, and in particular, as they relate to CHP, there are very clear criteria to ensure that these are high efficiency CHP plants. Hopefully that gives an overview of our lending to coal, but I am happy to have a follow-up question.

Q162 The Earl of Caithness: Would you consider making carbon capture and storage an essential part of any funds that you lend towards coal-powered or lignite-powered power stations?

Cheryl Fisher: At the moment, as I said, we ensure that all coal-fired projects we finance are capable of being retrofitting with CCS. That is the first thing. The criteria we use involve more than simply checking to see that there is a space available. We do have a more thorough analysis of the situation.

In terms of looking at future policy, I should say as well there are other ways for coal-fired power stations to meet the emissions limits without using carbon capture and storage. Obviously you can coal-fire with biomass as well and we have some good examples in the UK of power stations switching, for example, from coal-fired only to partial biomass furnacing. That is also a way in that we look to see whether or not power stations can be consistent with the EU's objectives in the longer term.

Whether or not some future policy were to look at mandatory CCS, I think that is a matter for our policy consultation that we are currently undertaking. We are looking at our coal criteria and whether or not they are still fit for purpose, including consistency of the projects we finance with the EU's shorter and longer-term objectives as set out in the 2015 road map.

Q163 The Chairman: Thank you. Mrs Fisher, would you be kind enough to let us have a list or direct us to where we can find a list of investments committed to in 2011 so that we can tie it back to those two numbers, the 12 and 18? Is that possible?

Cheryl Fisher: Yes. There is a full list of our projects on our website. It is all publicly available information. I am not quite sure what the 12 and the 18 are, but—

Simon Brooks: The 12.8 is our energy and the 18 is our climate action.

Cheryl Fisher: Of course. Sorry, yes.

Simon Brooks: Lord Chairman, we will send you such a list so you can be clear which projects were done under each head.

If I may, I would like to make a further comment about the Slovenian project, the Sostanj project, which Lord Caithness raised. It has been a controversial project and it is quite important to appreciate the timeline involved here. It is a 600 MW project that will replace existing outdated capacity and, therefore, as Mrs Fisher says, meet the requirements of the policy. In fact, there is a long history to this project and it was developed in 2006, which was just before the finalisation of the policy that Mrs Fisher noted was in 2007. The contracts were approved by our board and signed in 2007 in the first instance. The larger part of that contract was to follow on and was eventually signed in 2010. As you may know, that contract requires a guarantee from the Slovenian Government, which has been held up and has been the subject of significant discussion in Slovenia, including in the Slovenian Parliament.

I would say, Lord Chairman and Lord Caithness, when Mrs Fisher mentioned that we have done only a handful of projects involving coal recently, the particular project in Slovenia tends to keep coming back because it has been such a long time in the arranging and we continue to hear about it because it is such a controversial project, not least in Slovenia. I hope that clarifies the situation on that project.

Q164 Lord Renton of Mount Harry: Mrs Fisher, I listened very carefully and with great interest to you going through the figures of the European Investment Bank at the moment, but we are a European Union Committee and we look a lot at what the European Commission is talking about planning for the next 10 years or so. I understand that they are suggesting that European transmission investment—that is, the moving of power, say, from France to Germany, may require in the order of 100 billion, which I think is probably a euro figure, not a sterling figure, but never mind—over the next decade, and that investment in energy more generally will be over €1,000 billion in that period. Are these figures that you recognise and would support?

Simon Brooks: Shall I start off with the answer on that, Lord Renton?

Lord Renton of Mount Harry: Yes, of course.

Simon Brooks: We do indeed recognise these figures and we recognise them from the Commission. Our views are that they are of the appropriate order of magnitude. We have no particular disagreement with the Commission on this, but I would say that, for me, the most important thing is that the Commission alert us to the scale of the challenge ahead. Whether these particular figures are, shall we say, 10% or even 15% out is not so important as recognising that there is an enormous quantity of investment that is required and whether the final figure is exactly €100 billion does not make much difference to the steps that we need to take over the next two or three years, if I can put it like that.

Q165 Lord Renton of Mount Harry: No, I fully understand that. That, in a sense, must be so. What do you see as your part in this energy-related expenditure? Obviously you will be involved. Will you be trying to be more involved with private finance as well by your side?

Simon Brooks: Yes indeed. Our general approach to projects is that we only declare ourselves open for business in this general area. To some extent, we are in the hands of project promoters who come to us with proposals for projects, but we are obviously very well known in the sector in Europe and everybody knows that we are ready to do them. As

I said earlier, we are favouring renewable energy. Indeed, of our total energy lending, about 40% has been for renewables. This is an area where we think, as a public sector bank, we have a particular role to play in getting these new technologies off the ground and giving them a chance to prove themselves. We are well known for doing that and that is an area where I am sure we will be particularly active.

In terms of the future, what will really matter for getting these energy projects away is that there is what we call a good investment climate, which is a way of saying that the developers feel they can make a reasonable profit with reasonable certainty. We recognise also that we may have to work in the markets to develop new products to bring in financiers, sources of finance, who have not been active in this area up to this point. That is Mr Jennett's speciality.

Lord Renton of Mount Harry: Would you like to be more specific about that?

Simon Brooks: I am thinking here, for example for transmission, it could be that this is an area where the development of project bonds could be particularly helpful because the transmission assets are usually pretty straightforward in terms of their regulation and developers know roughly what sort of profits they are going to make. This can be quite attractive, potentially, to pension funds and others if we can find ways of enhancing their rating to get them up to the level of attractiveness, in other words down to the level of risk, they find acceptable. Mr Jennett has been working on this area about how project bonds do this work and, if you wish, he could say a few words about the progress we have made on this.

Lord Renton of Mount Harry: I would very much like to hear it. Who would be buying the project bonds?

Simon Brooks: Mr Jennett?

Nicholas Jennett: Thank you very much indeed. We are at the early stage of the so-called project bond initiative, but already the indications are that a number of institutional investors, notably pension funds and insurance companies, will be interested in buying these bonds as long as we can achieve, as Vice-President Brooks indicated, the required rating, as it were the rating sweet spot, which gets the right balance for those institutions between the yield they make on the investment and the associated risk and, of course related to that, the amount of capital that they have to put aside against that investment.

As far as energy transmission is concerned, we are currently talking to a number of potential project candidates for the project bond initiative. The scale in which we will be able to assist these projects in the pilot phase of the project bond initiative is relatively limited. The initiative is limited both by duration—projects will need to be closed in the pilot phase by the end of 2016—and it is also the case that the amount of European Commission finance that has been made available to support the initiative for energy transmission projects is relatively limited at €10 million. Nevertheless, we are optimistic that we will have a number of projects in the energy area within the parameters of the pilot phase of the project bond initiative.

I am happy to speak, if it would be helpful, about the mechanics of how the initiative works, but that is by way of overview in terms of what we are expecting in this pilot phase.

Q166 The Chairman: Mr Jennett, could you just clarify, is that €10 million or €10 billion?

Nicholas Jennett: The figure I was referring to was the amount of resource that the Commission has made available to support EIB's credit enhancement for these projects and that is a figure of €10 million for energy transmission networks.

Perhaps if I may now say something about the mechanic for how the initiative works. The initiative works on the basis of the Commission having made available to EIB an amount of capital that will act as a first-loss piece on a portfolio of projects. In other words, on the strength of the Commission making available this capital for a first-loss contribution, EIB is able to make available a multiple of that figure by way of subordinate debt to credit-enhance bonds that are issued by project companies. The overall amount of Commission funding that is available for the project bond initiative is €230 million, of which €10 million has been specifically hypothecated for energy.

Simon Brooks: Are you able to help the Committee by giving a rough indication of how much total volume this €10 million will support? I think that is the key.

Nicholas Jennett: Yes. On the €10 million figure we would expect to achieve something like a multiplier of 12—12 to 14.

The Chairman: So this is a wrap, is it, Mr Jennett? You are just going to wrap somebody else's debt with your credit-enhancing—

Nicholas Jennett: No, it is not a wrap, if by a wrap you mean a full guarantee. This is credit enhancement. In the project structure, we are able to offer credit enhancement up to the value of 20% of the senior bonds issued by a project company. We believe this will be sufficient to take a project that has an underlying rating of around about borderline investment grade, BBB or something like that, to around about a single A rating, so achieve a two to three-notch uplift in the credit quality of those bonds. The evidence we have from our market soundings is that that single A rating is the sweet spot in terms of the balance between risk and reward for the institutions, the insurance companies and the pension funds that we are hoping to attract into this market.

Q167 Lord Renton of Mount Harry: In this, could I ask what sort of interest rate do you think you would be paying?

Nicholas Jennett: The EIB's contribution in these projects is to make available a tranche of subordinated debt. That subordinated debt will be priced in line with the general principles that Vice-President Brooks indicated at the outset of the hearing; in other words, based on both our cost of capital and an assessment of the risk that we believe we are incurring in making the investment. In a sense, the bigger question is the issue of what will be the pricing of the bonds that are issued by the project companies themselves. In other words, what will be the interest rate for the bulk of the financing from senior debt. That will be clearly influenced by the credit rating uplift that we are able to provide, but ultimately will be determined by investor appetite and the price that investors will be prepared to pay in order to secure these bonds.

Q168 Lord Renton of Mount Harry: Thank you. This is quite an innovative project for you, is it not?

Nicholas Jennett: Yes, it is. The only reason that I am slightly less than wholly definitive in that answer is that the project bond initiative is a development of an earlier instrument that we developed with our colleagues at the European Commission, the so-called Loan Guarantee for TEN (Trans European Network) Transport. That has many similarities to the project bond credit enhancement that we will be offering, the first significant difference being evidently that the loan guarantee for TEN Transport was limited to TEN Transport. Project bonds cover three sectors: transport, energy transmission and broadband.

Secondly, the range of risks that are covered is wider in the project bond initiative. We are looking to cover the whole range of risks that can appear in a project financing of this sort. Finally, the project bond initiative is explicitly designed to give credit enhancement for capital market issues, either for public or private placement bond issues, whereas the Loan Guarantee for TEN Transport was a credit enhancement instrument for the banking sector primarily.

Q169 Lord Renton of Mount Harry: Just finally, what is the length of the bonds? You may have already mentioned this, but I am afraid I did not mark it.

Nicholas Jennett: The length of the bonds will be a judgment that is taken by the bond issuers and the bond arrangers, but we expect that, for long-life infrastructure, the tenor of the bonds will be close to the economic life of that infrastructure with an appropriate tail at the end of the bond period. This would be quite standard in a project financing. What this means is that in practice we could look, I would have thought, in the energy sector for bonds with tenors of 25 years or more; so a very well targeted instrument to support investments in long-life economic infrastructure.

Lord Renton of Mount Harry: Thank you very much, and good luck, I hope it goes well.

Nicholas Jennett: Thank you very much.

Q170 The Chairman: Just before we go to Lord MacLennan's question, the question of the rate, I do not want to press you because I know this is a capital markets issue—

Nicholas Jennett: Indeed.

The Chairman: But what would be the range of rate for not the senior bonds—you are going to take the first risk—the layer after that? What would the rate be on that as it stands today to the nearest 1%?

Nicholas Jennett: If I may just add one clarification. The project finance structures that we are anticipating here will involve a normal equity component; so clearly the first loss on all of these transactions will fall to equity. Nothing changes here and equity in these deals will be looking for the normal kind of equity returns that they would expect in a major project financing. The contribution of EIB is either to offer as a funded tranche at the outset of the project a tranche of subordinated debt that will go into the capital structure, or to make that subordinated debt available as a standby facility that could be drawn during the life of the project. In terms of the pricing of that subordinated debt, it is going to be wholly reliant on the risks that we judge we are being asked to take on the individual transactions. That may vary significantly between transport, broadband and energy.

I will take the opportunity that you gave me not to be pushed on that, but the general principle of pricing will be the one that the Vice-President indicated, our cost of funds, our cost of capital plus an appropriate risk premium. The risk premium is also important in that that will, of course, remunerate the European Commission's contribution to this initiative. This is not subsidy. This is simply targeted and, in our view, very effective use of public money, but it is public money that should be fully remunerated. We would hope at the end of the initiative to ensure that the Commission has made, and indeed EIB has made, a return commensurate to the risks that we have been taking in the initiative.

Q171 The Chairman: Just finally to the A-rated bonds then, the senior debt, what percentage would those be going out at today? If it is a very wide range, I just need to know roughly.

Nicholas Jennett: I think probably the best thing that we can do then is to return to you with some actual numbers from the infrastructure bonds.

The Chairman: If you could, that is fine. I do not want to press you.

Nicholas Jennett: That would probably be most helpful.

The Chairman: I would just like to get a sense of this, because clearly we want to know—go on, sorry.

Nicholas Jennett: There will not be ideal comparators because this is a new asset class that we are looking at now, but let us come back to you with some indications of what we believe are most likely to be the equivalent instruments, as I say, with the proviso that we are talking about a new asset class here. There will be ranges of uncertainty about that.³³

The Chairman: We totally accept that. We are just trying to get a sense rather than something precise. Thank you.

Q172 Lord Macleannan of Rogart: In his opening remarks, Mr Brooks said that the fourth priority was research, development and innovation. I wonder if you could initially indicate what proportion of your financing goes in that direction, and then I have a more specific question to ask you about the emissions trading systems.

Simon Brooks: Certainly. I mentioned at the beginning that we lent about €18.5 billion in 2011 for climate action. In that year, our R&D component was about €1.75 billion, so that gives you an idea in that particular year. It can be quite variable, but we feel it is a significant contribution. If you would like an example, over recent years the efficiency of the European car fleet has improved very significantly and the EIB has played, I think, an important role in supporting the R&D efforts of both major and, indeed, in some cases, second-line car manufacturers, in particular to make sure that these important investments that are needed for the longer term were not subject to being cut back at a time when financial pressures on these companies are very harsh. I do feel that, in that area, there is already evidence of the pay off.

I would say that some of our other work, which is not necessarily explicitly R&D, also has an R&D character to it because many of the renewable energy projects which we help to finance are pilot phases of new technologies and we are able to give them a push. A principal reason for doing this is to aid the cost reductions that come from learning by doing, and you can only get those cost reductions from “learning by doing” by doing some projects. For example, we are heavily involved in the offshore wind sector, which is at present very expensive. We believe that by helping developers undertake these projects, they will be able to learn what in practice is needed to get the costs down.

Q173 Lord Macleannan of Rogart: Thank you. As I understand it, the EIB is the European Commission’s agent for the implementation of its initiative to raise financing for carbon capture and storage and innovative renewable-energy projects from the sale of 300 million emissions trading system allowances from the new entrants’ reserve of the emissions trading scheme. Can you say how successful that has been, and is it right that 200 million have been sold of these allowances, raising €1.5 billion?

³³ Note by witness: In relation to Q163 and 165 – As indicated during the Oral Evidence, there are no ideal comparators for the likely spreads on energy transmission infrastructure project bonds, as these will represent a new asset class. However, early indications from bond arrangers suggest a spread of around 200 to 250 basis points for an A- project bond in this sector (with this dependent on country, maturity, type of project, sponsors etc.).

Simon Brooks: Certainly, Lord MacLennan. We do act as the Commission's agent in two aspects of the NER300 scheme. One is the monetisation of the allowances themselves and, as you say, 200 million have been sold, raising about €1.5 billion, and that process has now been completed.

The other area where we have assisted the Commission is by providing some technical analysis of the various projects that the Member States submitted to the competition. Although the decisions about which projects should benefit from awards under this scheme is wholly a matter for the Commission, we did do a lot of work on putting all the various bids on a consistent basis so that the Commission were aided in their decision-making process.

Lord MacLennan of Rogart: Was the €1.5 billion part of the earlier total that you mentioned of €1.75 billion or was that entirely separate?

Simon Brooks: It is entirely separate.

Q174 Lord MacLennan of Rogart: It is entirely separate, thank you. I understand you have a risk-sharing finance facility that is used to provide finance for research, development and innovation. Can you tell us more about that? You have already spoken considerably about risk, but this is connected with innovation particularly.

Simon Brooks: The Risk-Sharing Finance Facility has a few features, in common with what Mr Jennett was saying about the project bond initiative in that it is a joint action between the European Investment Bank and the European Commission, by which the European Commission provides from the EU budget support that enables us to reach companies of a lower credit rating than would otherwise be consistent with maintaining the quality of our loan book, particularly in the fields of research. Again, the expert on this is Mr Jennett.

Nicholas Jennett: Yes, thank you very much. So far, the Risk-Sharing Finance Facility has resulted in the signature of more than €9.5 billion of loans to companies and indeed some public sector entities that have come to us with projects, which, as the Vice-President indicated, would have too high a risk profile or perhaps a counterpart with too high a risk profile for EIB to finance. In that sense it has been an extremely successful initiative. As far as energy is concerned, approximately 15% of our Risk-Sharing Finance Facility transactions in value terms have related to energy, particularly in the solar-power and wind-power sectors. We have also supported a number of companies that have sought to invest in research, development and innovation in the area of energy efficiency, notably, for example, in the automotive sector. That has been a very important driver of investment opportunities in that sector.

Q175 Lord MacLennan of Rogart: Can you give some indication up to what level of risk you are prepared to go into?

Nicholas Jennett: Yes. The Commission's contribution that the Vice-President indicated also operates as a first-loss piece from the Commission on a portfolio of Risk-Sharing Finance Facility transactions. That enables us to go down the risk curve to low or even sub-investment grade in terms of the lending that we are able to make. It enables us to do a considerable amount more of this form of lending than would otherwise have been prudent in order to maintain the credit quality of EIB's loan book. This is in effect how this works and, as I indicated, almost more than €9 billion of these types of transactions have been signed during the currency of the risk-sharing finance facility.

Lord MacLennan of Rogart: Thank you.

The Chairman: I am very conscious we only have you for about another 15 minutes, Mr Brooks and colleagues. We will probably try and do the next three in about five minutes each, I think, for the timetable.

Q176 The Earl of Caithness: Just following up Lord MacLennan's question about research, development and innovation. How important is it to investors to have certainty from the Government and the EU in their comments about energy strategy, and how good are the EU and Government, in your opinion, at giving that certainty?

Simon Brooks: Clearly, as I mentioned in my earlier remarks, Lord Caithness, everything we do depends on the preparedness of project developers to do the investment and that is a matter of having a favourable investment climate. It is easy to see in the renewables area, for example in Germany, how applied policies, using appropriate incentives and consistently applied, have certainly been able to bring through a large volume of projects. I would also say that the market has occasionally taken fright in some other Member States, where they believed that the Government was moving the goalposts in the middle of the game. I refer in particular to recent changes in Spain.

Getting the investment climate right is critical to all these projects. The European Investment Bank can, by its assistance, help projects that are rather close to the line get over it, but we cannot transform a project that is fundamentally financially unsound into one that works properly. The investment climate is absolutely critical and, on this, it is clear that clarity and stability of incentives is what is required. In many of these sectors, the promoters can choose where they want to operate. They are not necessarily tied to Europe. They can go elsewhere, so they are always looking at the risk and return combination and the expectation that it will persist over a period of time. It is very important.

Q177 The Earl of Caithness: Following that up, what are your views on the options for reform of the emissions trading system announced by the Commission and do you think that will have an effect on investment?

Simon Brooks: I think this is a very interesting and important question just at the moment. The emissions trading system, the ETS, is a cap-and-trade system. You set a cap and people trade and you try to get the most efficient outcome on the basis of limiting the total emissions at the level determined by the cap. This set of mechanisms does not guarantee that the price signal, the actual price of the credit, will be stable or at any particular level. We have certainly seen recently that prices have been much lower than most people believe is necessary to bring through the amount of renewable and other low-carbon investments that we will need to meet the very large figures for required investment which we discussed earlier in the session.

The conflict between the idea of a cap-and-trade system capping on the one hand, which it does very effectively, and providing a stable price incentive on the other hand, which it recently has not done so effectively, is critical. The Commission has made proposals to try and improve the position on the price signal and, from my point of view, insofar as those proposals, if adopted, would help to improve the incentives from the ETS for low-carbon investments, they can only be welcomed. But we shall have to see what the European bodies make of it.

Q178 Lord MacLennan of Rogart: A continuing source of uncertainty is whether or not the renewables target will be extended beyond 2020. Do you think that a 2030 renewables target might be justified and might help to attract greater investment into low-carbon

projects and do you think, as a PS, that the shale gas developments are going to affect this in any way?

Simon Brooks: You have put me slightly on the spot here in respect of a 2030 renewables target. From the point of view of investment, what developers want and what financiers want is stability and certainty and, to the extent that a 2030 target would provide more of that, it is clearly potentially beneficial to the investment climate. However, trying to work out the right mix of incentives at the European and national level is a matter for national governments and I will leave that to them. But clearly stability in the investment climate is good for investment.

Moving on to your second question, shale gas is a very interesting development. Clearly in the US, it has transformed the situation. For reasons of geology and others, it is not so clear it would have such a dramatic effect on this side of the Atlantic Ocean. Nevertheless, it looks like it could be important. I think our general view on gas is that, insofar as you can get gas to substitute for coal, the pay-off on emissions is very significant, because gas is about half as emissions-rich as coal. If you could achieve that, you would benefit the climate and improve the situation in relation to European targets.

On the other hand, if gas were to substitute for renewables without making any dent in the coal side, the effect on greenhouse gas emissions would go the other way and it would not be so welcome. It does seem to me that shale gas, or gas in general provides a very useful bridge to a lower carbon future, but it is a bridge that needs to be managed to ensure that substitution goes the right way.

Q179 The Chairman: Just before we go on to Lord Giddens' question, do you think a carbon floor price would help investors?

Simon Brooks: Yes.

Cheryl Fisher: Yes.

Simon Brooks: It gives them greater certainty.

The Chairman: You would not like to be drawn on what level you think it might bring forth investment?

Simon Brooks: No.

The Chairman: Very fair.

Simon Brooks: I think the principle of a carbon floor price is clear.

Q180 Lord Giddens: Perhaps I can ask you a brief wrap-up question. The eurozone is on the edge of recession. Do you think that investment in energy infrastructure can help kick-start a return to growth and also contribute to job creation, and what would your role be in that, if that is the case?

Simon Brooks: This afternoon we have been discussing the need for energy investment with a rather long-term perspective, and in the current situation, other things being equal, if you were able to advance these investments that you know you are going to need in the longer run at a time when there are spare resources, then why not do it? On the other hand, the budgetary positions of the various Member States are relevant insofar as subsidy is required to get some of the newer technologies away. That would have to be balanced off against the more Keynesian view, "Just bring the projects forward a bit".

Who pays is always an issue and I do think that part of our role in the future, following our capital increase, will be to give a further push where we can to energy investments, including through new techniques such as the project bond initiative that Mr Jennett described earlier, but also other innovative financing solutions. I suppose I would close this comment by saying that there is lots of evidence that public sector money can be used to unlock capital market constraints and this may be a more efficient use in terms of leveraging up a big bang for your buck, as it were, in terms of getting the economy going than rushing to give capital grants to individual projects. I think the work we are doing on project bonds, RSFF and similar projects is an efficient use of public sector money.

Q181 Lord Giddens: Thank you.

The Chairman: Mr Brooks, Mrs Fisher and Mr Jennett, thank you very much. I think it has been very clear—the advice you have offered and the evidence you have given us—and we are very grateful. Thank you very much.

Simon Brooks: Thank you, Lord Chairman. I hope your Committee has found it helpful.

Fiona Hall and Niki Tzavela MEP—Oral Evidence (QQ 237 – 247)

Evidence Session No. 12 Heard in Public Questions 237 - 247

WEDNESDAY 23 JANUARY 2013

12.30 pm

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
Lord MacLennan of Rogart
Baroness Parminter
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Niki Tzavela MEP (EFD, Greece), Rapporteur on the Roadmap, ITRE, and **Fiona Hall MEP** (ALDE, UK), Shadow Rapporteur, ITRE

Q237 The Chairman: Thank you very much, and thanks for making us so welcome, too. I think you have all had a very busy time ahead of what is coming tomorrow, so thank you. Perhaps I could deal with a formality. We are a formal evidence-taking session, so if I could I will just deal with that before we go on. We hope we have given you a list of interests that we have declared; it should be available there. We are taking this as formal evidence, so we are going to take short-hand notes if that is okay, and it will be on the parliamentary website. It will go on the record and, of course, we will circulate the transcript. Picking up on the point that you have just made, we thought that a wide-ranging conversation around a number of key issues might be the best way for things to flow between us. Otherwise, we could get rather stuck. The main areas that we would like to explore with you are the financing of the energy sector over the next decade—the question of this €1 trillion that is going to be needed; the post-2020 policy; the energy mix, particularly the issue of gas; carbon capture and storage; and, of course, the ETS.

Niki Tzavela: Could I also suggest another topic which is of interest to us, too: shale gas?

The Chairman: Absolutely.

Niki Tzavela: We can include it in the exchange of views on the gas sector. The first question is how we finance the ambitious infrastructure that we have in the plan of the European Union. As you know, there are the structural funds of the Union, and the regional fund provides financial assistance for infrastructure in general. We have a new funding mechanism, which is the CEF—the Connecting Europe Facility. This covers three areas of networks: transport, broadband and energy. We learnt yesterday that the budget that was

planned for CEF has been decreased. We do not know the amount yet. The next question is what sector gets the most. If we say that energy will create more jobs, I do not know what the criteria will be for allocating the money. Energy and transport are crucial issues, and broadband is another, so the fight is there. What else can we do to finance it? I have to declare that the CEF covers only European energy infrastructure and has to cover two Member States at least. So we have to think that these are the interconnections.

Another source of finance is the project bonds, which is a joint activity between the European Investment Bank and the Commission. Anybody can submit a project under that scheme. The European Investment Bank screens the viability of the project. This is the mechanism that will justify whether a project is viable. Then we put it under the project bonds umbrella. All the projects are guaranteed by the Commission and the European Investment Bank. An individual or the state can then go out into the market and sell the bonds for the project, since they have the stamp of viability from the European Investment Bank and the Commission. This came with a lot of aspirations and hopes from us, but they have stopped it somehow. They did some pilot projects and tried to see how they could copy it, but, in my opinion, energy infrastructure provides the best prospects for project bonds. PPPs, or public-private partnerships, are another way of covering the cost of projects. Another source of income or new money for the Commission could be a financial transaction tax. It passed and we await some extra money from it, but nobody knows how it will be allocated. So this is the first question: the financing of energy infrastructure. We have Fiona joining us.

Q238 Lord Cameron of Dillington: Before Fiona comes in, can I just make one point? A point that has been made to us continually is that quite a lot of money is in the corporate sector, particularly the international companies and the big energy companies. They have it all on their balance sheet. In order to spend considerable amounts of money, they need a very clear signal as to where energy policy within the EU is going. If that very clear signal came along, the money would arrive in bonds, equity and so on being raised, but there seems to be a lack of clear signals. That is the message that we have been told by some of those corporations.

Niki Tzavela: And you have been told correctly. If I was an investor, I would be very sceptical about putting in my money, because we know that energy infrastructure, in order to be viable, has to last at least 40 years. It is very expensive.

Lord Cameron of Dillington: And you can borrow very cheaply now, so if ever there was a time to invest in energy, it is now, but you must have a clear signal.

Niki Tzavela: That is why we need a road map. We are not giving the clear signal that the market is expecting, but we asked the Commission to give it in the report that it will issue for 2030. We say that it is crucial for energy infrastructure investors to know where we are going. If you ask me as rapporteur of this report, the report would not cover me if I was an investor. I would say that I still have questions. The report is a basis for some excellent information and legislation, but this has to be done and we have asked the Commission to do it. For the report of 2030, we asked the Commission, first, to evaluate what had been done up to 2020; secondly, to see what went wrong and what was a success; and then to give us the green light on where we are going.

Fiona Hall: My apologies for arriving late. I want to pick up on this question of 2030, because it is a very hot topic that is being discussed at the level of the Parliament, but it is also very relevant for the United Kingdom. I often hear from investors in the north-east of England, in my constituency, this question of what will happen after 2020. We have the 2020

renewables target, but people want to know what is going to happen after that. It is a very short time scale already from an investment point of view—2020 is tomorrow. It is not just the people who would be building the wind turbines or the CCS plants or whatever—the direct builders of the energy infrastructure—who want to know; it is also surrounding businesses and companies. During the summer holidays, I had meetings with two of the port authorities in the north-east of England, one very big one and one very small one, and they both basically had the same question. They wanted to know what they were going to do, because, for infrastructure in a port, even 2030 is tomorrow. You are really starting to think, “Am I going to need land for wind turbines? Am I going to be importing lots of biomass?”. It is very difficult for industry to get a signal just from an overall commitment to decarbonisation, however important that may be. Therefore, personally, I very much feel that we need 2030 targets, not just for greenhouse gas reduction but for renewables and energy efficiency—not least because that is what has worked for 2020. We can look at what is delivered.

The specific renewables target has delivered far better than the wider greenhouse gas target through the ETS. We could have a whole different discussion about the quantities around the emissions trading scheme, but I think that listening to the industry back home is where we need to go. That is not where we are at the moment—I shall be quite frank about that. That is not where the Government are at the moment, and this is a discussion that I have with colleagues in Westminster. There is a long-standing tradition in the UK, which I think it is fair to say is not really party political—I think that it was Labour’s before it was the current Government’s, to say, “Well, we’re technology neutral. We’re going to go forward. We’re not going to commit to any technology at all. We’ll have a basket approach. The best way to get the cheapest, low-carbon energy that we can is by having a competitive situation”. The reality, though, is rather different, because when it comes to it, some technologies are more advanced than others. You can look ahead to 2030 and have a reasonably good idea. The road map for 2050 says that, whatever scenario we choose—whether we are going to have lots of CCS or not very much, lots of nuclear or not much nuclear—actually we are going to have a lot of renewables. Therefore, at a UK as well as an EU level, we need to bite some bullets very soon and say, “We can’t just keep this vague, because that’s not enough to establish certainty for investors”. That is my personal view. It is a conclusion that I have come to having talked to investors in the region.

Q239 The Earl of Caithness: From our discussions this morning, it seemed unlikely that there would be any consensus within the EU—you will know better about the Parliament. I should like to hear what you think the chances are of any agreement post 2020 in the near future.

Niki Tzavela: An agreement on what?

The Earl of Caithness: On climate change and implementing the road map.

Niki Tzavela: In my opinion, defining targets for 2050 requires pan-European governance on energy. According to the treaties, each member state has a right to use its energy mix. We cannot have binding targets, when each member state has a right to have its own energy mix. I keep on saying that to my colleagues. It is like we did with the euro. We had binding targets and each one of us had our own economic model. We had one currency and each one of us had our own economic model. How can we have binding targets if we do not have pan-European energy governance? That is why I tried as a rapporteur to set milestones. We cannot expect Poland to reach binding targets in renewables. The Poles do not have sun; they do not have wind; they have coal. We should give them the first step. They have shale

gas; okay, that is the first step. The present situation is an absurd and paradoxical phenomenon. We have the decision of Germany to phase-out nuclear. Coal became cheap in the States because of shale gas. They put cheap coal in Germany and now we have the paradoxical phenomenon whereby they use coal and renewables, with a 7% increase in greenhouse emissions as a result. In Greece, we have a huge economic problem. We cannot afford gas; we cannot afford oil; we have fireplaces. We want to get control of what people burn in their fireplaces. Why? It is because Greece was disciplined in greenhouse emissions. Now we have started polluting Athens again because of the economic crisis. We should come up with milestones and targets that are not binding and do not impose unrealistic policies within the Member States.

Q240 Lord MacLennan of Rogart: I noticed that we were provided with recommendations of the Committee on the Environment, Public Health and Food Safety to your committee. Some of those recommendations, it would be interesting to hear your reaction to. For example, the 11th point in the paper calls for greater involvement of the EIB in financing renewable energy, energy efficiency projects and marketplace mechanisms. There is also a call for nuclear energy, as the major low-emissions energy source, to be worked on to improve its public acceptance. This is not quite reflected in what I understand your report to be saying, but it seems to me that if we are going to make progress on the fronts that you describe, we have to offer inducements in the European Union. I am not clear that we are sufficiently focused on what inducements can be offered. It is not a matter of forcing countries—Germany, for example—to abandon their policy of non-nuclear, but it is a matter of encouraging other technologies and systems to be developed cost effectively.

Fiona Hall: This leads into a very important area of what we should be doing to make sure that we keep on being at the forefront of technology. To me, it makes a great deal of sense to support new technology, which we have to do but I would not see it as a bribe. We have to support research and development because that is where we have the cutting edge at the moment. We are in the lead in Europe in the development of a lot of these technologies, particularly in renewables. We are developing it not only for ourselves but as technology that we can export to the rest of the world. It is where the jobs are; these are the growth sectors. If you look at the UK economy, at a time of great economic difficulty, the whole green technology area carried on growing and creating jobs.

Therefore, it is entirely logical for us to carry on putting money into and encouraging emerging forms of energy and to recognise that something that is new to the market needs support to get it able to compete evenly, whereas the mature technology, which has been around for a long time, should not be supported. We have to put the money behind the technologies that are still developing, and you have to arrive at a certain critical mass in order for it to actually turn around. We see this with photovoltaics. They have been heavily subsidised across Europe in different countries with different schemes. We see that it is very important to withdraw that subsidy at the right moment, and we did the right thing in the UK to reduce the feed-in tariff. There are always a lot of complaints at the time, but it is necessary to do that, otherwise you get a bubble, as happened in Spain. However, that sort of support at an early stage works and helps industries to get off the ground. It makes a whole lot of sense to continue to do that with any new technology that is going in the right direction in helping to cut greenhouse gas emissions. That technology needs to be developed to find that critical mass before it can compete. We have an internal market, and ultimately the ideal situation is to have everything competing without any subsidies at all. In the longer term, you need to make sure that we are looking at that at a pan-European level, but in the short term we need to be making sure that we are giving these new technologies, which we

lead on and are creating growth and jobs for us here in Europe, the support that they need to take them up to that level of being able to compete straightforwardly. We can both pursue our greenhouse gas targets and support our industry at the same time. That is the lesson that we are beginning to see.

Niki Tzavela: In the report we also say that renewable subsidies should be phased out because it would not be fair to the market if we kept on subsidising one sector. So in the report we have this. Also in the report we express the concern that if we do not achieve a global, binding legislation on the environment, Europe has to say what it is going to do, because it is the only continent that deals with climate change. This situation does not contribute to dealing with the global climate change issue. We have expressed our concern on this and on whether it has been evaluated by the Commission.

Q241 Lord Cameron of Dillington: Earlier you mentioned shale gas. How do you see the future of shale gas within the European mix? Bearing in mind the cheap supply of gas to US industries and the fact that they are exporting to Europe—to Germany—where is all their cheap coal going which they cannot use themselves?

Niki Tzavela: I was a rapporteur on shale gas, and I will be very blunt in my response. Only if the UK starts on shale gas will it be a success story in Europe. Why is that? It is because you have a well-organised business environment. You are a well-organised country, you are disciplined and you look into things objectively. I am not being pro-Brit, but I want to be very objective. If the UK starts moving, shale gas will be a success story and one of the biggest contributions made by the UK to Europe.

If shale gas starts in another Member State, I am afraid that it will not have what you have. As I said, you have a well-organised business environment and a disciplined society. You have an objective view of the situation. I have to confess that yesterday we had the Canadians here to brief us about shale gas. I expressed my concern about water contamination. They could not understand what I was saying. They said, “It is not a problem. We solved it years ago”. I was so far behind the information. The Canadians were relaxed and I respect them; I do not have any grounds for saying that I do not believe them.

Shale gas is a challenge for Europe, not a threat. We are Europeans so we have faced a lot of problems and challenges, and we have to take the lead in this. Look at what is going on in America and where it is now. Not only do they have cheaper prices, they are paying \$3 while we pay \$14 or \$15. Can you imagine the quality of life in that situation? Let us think about the competitiveness of European industry. Where are we going? In two years the US will be independent in gas and oil. This means that they will be independent of the Emirates and thus independent geopolitically. Shale gas is bringing forward a revolution not only in economics but also in foreign affairs and geopolitics. The world will change because of shale gas. Are we afraid of it? We should not be. We have very good scientists and lines of development and we will be able to cope with it. We cannot ignore our own resources. As Europeans we used to move into other places around the world and take their resources, but we cannot do that now. We have to see that we gain from our own resources.

Greece does not have any shale gas, so you can see I am speaking objectively about it. It is not in my national interest at all, and since I have the opportunity to see you today, please bear that in mind. It is only if you, the Brits, take it up that shale gas will be a success story in Europe, otherwise it will not be.

Q242 The Chairman: You do not think that Poland has a large role to play in this.

Niki Tzavela: Poland will follow you because you will monitor that country. We have to see that we make a safe start, and everybody in Europe will trust you. If the Brits do it, even the Germans will trust you. If you start this, it will be a success.

Lord Renton of Mount Harry: I have been very much impressed by developments in Poland on the whole, from being subservient to Russia. There is a great deal of new industry coming forward and so forth. I would very much welcome Poland having a considerable part to play in the question of energy, how it is to be developed and so forth.

Niki Tzavela: I am very fond of Poland and I admire them for what they have done. However, if shale gas was developed in the USA and Canada, it was because the environment was different. You know what I mean. The well established business environment there helped support it to go on. Poland still does not have a well established industrial environment. You should start, and the Poles should follow you. I repeat that I have a high respect for Poland and the Polish people, but if we want to be successful, the UK has to take the lead. Perhaps I make sense. I hope I do and you understand what I am saying.

Q243 Lord Maclellan of Rogart: Whatever progress we make on renewables, the evidence that we have so far received in our inquiries suggests that gas is going to be the rich source. Do you think that gas could become entrenched along with the development of and surge in coal, particularly in Europe and Poland? We might find that fossil fuels are locked into our systems.

Niki Tzavela: I can give you a certain answer. I think it is a mix there, so we will not have a lock in. Fiona, can you elaborate on your side?

Fiona Hall: Thank you, yes. Coming to shale gas but linking it into the question that you just asked, I think that there is a little bit of work to do still on shale gas to make sure that environmental legislation, on water protection in particular, covers shale gas extraction. I have nothing against shale gas extraction per se, as long as those environmental protection measures are in place. I see that shale gas is very important to countries such as Poland, because it offers the opportunity of making an immediate cut in their greenhouse gas emissions from coal. If they move from coal to gas, that offers an important step when we are thinking about negotiations on greenhouse gas reductions going forward. Poland has been very unenthusiastic so far, but having the possibility of moving away from coal alone as an energy source is important. To answer your question, I have an enormous concern about us getting locked into gas. For me that is the big worry about a shale gas revolution. Frankly, we start to think that we can have gas in the long term. We know from the UK climate change committee that we must already have decarbonised our electricity supply in the not too distant future. Therefore, we are in danger of getting ourselves into a situation where we have CCS as a technology but we are still building the pilots. We do not know absolutely that it can do what we want it to do. We certainly do not know at what price we can do it. So we might become dependent on gas and then find that we are locked into it, that we have made a lot of investment in that direction and that we then cannot decarbonise the electricity supply as we want to. That is fundamentally my concern about shale gas: it looks very seductive but actually it is leading us in the wrong direction in the longer term.

Niki Tzavela: I would add to what Fiona said that we are talking about 10, 20 or 40 years ahead of time. We all hope we will have achieved more cuts in gas emissions and everything, but realistically in market price speaking, gas will be a big thing. Already I can see that for Europe. We will have all the refineries: we mentioned that in the report. All of it will be there. Gas will play a very important role. Unconventional gas will play an important role. Going back to Britain, you started the industrial revolution just with your resources and

now there is an energy revolution. I would not be concerned about locking in gas. There is a strong tendency on renewables.

Q244 The Earl of Caithness: Can I just follow up on what was being said a moment ago about CCS? The blame—if that is the right word—for the lack of progress with CCS has clearly been laid at the Member States' door in our discussions this morning. Do you think that is a fair accusation, and should the Commission be doing more to promote CCS, given that it is such an integral part of their predictions for climate change levels in the future?

Niki Tzavela: CCS could play a role on the road to decarbonisation by 2050. It is an important option for several energy-intensive industries, such as oil refining, aluminium smelting and cement production. However, the process is still in the development stage in Europe and its development remains highly uncertain due to unresolved problems such as unspecified delays, high costs and efficiency concerns. CCS, developed in an economically efficient, safe and sustainable way, will need to be used on a commensurate scale as soon as possible. The Commission indicates 2030 in its communication, but I would add the small observation that there is a tendency now for companies to take their CCS projects abroad, more specifically to North America, particularly Canada. In this answer I am reading my text, because it is a complicated matter and I wanted to be careful. The only general CCS project we have in Europe is in Rotterdam—Shell has it. We often wonder why they are moving into this in the Americas; I think it is due to population density. But CCS is something that occupies and concerns the Commission, and this year we expect a lot on it, as well as on the ETS—the structural differences and all that. This year we will have a lot of news on CCS and the ETS. The Commission is not to blame; the Commission does not have the money to finance it. That is why we say that it has to be on a commercial basis. If we do not have CCS, we do not have alternatives, so we have to see a future without fossil fuels.

Lord Cameron of Dillington: The NER300 fund was set up largely for CCS and none of it has been given out.

Niki Tzavela: From what I was told, there was a delay because there was a demonstration problem—there were supposed to be five and we only have one, in Rotterdam, which has already closed.

The Chairman: Something is wrong in this, because we cannot quite get to the truth of it.

Q245 Lord Whitty: I have two sorts of questions, one of which is straightforward. You have not mentioned nuclear. With the promise of shale gas, the German decision against nuclear power, and some public doubt about how far renewables can be developed, should not nuclear power be more central to the strategy of the European Union to reach a low-carbon or a nil-carbon target. Can anything be done at the European level to encourage the development of nuclear power?

Niki Tzavela: There are two positions within the Parliament, the pro-nuclear and the anti-nuclear. Again, we should be objective. I have worked in the energy market, and in my opinion Europe will need energy from all kinds of sources. The problem that we found with nuclear was that there was no stress test area. We had Chernobyl and we still do not know how many people died after that, although I think England had a high number. We expected Fukushima to come and see the safety standards. Nuclear will be the future in Europe, but we have to be very extremely careful about keeping standards. Another crucial thing with nuclear is that, along with climate change, anti-nuclear protests et cetera, at the university and technical level we lack skilled labour for it—all over the world, not only in Europe—because they closed down all the schools that produced skilled labour for us. In Japan they

did not have a skilled labour force on the technical level either. I do not think we have one in Europe. If you look at the education landscape all over the world, you will find nuclear-productive educational institutions, so this is crucial. Along with safety standards, we have to produce a skilled labour force to cope with nuclear, and then we will be safer.

Lord Whitty: My other question relates to the internal market. All these ambitions would be more easily or more cost-effectively achieved if there were a genuine internal market. But because, as you say, each country decides its energy mix—and equally importantly decides its regulatory framework for the supply of energy—is it not desirable that we have a more European level, or an approximation, of the energy regulatory framework. plus, as you were saying when talking about EU-level funding, a genuine, physically interconnected market? Effectively, that would be a European super-grid.

Niki Tzavela: Let me see what they write for me. I have my own opinion, but let me see. Constantine is an extremely good assistant indeed. European funding is encouraging Member States to work together. The minimum requirement is for two Member States. I think we are moving into a coherent energy policy, if we take into account that last year we had each Member State having to report to Brussels on their bilateral agreements and energy contracts, not only with third countries but with companies. This means that somebody is centralising the system to cope with the prices, because if you see for how much the Russians sell it to the Poles and what the price is to the Germans, it is different. We are adopting the model of interdependency of the EU on energy, as opposed to independence, because each one of us could be independent on energy supply if we had a contract with the Iranians for 50 years—even though in the global market an Iranian contract is the most unreliable contract in the world. Anyway, this is the energy market.

Now, we go into the interdependency model. This will also help the renewables market, because if Greece has a lot of renewables it can export to Bulgaria and make the binding targets help the other Member States. So we are moving to the interdependency model. Also, if we move to having shale gas in Europe, we will create a gas market that does not exist in Europe. It is only rhetoric, which is very important.

Q246 Lord MacLennan of Rogart: You spoke earlier about the fact that Europe is probably in the lead in renewables at the moment, but we do not seem to pull together in this. Since the Lisbon treaty, the European Union has competence in energy matters, and although parts of it are kept out—such as nuclear, which I gather is not co-decided—it seems that the rest of energy can be a matter for co-decision. I am somewhat surprised that we hear so much discussion, in the Commission particularly, about what might be ideal or what might be done here and there, yet we have had no sense of political pulling-together in the evidence given to us. I know that the law does not allow energy choice to be forced on a particular country, but prioritising renewables, for example, would seem to be well within the competence of the Union. Do you think that we are moving in that direction? It seems to me, going back to your point about 2020 or 2030 being tomorrow, that it is both urgent for climate change, and if we are to take advantage of the technical advancement of our skills or technology, we are going to have to move PDQ because there is competition from China and elsewhere. I think the idea of giving the competence in energy to the Union was, in part, to try to give them a leg up over the competition.

Niki Tzavela: The Lisbon treaty cannot change. If we have a change in the treaty we will see that we do not have national energy mixes, but we will see how we can move in one direction as one body. There are so many differences between Member States, you cannot imagine. We cannot impose on Member States the energy survival of the people. The first

obligation of each Member State is to ensure the survival of its people. First comes being and then comes well-being. In my experience, looking at the European Union, there is an egotistic approach from half of Europe to renewables. The other half have so many problems surviving that the only thing they need is cheaper heat. They need heat. People are dying because they do not have money for heat. Colleagues of mine talk about cake and not bread. We have to be patient. Another thing is that when there are two sides, they become dogmatic. When we are dogmatic we are not objective and fair. We have the dogmatic side of the climate change followers and we have the other dogmatic side, who say, "Forget it, let's move ahead". We have to have a golden middle. The people of Europe need patience. We have to slow down a little bit. I go back to asking how we can speed up and what we can do to update and help Europe. We have to exploit our own resources and make the life of European citizens better and cheaper. We should not be afraid of exploiting our own resources. We have the scientists, the knowledge and the best background in the world, but we sit here and expect things of other continents. Why? Because of having a dogmatic position on climate change. We should not. If you are a dedicated Green, you should be bold and daring and say, "This is polluting and I will make it non-polluting, but I will not delete it". It is like having a headache and cutting off your head rather than taking medicine.

Q247 Lord Renton of Mount Harry: You are clearly a fighter, and clearly you feel very strongly that this is an area where we can make very good changes, but it will require a lot of strength. Oil companies are very strong, powerful and rich, and it is not easy to make the progress that you have been talking about.

Niki Tzavela: But we can still hope and pursue it.

The Chairman: It is therefore a political question. You said that your report demanded that the Commission provide policy certainty. Do you think that that is likely, given the political background and the divisions you described? We should not stop asking for it, but what is your assessment?

Niki Tzavela: We have a Commissioner who is very realistic. Policies are tightly connected to personalities. He is a realistic politician who has got the message about uncertainty in the energy market. The Commission will give the clearest message that it can, but we all have to help by not pressing dogmatic approaches and positions that are sometimes completely out of this world. We have to help on this. If we do not, the politicians who make policy may go backwards.

The Chairman: That is fabulous. Thank you very much. We have covered a lot of ground and we are very grateful to you.

Niki Tzavela: I thank you, too. I enjoyed it. Keep in mind my personal request on shale gas, please. Lord MacLennan, from what I see—you will like this—it has been agreed in the Connecting Europe Facility to allocate 75% of the €9.1 billion to renewables and efficiency. So renewables and efficiency will get three-quarters of the money. Constantine said, "I think he will like this", when he passed me the note.

Lord MacLennan of Rogart: Thank you.

The Florence School of Regulation—Written evidence

Sophia Ruester³⁴, Sebastian Schwenen³¹, Adeline Lassource³¹ and Jean-Michel Glachant³⁵

We seek to contribute with evidence on (1) first, how energy policy can enable decarbonisation *and* economic growth, (2) second, how for this sake a common European policy might be better suited than individual Member State action, and (3) third, how public support to research and innovation should be optimally designed and how it can be flexible enough to take into account emerging new technologies. We hence submit contributions related to three fields of inquiry raised in the Call for Evidence. Section 1 of this response contributes with evidence on decarbonisation and economic growth. Section 2 provides an opinion on whether and where joint EU action is needed. Section 3 discusses public support to innovation.

I. Energy's contribution to economic growth

Innovation is key. If the EU wants to successfully reduce greenhouse gas (GHG) emissions to 80-95% below 1990 levels by 2050, decarbonisation and economic growth should coincide. Future energy mix and system architecture are highly uncertain; technology paths for the post-2030 horizon are basically unknown. However, various roadmaps conclude that '2050 is technologically feasible' (e.g. EC, 2011; IEA, 2012; ECF, 2010; Eurelectric, 2011; Greenpeace, 2010) and that it is of utmost importance to (a) achieve this decarbonisation in a cost-efficient way, and to (b) foster European competitiveness in R&D and manufacturing of low-carbon technologies. Innovation will help decreasing costs to reach 2050 and make technologies needed to reach 2050 a good business case, creating employment and growth.

Major efforts will have to be spent for the decarbonisation of the power sector. Given that a certain level of GHG emissions in non-energy sectors (such as agriculture) is not avoidable (see also EC, 2011), the electricity sector has to be decarbonised at a very high degree. Besides, the electrification of other sectors, such as transportation, will result in an increased role of electricity in final energy consumption. Though, it is clear that decarbonisation efforts can foster economic growth in certain sectors of the economy (e.g. those related to the development and manufacturing/deployment of green technologies), but can at the same time have detrimental effects on other sectors.

Falling energy prices and benefits for energy consumers? The EU 2050 Energy Roadmap Impact Assessment finds that future consumer prices for energy will strongly depend on the respective future scenario. For a 2050 decarbonisation scenario based on a diversified power production portfolio, the impact assessment predicts lower electricity prices than in the business-as-usual (BAU) scenario. Such lower prices would unleash real consumer income and hence consumer spending and increase the competitiveness of European industry and service sectors on the world market, thereby contributing to growth. On the contrary, in other scenarios, especially those building on a very high penetration of renewable energy sources, electricity prices are predicted to exceed those of the BAU case, mainly due to high costs for power grid expansions. Despite this uncertainty in the evolution of energy production and supply costs up to 2050, in most scenarios presented by the EU or other stakeholders, decreasing electricity prices compared to the reference case earliest

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occur in the second half on the way to 2050. Hence, growth effects arising from cheaper consumption of energy would only arise in the longer-run.

Economic growth through industrial leadership? If decarbonisation has no alternative and potential gains from decreasing energy production- and supply costs only occur in the longer-run, growth effects stemming from the competitive production and profitable trade of low-carbon technologies on the world market are key to enhance growth in the shorter- or medium-term. Regarding *wind energy*, for instance, top-European turbine manufacturers such as Vestas, Siemens, or Gamesa saw a continuous reduction in their global market share. But it is only European manufacturers that are active in the offshore wind market today, and there could be an argument to use this advantage of being a pioneer, and to benefit (i) from domestic technology adoption as well as (ii) from exporting the technology to non-European markets. Similarly, for *solar PV* China has become the ‘manufacturer of the world’.

Manufacturing of cells and modules is a labour-intensive process, and the efficiency and quality of Chinese products is comparable to European ones. But European firms still have a strong position in solar PV manufacturing equipment – high-tech products that are sold to Asian countries, too. Again, there could be an argument to strengthen the domestic industrial base to keep this competitive advantage. In any case, successful entrepreneurship will require discovering and developing niche markets, where European players can position themselves without having to fear lower-cost competition from non-European competitors.

Energy policy should not be treated in isolation. How can energy policy make its contribution to both decarbonisation and economic growth? As competitive production of and innovation in low-carbon technologies within the EU is crucial for enhancing decarbonisation and growth at the same time, energy policy has to explicitly take account of technology development. Thus, energy policy should not be treated in isolation, but energy-, technology- and also science policy should jointly be fine-tuned with a focus on pushing new efficient green technologies on the market. For instance, research and industry collaborations have to be supported by government funds and gain from international, and even world-wide cooperation, as also mentioned in the latest EU Communication on science and technology policy (COM(2012) 497). Tightening research collaborations between research and the industry increases synergies for innovation, facilitates knowledge spillovers, and guarantees a smoother path from applied research to industrial demonstration. In turn, energy policy then should also guarantee competitive energy markets that deliver appropriate incentives to innovate in green technologies, which are remunerated in the market accordingly.

A mix of policy instruments. As for energy and technology policy, two kinds of instruments can then be used to accelerate innovation, demonstration and deployment of low-carbon technologies. First, *market pull instruments* (such as carbon pricing, target setting, etc.) incentivise by ‘creating markets’. *Technology push instruments* comprise direct support to innovation (such as grants, low interest loans, loan guarantees, etc.). There is a consensus among academics and industry experts that a mix of both types of instruments is needed to address market failures resulting from two kinds of externalities, namely environmental damage and innovation spillover (see e.g. Aghion et al., 2009; Horbach, 2007; Nemet, 2009). The relative importance of market pull to technology push decreases as one moves from technologies close to market competitiveness towards highly immature ones (Grubb et al., 2002). A crucial difference between these two types of instruments is, however, that technology push directly supports domestic firms and innovation while market pull is open to external players as well (e.g. it can also pull innovation in foreign countries who then sell their products inside the EU). Instruments aiming at accelerating growth within the EU

technology sector will therefore likely be biased towards technology push. It will hence be of utmost importance to well coordinate such European technology push.

2. A common EU approach to transforming the energy system

Any EU involvement should be justified. EU action must not go beyond what is necessary to achieve the high-level objectives and should only be taken when it is more effective than actions at national, regional or local level. From an institutional perspective, there are shared competences between Member States and the EU regarding the achievement of the European energy policy goals – i.e. the completion of the internal market, a sustainable and environmentally friendly energy system, and security of energy supplies (Art. 194, Treaty of the Functioning of the EU). But one has to assess carefully economic rationales for any centralization and harmonization of policies at the EU level.

First, there might be the need to coordinate national policies that aim at correcting market failures, since heterogeneity among Member States might lead to distortions in competition. The currently implemented bottom-up approach with 20-20-20 targets being specified in EU Directives that have to be implemented into national laws indeed resulted in a wide set of market pull and technology push instruments whose efficiency and effectiveness should be reviewed. Besides, a harmonised approach to policy instruments would also reduce the cost of technology demonstration because projects would not have to prove viable under different policy schemes.

Second, the coordination of support to innovation would avoid costly duplication of RD&D, which is especially important for capital-intensive technology demonstration. A common EU funding scheme would also ease coordination of funding and decrease free-riding in the sense that Member States would only fund technologies that are produced within their own borders and free-ride on other countries to push other technologies. In a similar vein, pooling of EU funds yields immediate synergies for funding decisions. Hence, dedicating a share of EU ETS emission allowance allocation revenues that then could be used for centralized funding probably would ameliorate the coherence of funds for technology push. However, the main risk inherent to an EU approach is that ‘wrong’ technologies might be supported on a large scale, and costly lock-in into targeted technology paths occurs.

Third, most of the single Member States simply are too small to implement certain instruments (such as an emission trading scheme) or to compete on a global scale with economies such as the US or China. Joining forces and benefitting from synergies can be important to survive on the global stage. Moreover, when joint action is taken, technology-, but also industry- and trade policy are more credible towards world market competitors, while also being more credible for attracting investment in clean technologies towards European players. Last but not least, also for overcoming the financial crises and relaxing funding constraints, the EU has to play its role, as most of the Member States cannot deal with the financial crises alone, which clearly is a European problem asking for European solutions.

3. Support to research and innovation

Smart choice of public support instruments. Subsidies in the form of grants and contracts are by far the preferred policy instruments to fund clean energy innovation of any type. This has good reasons; however, this instrument should only be used as an instrument of last resort. Olmos et al. (2011) provide an in-depth analysis on how appropriate financing policy instruments should be chosen to spend the limited public money wisely. The form of direct public support needs to be tailored to the features of each innovation project –

depending on both the technology targeted and its level of maturity – and to the type of entity best placed to undertake the respective RD&D.

Public loans are well suited to finance lower cost innovations with well quantifiable future market prospects carried out by large companies. They become relevant if the liquidity of the capital market is low or in recessions when private credit markets' appetite for risk is unduly depressed. Publicly owned equity is suitable to finance risky, potentially highly profitable, innovation preferably undertaken by small entities. Subsidies in the form of technology prizes shall fund early low-cost innovation preferably undertaken by research institutes. Tax credits and other benefits related to RD&D investments are best suited to support near-market, incremental innovation conducted by large companies. Grants and contracts – on the one hand the most attractive form of support from the innovators' perspective but on the other the most expensive instrument – should only be awarded to socially desirable clean energy innovation that would not be undertaken otherwise and where all other instruments would fail. This is clearly the case for most early-stage, capital-intensive processes as well as for many other pre-deployment RD&D activities.

Encourage efficiency while not discouraging private sector participation. Spending public money wisely also involves a smart design of financing policy instruments. First, supporting institutions should use competition for funds whenever possible to set incentives for high efficiency and minimize public intervention. The public sector should avoid picking winners and instead leave this decision to the industry. Second, public funding should be output-driven whenever this is compatible with the engagement of private innovators, which involves making the release of funds and their amount conditional on the achievement of some minimum objectives, linking support to key performance indicators. Finally, the institutions set up to allocate funds to clean energy RD&D should be lean and flexible enough to avoid institutional inertia and lock-in, which make it hard to reallocate funds when it becomes clear that the original projects turned out to be less promising than expected. Any strategy of directed technology push favouring specific technology options needs to involve a phase-out strategy.

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3 October 2012

Antony Froggatt—Oral evidence (QQ 34-59)

Evidence Session No. 2

Heard in Public

Questions 34 - 59

WEDNESDAY 14 NOVEMBER 2012

Members present

Lord Cameron of Dillington (Acting Chairman)
The Earl of Caithness
The Earl of Courtown
Lord Giddens
Lord Lewis of Newnham
Baroness Parminter
Lord Plumb
Lord Renton of Mount Harry
Lord Whitty

Examination of Witness

Antony Froggatt, Senior Research Fellow, Energy, Environment and Resources, Chatham House

Q34 The Chairman: Mr Froggatt, thank you very much for coming to see us. We are a very relaxed committee, but it is a formal evidence-taking session and a full shorthand note will be taken, which we will put on the public record in printed form and on the parliamentary website. You will be sent a copy of the transcript for you to amend any minor errors. The session is on the record as being webcast live, but we do not think anyone is listening so I would not worry about it too much. I have read your document *Coal Financing in Europe: The Banker's Dilemma*. I am not totally convinced that bankers have much control over the delivery of the EU's climate change objectives. I was wondering whether you do reckon they have any control, and what intervention is needed by policymakers in light of your response in terms of both coal-fired energy and other forms of energy.

Antony Froggatt: Within that project we had a closed workshop with different financiers and financial institutions to look at some of the questions they were facing. You see different policies by different institutions on this issue. You have HSBC, BNP Paribas, Société Générale or WestLB, all of which have developed specific policies that define the type of coal projects they would like to lend to. As they are global institutions, some have a range of policies, in particular separated between developing and developed countries. That defines the standards they would like to see or require from any investments they make. For example, they would say, "We will invest only in a coal station that has an efficiency

ratio of, say, 43% or 46%.” Therefore, that defines the type of project they would invest in. In that way it has a direct impact on EU climate objectives, because clearly the higher efficiency coal stations will emit less CO₂ per kilowatt-hour.

Q35 The Chairman: If you take a country like Germany, which has closed down all its nuclear stations and is about to build 17 new coal-fired power stations, is the view of the bankers going to have much influence over its national energy policy?

Antony Froggatt: Perhaps I may first say a word about Germany. Germany has closed down eight stations and is intending to close down the rest by 2023-24. Within that framework of its *Energiewende*, it is proposing to increase the use of renewables, achieve higher efficiency standards on both the use and supply sides within the coal sector, and meet its existing climate commitments—a 40% reduction of CO₂ by 2020.

In terms of coal within Germany specifically, there are two issues to note. One is the number of stations that will close. The EU has specific objectives in terms of non-CO₂-related emissions—particulates—that is leading to the closure of a number of stations, as we are seeing in the UK. How much of that will close and over what time scale is not clear, but it is a significant percentage, as we have in the UK. Some of that is replacement.

Secondly, there is a significant difference between what is under proposal or planning and what will actually be built in Germany. It is a very interesting time in terms of the financial state of the utilities and what new capacity might be built, in part because of the significant penetration of renewables and the impact that is having on the market and the delivery of electricity. It is suggested that 14 GW is under planning and construction, but I would suggest that what will be built will be significantly less.

The final point on coal is that it is important to separate hard coal from lignite. Lignite is far worse from an environmental perspective, but the drivers from a social perspective are also significantly different. Basically, you do not ship lignite; you mine it and burn it there and then, because it is much more expensive to move. It has much larger local social issues.

Perhaps I may add one more point, because it is one of the questions in here and leads on from what is happening in the energy market in Germany, which is a really important issue going forward to 2050 within the EU, not just because of the phase-out and change in energy policy. Already Germany has a very ambitious and, I would argue, successful programme to put renewables on the grid. Over the last three years about 7 GW per annum of solar has come on line. They now have up to about 30 GW of solar capacity. On sunny days in Germany this is having a marked impact on the availability of different electricity sources and on price.

In Germany the wholesale price is falling. One of the complaints of neighbouring states is that the price is now affecting them as well. People were asking what would happen with the German phase-out. Would Germany just import nuclear electricity from France or Czech coal, which would be an abdication of environmental responsibilities? But we are seeing large exports of electricity at particular times, because of the large penetration of renewables. If we continue on the path of increasing penetration by renewables, what does that mean for the market and market actors—the current large utilities that are no longer getting the market prices they were for their electricity?

Q36 Lord Lewis of Newnham: The price of electricity in Germany is so significantly higher than in this country.

Antony Froggatt: It depends on for whom. For domestic consumers the prices in Germany are €0.25/kWh and in UK, €0.14/kWh, for industrial users, €0.125/kWh in Germany and €0.098/kWh (both sets are including taxes). In part, this is because of the payment for renewables. There is an additional tariff, which is going up and has created a political storm in Germany as it starts to realise what the cost of renewables is to individual consumers. It does not apply to industrial users, so they do not pay that. In some ways they are benefiting because the wholesale price is falling and they are not paying the renewables tariff. The number of companies declaring themselves as heavy industrial users has increased significantly in order to come within that category from about 200 to over 1,000 companies. One figure suggests that industry uses around 19% of the country's electricity but is paying less than 1% of the renewables tariff.

Lord Lewis of Newnham: This is the difference between domestic and industrial.

Antony Froggatt: Exactly.

Lord Lewis of Newnham: The ratio in this country is certainly different.

Antony Froggatt: Yes.

Q37 Lord Lewis of Newnham: If one remembers the situation in Denmark, when it went over to wind as one of its primary sources, one of the difficulties was that when it had insufficient wind it was able to import from Norway and Sweden, but when it had an excess it had to pay Germany to take the electricity from them. It seems to me there is a balance here between over- and under-production. This puts tremendous loading on to what the Germans seem to be directing their effort towards, which is a European grid system that will allow it to feed into this particular problem.

Antony Froggatt: I agree. One of the points I was trying to move towards is that greater penetration of renewables will drive market reform in a way that maybe we did not see in previous attempts. There are four areas one would look at to address the idea of intermittent renewable energy production. One is related to greater interconnections. The second is to do with more strategic use of electricity, like the introduction of smart grids and smart appliances. Fridges come on when you get a certain frequency and you can use it in that way. Another is electricity storage, which currently is very expensive and relatively restrictive, and finally there are capacity payments, in terms of having standby capacity to come on line and enable you to meet demand all the time when needed. There are four mechanisms to consider, and countries are looking at these in different ways. They have different stages of technologies and potential costs. The question is how you bring those in.

Q38 Lord Lewis of Newnham: We are going to talk about the grid in a moment in one of the further questions. As far as coal is concerned, Germany has implied it is not going for the carbon capture and storage scheme, so how is it going to deal with the 2020 and 2017 directives dealing with emissions from power stations?

Antony Froggatt: I would separate the question of particulates from the CCS question. What do you do in order to meet the shorter term environmental regulations associated with the coal sector? Some of that is early closure. Then the question is: do you retrofit? That depends on how long you intend to operate the power stations. Does it make financial sense to do so?

As to CCS, across the EU it is probably going much slower than people anticipated a few years ago. We are not seeing the demonstration projects that were intended either through

the recovery plans or the use of some of the ETS money. All countries are going much slower than was anticipated.

Q39 Lord Lewis of Newnham: Have there been any CCS projects in Europe that have worked?

Antony Froggatt: There are demonstration plants but not at scale. The question is not just about the capture of carbon but the whole transportation and storage of it. One needs to be able to demonstrate a viable system rather than just a particular technology. If you look at how technology develops, it is not usually the first generation of technology that is at scale. Usually, you have a pilot project and then a demonstration. You may have a second series of demonstrations before you go into full-scale production. The concern in terms of CCS deployment is that, if we are looking at these multiple stages, we are already at the beginning or half-way through that one and not moving fast enough, if we want to be able to prove that it is a viable technology.

Q40 Lord Giddens: If I may make a comment before I start my bit, in his interesting new book Dieter Helm argues that managing intermittency with capacity payments, or whatever method you choose, has a hidden impact on the orthodox sources of power generation, because they have to have more stock to deal with the intermittency. That produces costs for the orthodox part of the power system. I had not thought of that before he mentioned it, and it is quite a significant point.

Antony Froggatt: I would agree.

Lord Giddens: You need to overstock what you need.

Antony Froggatt: Do you mean over-stocking in terms of the amount of capacity?

Q41 Lord Giddens: Yes, because you have to defend against intermittency. Therefore, his point is that it is more expensive than it might appear.

Antony Froggatt: There are four different mechanisms for which you will have an increasing requirement in order to balance the grid in that way.

Q42 Lord Giddens: I understand that, but it is quite an interesting point. As someone who has been working on this issue quite hard, it had not really occurred to me before that to manage intermittency you must have more capacity in the orthodox system than you would otherwise have, if you were not using intermittent sources of power. Therefore, you have a hidden cost to the orthodox system, whether it is gas, coal or whatever it might be, because you have to make up the odds for the intermittent use and store that in the orthodox power system, because there is no way of storing electricity on a large scale that we know of. I found it an interesting point that I had not really thought about before.

My mission is to pursue with you Germany, which has already been mentioned. It is really important to our Inquiry, and coal is as well. Renewables will play a part in both generating jobs and cutting down on carbon consumption, but we must cut down on the use of coal because that is the easiest and most effective way of reducing carbon emissions. We have seen the impact of shale gas in the US in promoting the decommissioning of coal-fired power stations. Germany is interesting because it is such a mixed bag. When you go there, the moral atmosphere and people's attitudes to renewables are so different from here. On the other hand, you have lignite-fuelled power stations. I would like to hear your views on what will happen with the German experiment, because it is an important and real-life experiment for Europe. Will the Germans be able to control dependency on fossil fuels that will

otherwise undermine what they are doing with renewables? To me, that is still a very open question. The decision was not taken as a long-term strategic one; it was purely a political off-the-cuff decision to close down the nuclear power stations. Even though the SPD before Angela Merkel came along had that policy, she took the political decision. First, I would like your take on what you think is going to happen in Germany and its implications for Europe. Obviously, it has implications for all its neighbours and so forth. Secondly, could you comment on the German solar industry? Germany had a solar industry and then the Chinese moved in. There are cases going on in the EU at the moment about solar dumping. What does this show for the future of European industry as it tries to create a renewables sector that will generate jobs and cut emissions? Are there lessons there? Thirdly, what do you think of energy efficiency? Having worked on that issue quite a lot, there tends to be a lot of empty hype about it. Unless you cut consumption, you do not get very far by simply making producers more efficient. It just depends on how people use their extra income and whatever other resources are provided. To me, Germany is an ambivalent country. When you drive down the autobahns there is no speed limit; people are powering down there in massive Mercedes alongside windmills. Unless you cut down carbon consumption, the savings and even the jobs you release by energy efficiency in some sectors might simply be outweighed by increased carbon use. The Jevons paradox, which is a pretty worked up theorem in economics, is that the more efficient your economy, the more energy you use, not less.

The Chairman: We ought to let you have a chance to answer all of that.

Lord Giddens: They are three questions; they are shorter than the original questions down here.

The Chairman: I do not know about that.

Q43 Lord Giddens: Sorry, I am probably rambling on.

Antony Froggatt: Coal in Germany is a vital issue in terms of its electricity source. It is the largest of the sources in terms of the provision of electricity, its social issues given the use of lignite and its political ramifications. The SPD is very closely connected in certain regions to coal, and therefore that influences policy to some degree. Maybe I am repeating myself and I spent too long on the opening question.

Lord Giddens: Do not if you feel it is unnecessary.

Antony Froggatt: It is very clear that a large build is on the table, and the question is how much of that will get built. There is more likelihood that lignite will be built because it has a different social consideration within all the political ramifications and decision making. It also depends on what happens with renewables. As we have discussed, renewables are changing the way in which the market is operated. If the market price of electricity is lower, profit margins are lower for the utilities. How much of the base loads do they want to build, and how much will they move towards more flexible power stations, which are usually gas? Are we going to see this as a driver of greater construction of gas stations in order to balance renewables within that whole balancing mix? That is a possible scenario, but it comes back to some of the social conditions around the SPD and perhaps lignite. It is very important and one has to see how it will develop.

As to the renewables industry, it has happened in lots of different sectors, hasn't it? Europe has developed the technologies, skills and expertise, and manufacturing has taken place in other parts of the world. China can manufacture solar panels cheaper than Germany. The production price of solar PV panels has fallen by 80% in three years. That has brought

benefits, because it has enabled the German feed-in tariff to be reduced at a faster rate, because the two are linked through a certain mechanism, but clearly some of the manufacturing jobs have disappeared and gone overseas. Yet the German solar industry is not just about manufacturing; it is about installation, maintenance and a whole series of other issues. A percentage has gone away, but in Germany there are probably still more jobs per kilowatt-hour than in other sectors. I do not know that for sure, but I imagine that is the case.

Q44 Lord Giddens: What we are supposed to be doing is to look at possible energy investment in Europe in relation to both decarbonisation and job creation.

Antony Froggatt: Right. There are approximately 350 000 people employed in the renewable energy sector in Germany according to a publication from the International Renewable Energy Agency in 2012, however, I am not sure, and how potentially that will change over time in terms of how many of those are in manufacturing and how many are in installation and maintenance.

Your final point is fundamental in terms of energy efficiency. The renewable feed-in tariffs were introduced in 2000 or 2002, and in the 10 years that followed that, through to 2012, electricity demand in Germany increased by 10%. You are right to point out that, unless you address it, overall it is not going to affect emissions in a significant way. The new plan proposes that electricity consumption will fall by 10% this decade. It will be a remarkable achievement. It shows that they have identified the point you raised: that you need to address this and reduce demand, not just become more efficient, if overall you are going to use energy efficiency as a mechanism to reduce emissions. You can see the steps being taken to try to achieve that in terms of work with industry, domestic consumers and so on, but we have to see whether or not this is successful, which is why we look to Germany and what it will achieve in the next few years.

Lord Giddens: If I may say so, we have made very little progress in changing consumers' lifestyles in relation to energy. That is a big unanswered question to me.

Q45 The Earl of Caithness: Given your fig.1 indicates that Asia-Pacific consumes five times as much coal as Europe and Eurasia, does it really matter whether Germany becomes the dirty man of Europe by building more coal and lignite stations in the big scheme of things?

Antony Froggatt: Yes. It is a big problem. The *World Energy Outlook* published by the IEA on Monday, which is the reference for many energy issues, has a figure that shows by 2017 we will have invested in all of the fossil fuel infrastructure that we can invest in by 2035 if we are to meet the target of two degrees. That is driven by huge coal investments in Asia, and in particular in China. However, it does matter what Europe does. If we can show that a highly developed society can reduce its emissions, be economically competitive and reduce its dependency on fossil fuels at the same time, that is an important lesson other people will look to. At the same time, we will be developing technologies, as we have seen in the case of solar PV. It was the German feed-in tariffs that stimulated the market. That market has gone into Italy and is now moving into Japan. China itself is setting itself targets not just for construction but the deployment of renewables, but it is still hugely dominated by coal. They are saying they want all energy resources—renewables, nuclear, coal and gas—because of the massive increase in electricity demand predicted in the coming years. Unless we make attempts to deliver viable options and show that they work—not just talk about them but demonstrate that they are being used in Europe—the coal story will continue.

Q46 Lord Renton of Mount Harry: We are specifically a European Union body; that is what we are meant to look at. I would very much like to hear what you think other EU countries are likely to do. We know there is a renewable energy target by 2020. What do you think they are going to do? Do you think that mainly they will be reducing their reliance on nuclear, as Germany is doing, or not? What is France's position likely to be? Do you think that in the end nuclear will be a core part of the low-carbon energy mix, and perhaps this should be championed by the European Commission, and that is the way the European Commission should go?

Antony Froggatt: Within the framework of the EU, energy is in a strange position. It was only within the Lisbon Treaty that it became an area of joint competence, yet the language within it says that the energy mix is up to the choice of the individual member states. That is one side of it. On the other side, you have the Renewable Energy Directive, liberalisation directives, emissions requirements and potentially CCS. You have a whole series of legislation that does affect the choice of member states. Nuclear remains politically divisive within the EU. You can divide the member states between those that do have nuclear and those that do not. Post-Fukushima one sees a remarkable difference in response. You have the German response, which we have discussed. In Italy there was a referendum post-Chernobyl and it phased out nuclear power. Under the government just prior to Fukushima, legislation had been tabled to reintroduce nuclear power. There was another referendum post-Fukushima that said they could not have that legislation. Belgium reverted to its previous position of phasing out nuclear power. The UK has said it will continue largely as it was prior to Fukushima.

Q47 Lord Renton of Mount Harry: France?

Antony Froggatt: France is different. It is difficult to know where it will go because there is a difference between policy statements. The new administration has said it will reduce dependency on nuclear energy to about 50%, by 2025. It comes down to the nuclear question. You need to divide two issues: existing nuclear power stations and whether you do plant-life extension. Most of the power stations in the EU-15 were built in the 1970s and early 1980s, and they had a nominal design life of 30 to 40 years.

Lord Renton of Mount Harry: Like ours.

Antony Froggatt: That would be the point I would make. If you do not do life extension of the AGRs and you remove Sizewell, which was later, you have basically a similar phase-out timetable as Germany in terms of when you see the rapid reduction of output. That is an industrial rather than politically driven decision. The first question is: do you do life extension or not? The second question is: do you build more? Life extension is much cheaper than building new stations, and is probably cheaper than other renewables or potentially CCS. The jury is out on whether or not nuclear is cheaper than other options, and it depends on the figures you take. EDF has not commented on what it wants the strike price to be, but lots of press and analysts have suggested that it is over £100 per megawatt-hour, which puts it in a category similar to many renewables, potentially CCS and offshore wind. The economic case is not there in the same way one would argue it might be for PLEX, but plant-life extension has other issues from an environmental perspective. Germany closed its oldest stations as a result of Fukushima; it said it wanted to close those ones from an engineering perspective.

Q48 Lord Renton of Mount Harry: What about shale in the EU?

Antony Froggatt: Shale gas is a global game changer. In terms of energy mix, it has gone from 1% to 20% in a decade in the United States. Everyone is now looking at whether that is applicable to the European Union or other parts of the world. I refer you to the *World Energy Outlook*, published on Monday, which has a whole section on this. Quite interestingly, through to 2035 it showed that the contribution to the EU by shale gas was very low. People are looking at it from a technological perspective. How appropriate are the technologies? The so-called shale gas boom was a result of two technologies: a change in the actual drill bit and horizontal drilling. I am not an engineer, but people have suggested to me that some of these technologies are applicable to certain geologies and not others. It may not be just a question of infrastructure. Other people say that shale gas may be less easy to develop in Europe because we do not have the infrastructure and the licensing process will be different. We are much more compact in terms of human activity and a whole series of other things, but others suggest that it may be engineering as well. Therefore, it is unclear how much it will deliver and over what time scale, but shale gas is important in its impact on global prices, which is changing the way it affects our energy mix within the EU.

Lord Lewis of Newnham: This illustrates the point Lord Giddens was making, which is simply that we are very sensitive to changes in technology and the rapidity with which it is changing here. As far as shale gas is concerned, one of the big attributes as far as America is concerned is that it contains a lot of C₂ and C₃ components, which are being used by industry rather than directly by energy factors. One is not sure what the shale gas composition is going to be within the European scene as a whole. Can I come back to your point about individual countries? It seems to me that subsidiarity is a great concept. I can understand why in the Lisbon Treaty it was allocated in that particular way, but the reality is that, if you want to deal with the energy problem of Europe as a whole, you have only to look at the point you have been making about Germany and the grid system. If you are going to have a grid system, it will have to go across Europe. The introduction of renewables into the grid system involves a different type of approach from using it in the conventional method; and, as you say, the storage of electricity is another major problem. How far do you believe there ought to be a European approach to this particular problem? As far as the grid is concerned, I cannot see any other alternative.

The Chairman: Perhaps Lord Caithness should ask his question, as he may have other aspects to put.

Q49 The Earl of Caithness: I would like to follow up what Lord Lewis was saying. Could you explain how the current EU energy infrastructure and interconnection works and how it should be developed given all the many variables that are going to happen? Do you see one market or four markets, or the north-western Europe one and the southern Europe one?

Antony Froggatt: It is clear that there is an overriding advantage to having greater interconnection, particularly as you move towards greater use of renewable energy. That is a strong driving force for change. The other strong driving force is the need to invest in the infrastructure in any case, both because it needs to be replaced but also because you have different populations in different areas, different power stations and so on, so the grid is changing to some degree in any case. They are suggesting that the anticipated cost of energy infrastructure over the next decade is about €200 billion. I think that just over €100 billion of that is within the electricity sector and the rest is for gas and a small amount for carbon dioxide, assuming that takes place. Given that level of investment, there needs to be a greater number of actors involved in that. It will not just be the individual utilities; it is governments and the private sector, all of which need to understand the system and be

confident that they are going to get a return on their investment. The EU recognises this. The Connecting Europe facility will provide a percentage of this. The energy part from them is €9.1 billion. Some of this investment will come from the existing system of regulation within member states to pay for it, but what we are seeing in the regulation of infrastructure is continual identification of priority areas, projects of common interest and priority corridors—you can see where these are located, and the North Sea is one of them—whose development they will aim to assist, because they are in the common European interest, through financing, assistance in streamlining the licensing process, and devising or agreeing mechanisms about who pays for which parts of it. Europe does recognise that you need a common European electricity market and to move away from more regional markets. It is part of the process that people are putting forward. It is ongoing, and there is widespread support within the EU for these developments.

Q50 The Earl of Caithness: How is that going to work in practice when, picking up your earlier point, Germany decides it wants to do quite a lot of solar and disrupts the market in the neighbouring countries around it in a nicely selfish way? This is going to be an increasing problem, because if Germany can do it, a lot of the southern European states can probably do it cheaper and better. How do you get a system that can absorb these sudden changes in renewables that are likely to affect it in the future?

Antony Froggatt: There are different mechanisms, one of which is interconnection. Other mechanisms exist already. If there is more interconnection, there is a wider area from which you can draw different renewables. This is part of the balancing. Some people have a vision of a renewable super-grid that balances the biomass in central Europe, the hydro in Nordic regions, offshore wind in the North Sea and solar in southern Europe and North Africa as large production sources. That is one vision, but coupled with it is a much more distributed system in which there is more local balancing as well. Greater interconnection does give you these opportunities. The means of moving forward in recognising the need for investment to utilise interconnection as a balancing mechanism is there, but we need to speed up that development. The renewables directive encourages and requires larger penetrations of renewables not just in Germany but in other places, so the technology needs to be put in place quickly to maximise the efficient use of those renewables.

Q51 Lord Lewis of Newnham: We have been talking very much about the climate change aspect of energy, but the other very significant factor is the energy security problem and the sensitivity of various member states towards their own energy security. Where do you see the greatest concerns in energy security?

Antony Froggatt: It varies from member state to member state. Historically, the central European countries have been much more concerned with dependence on Russian gas than many of those going further west. The reasons for that are clear. We have seen how in the last decade Russia has played with the gas taps, or reduced gas flows, to seek influence, particularly in Ukraine, and that had an impact on Hungary as a member state. Russian gas dependency is an important issue.

We talk about the role of technologies in this. The increased use of LNG is remarkable in terms of how quickly this is happening in the UK and the Netherlands in particular, which were large gas producers. They have gas infrastructure and so on and they are moving into LNG, so its role is increasing in the global gas market. That brings energy security in a way you do not have just with pipelines. Some of the concerns are being reduced, and the potential for shale gas going further forward may also help to alleviate some concerns about

gas supply for central European countries, if that were to come about. That is a clear area of concern.

We have focussed a bit on electricity, which is my background, but we should also look in particular at transport and oil. It is not so much a question of supply interruptions as energy security concerns leading to price availability and, therefore, the ability of consumers to utilise oil in the way they used to. Transport and its impact on the economies of the EU is an important issue and should not be overlooked.

The EU often looks at import dependency as a mechanism for measuring security of supply. It has significant implications. When the UK became an importer of gas for the first time in 2002, there was an added incentive for engagement by government in energy policy. Looking across the EU, I think the UK is the second least dependent member state on energy imports. It is behind Denmark, but it is in the bottom two, three or four. We have more energy resources than others. However, its importance is overplayed. Of far more importance are interconnections and access to other resources, rather than just the percentage of import dependency.

The final issue is that public engagement in this is really important. People argue that nuclear is good from the perspective of security of supply because it reduces dependency on fossil fuels, which is true, but it is also important to look at the other side of it, which is the political security that you have with nuclear. You see sudden changes in policy driven by governments and public concerns. Clearly, in Japan you have such a situation. There are different measures of energy security that are related not just to access to fossil fuels and import dependencies but a wider set of issues.

Lord Renton of Mount Harry: Where do you see the greatest tensions in EU energy policy?

The Chairman: That is the Earl of Courtown's question.

Lord Renton of Mount Harry: I beg your pardon; I take it back. I did not know.

Q52 The Earl of Courtown: We have already touched on this, but everything we have talked about in different ways revolves around tensions in EU policy in many cases, particularly among member states, because certain countries like Germany going down that route could cause tensions related to price and other such things. Where are the greatest tensions? If one were to prioritise these developments in the short, medium and long term, what would they be?

Antony Froggatt: You have the continual tensions that exist between institutions. You have Parliament versus the Commission versus the Council, and the whole process of developing the legislation and who wants to get which bits in for different reasons. As to the overriding tensions within the energy sector, there are probably two main areas. One relates to the future direction of the energy sector and the role of the market versus the state. The UK is on one level. I worked quite closely on the second electricity liberalisation package going through the Parliament. It was quite remarkable. You saw very clearly how the UK was very happy to have no national champion. You have E.ON, EDF and RWE as the major operators in the electricity sector, but in many other member states you would not see the same approach. You had reintegration of national champions. To take the example of Verbund in Austria, the Government did not necessarily want to continue with more hands on but retain influence in the energy sector. That is a different approach that you can see in the relationship between the EU and various member states. That translates to different areas as well. That is the institutional level. We touched upon different member states.

Energy is political, public and environmental, and it raises different levers and that changes over time, so the tensions do come up and down on different issues and energy sources.

In terms of up-and-coming issues, what happens with the post-2020 package? There was a suggestion that in the spring of next year they would start the discussions about the post-2020 package, looking in particular at carbon targets and renewables. Whether or not you have the same political configuration that you had in 2007 to 2009 to enable that package to go through the EU and whether or not globally different things impact upon that, in particular the climate negotiations, will be an area of contention in the next few years.

Q53 The Earl of Courtown: As far as Germany's coal-fired power stations are concerned, could it cope without them? There are great concerns about this form of energy.

Antony Froggatt: It would require significant investment in other areas. It would have to build up gas, probably in the short term. It is a much larger share of electricity than nuclear. Prior to Fukushima, nuclear was about 18% or 19%, so it has gone down to 9% within this period of time, and it is projected over the next decade to go down the other bit. It is a more gradual proposal. Germany is not going to abandon its coal overnight. It is a question of phasing in other things, building less replacement and not replacing any.

Q54 The Chairman: Could you answer a technical question for me? I should know the answer to this. In terms of gas versus coal and greenhouse gas emissions, I know that gas is much better as a transitional source of power. What is the ratio per kilowatt-hour in terms of greenhouse gas emissions, and how much better is it?

Antony Froggatt: A modern gas station produces about 300 to 350 grams of CO₂ per kilowatt-hour; a modern coal station produces about 800-600 grams; and lignite produces about 1000-800 grams. In terms of coal you are moving towards the ultra-super criticals, where you get efficiency ratios of 43% to 45%. They are quite expensive to build and are not widely deployed. Those are in the process of being rolled out. If you move to combined heat and power, you reduce it; and if you use CCS, there would be an 80% or 90% cut in emissions.

Q55 Lord Lewis of Newnham: Are we correct in saying that Germany is not going to use CCS?

Q56 The Chairman: It has set its face against it publicly.

Antony Froggatt: We will see. There are different issues on CCS in terms of its stage of development and the certainty around it.

Q57 Baroness Parminter: I wanted to ask a supplementary about tensions in EU energy policy, in particular between policy and public opinion, but I think you have answered that already. You have given us some helpful examples of that. I would like to take you back to your answer to Lord Caithness's question about the need to respect subsidiarity between member states and, at the same time, the vision of a big European policy, with hydro in the north, solar in the south and us with the wind farms. You said that to make a reality of that vision, it needed to move much faster. Are there any particular things that the European Union is not doing at the moment that it could be doing to make that vision a reality around the issue of infrastructure, regulating the market or supply costs? I want to come up with European blockages to making a reality of that vision.

Antony Froggatt: Things are being put in place. The infrastructure regulation is designed to speed up elements and create a common vision about areas in which a more interconnected market can function. Things go much slower than are envisaged. An example of that is the EU stimulus package, which I think was termed the European energy recovery plan. There were areas in which they said they wanted to do more work. It was designed to be a stimulus package and for the money to be spent quite quickly. I think only three of the projects out of the nine are finished. As to case examples, I have not looked into it but it might be interesting to see what lessons could be learnt from that to bring these things forward.

Financing is a key issue. Earlier I mentioned the figure of €200 billion needed for infrastructure. The total investment in the power sector is expected to be about €1 trillion to build infrastructure, replace power plants and so on. That is well beyond the balance sheets of the utilities. How the EU and member states can use their funds in a coherent way to leverage greater investment within the power sector will be absolutely crucial.

If you look at the big utilities—EDF, RWE and E.ON—they are multinational and of particular importance here is the fact they are multi-European. How much they invest in one member state affects how little they invest in another to some degree. You saw that over the nuclear question here. It was not the sole reason, but it was suggested that E.ON and RWE sold Horizon because they wanted to do more strategic investment in Germany, in part because of the changing political decisions there. We do not want a competition between governments to guarantee that they meet their own investment criteria and therefore offer such incentives that other countries cannot. Maybe coming to an agreement in this area would be really important. It is also worth considering an agreement between utility sectors, because many of them, for example Suez, are not just energy utilities; a lot of it is in water. Again, we will see competition because you need large-scale investment in these areas as well. I do not have an idea of what that would necessarily look like, but it is an area of concern.

Q58 The Earl of Caithness: It seems to me that a picture has been painted of a whole lot of uncertainties and tensions across a huge range of issues.

Antony Froggatt: I have a couple of others that I have not mentioned yet.

Q59 The Earl of Caithness: Given the amount of money that has to be spent, is the present EU structure the right one to solve the problem, or is the whole thing going to be a continual muddle for the next 40 years?

Antony Froggatt: It is important to define the uncertainties. We have talked about policy uncertainty. You mentioned it in terms of China, but the other uncertainty relates to what is going to happen to global demand. If you look at all the projections going forward for fossil fuels, for oil 70% to 80% of the global demand increase comes from Asia. Their growth patterns affect us and clearly are not within our control. We have not touched on the media, but it is an important area in creating uncertainty for public support for different technologies.

To go back to the question, identifying the uncertainties is important. The second thing is creating the longer term pathways. It is impossible to set political targets too far forward, but if the EU and member states were able to look towards 2050 and say where they want to be and what the overriding objectives are, I would argue that from a climate change perspective it is clearer what they need to be. Other people may disagree, but the direction in which we need to go is clear. Then you would look within that at where we anticipate—

bearing in mind the uncertainties about technology development, resource extraction and so on—the EU would be able to meet its own energy resources based on balancing environmental objectives and security of supply concerns. If you can have that agreement, and then within that framework shorter term targets and medium-term objectives—there is a difference because of technology developments, public opinion and so on—it helps to create the certainty you need.

You can look at the state in terms of the EU and the differences that we touched upon; you can look closer to home in terms of the UK Government and public spats on energy at the current time, and what impact that has on investment. If you were a renewable energy investor, you might be a little uncertain about how this is going to go for onshore wind. Understanding the need for certainty within policy is important, but whether or not the EU will be able to deliver that is a different question.

Q60 Lord Plumb: You might agree that another uncertainty underlines research and innovation, which is the basis of everything you have been talking about today. All the evidence we have had so far has emphasised the importance of research and innovation, and the EU has shown some initiative in trying to bring about collaboration. You have spoken well, if I may say so, about the importance of practical collaboration. To what extent do you think there could be better research collaboration between the various bodies who are involved at the moment and the innovators? A lot of the innovators are those who are or wish to be involved in the development process, but they are hesitant to put the money up front at the moment because they do not quite know which way we are going, whether it is wind, wave or whatever it may be, in the whole field. The research behind it is an expensive business, and innovation even more so. Do you see the possibility for greater collaboration there than we have at the moment?

Antony Froggatt: Yes, in particular because companies are no longer really national. Siemens has research facilities across Europe and the world, as do other energy companies. The development of these technologies, in particular in the energy sector, has huge financial opportunities for companies. They need to invest in those and they are doing so. There is always a balance between co-operation and fears over intellectual property rights. We know this is a particular issue in other countries not wishing to deploy certain technologies for fear that the intellectual property rights will be stolen or lost. There is a clear need for more collaboration.

The EU has its own research and development programme. Within the energy sector, quite interestingly, it has a separate research and development programme for nuclear from all other energy sources that goes through EURATOM. That is designed to enhance collaboration and so on. I do not have a clear view about what the next steps would be for greater collaboration except that, in the same way one looks towards the public sector using its financing to leverage greater overall investment, one might want to see the same in an R and D programme using public-sector finance to leverage much greater private financing in particular directions. The problem with that is how good government is at picking winners for technologies, so it is the contradiction of the broadcasting approach versus, “We think this is the right one.” That is always a difficult question.

Q61 Lord Plumb: Is there a body, including you or like-minded people, that gets together to discuss the various possibilities in different countries within the research field?

Antony Froggatt: I am sure there is. The EU’s framework programmes must have bodies that overlook within the energy sector.

Lord Plumb: But you are not familiar with it.

Antony Froggatt: I am not working on them. In terms of the technologies, it is always important to look at what can be delivered in the short term versus the medium to long term. People often talk about the problem that it is not only research and development but demonstration; it is being able to start to show how these do work and ironing out the problems, and that leads to widespread deployment. Being able to fund not only R and D but R, D and D is absolutely crucial.

The Chairman: Thank you very much, Mr Froggatt. It has been a very interesting hour and a quarter.

Antony Froggatt: If there are any issues that require further clarification, I am very happy to respond.

Dr Robert Gross and RenewableUK—Oral evidence (QQ 93-103)

Evidence Session No. 4

Heard in Public

Questions 93 - 103

WEDNESDAY 28 NOVEMBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
The Earl of Courtown
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Plumb
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Dr Gordon Edge, Director of Policy, RenewableUK, and **Dr Robert Gross**, Director, Centre for Energy Policy and Technology; Policy Director, Energy Futures Lab; Head of the UKERC's Technology and Policy assessment function; Convenor of the Energy Policy option, MSc Environmental Technology; Thesis Term Director, MSc Environmental Technology, Imperial College.

Q93 The Chairman: Good afternoon. Thank you very much for coming to see us today. We are very much looking forward to what you have to say. Perhaps I may deal with the necessary formalities. You should have in front of you a list of interests that have been declared by Committee Members. This is a formal evidence-taking session of the Committee. Full shorthand notes are being taken. They will go on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript and you will be able to revise it in terms of minor errors. The session is on the record and is being webcast live and will subsequently be available on the parliamentary website. Would you like to make some opening remarks before going to the questions, or would you like to get directly into the questions?

Dr Gordon Edge: I think I would like to say that European policy is very key for the renewables industry. It has been key in driving us to where we are here in the UK, and we are looking forward to further certainty out of the EU on the 2030 timescale. We think it is

important for the UK to be exploiting the potential of that to the full and get the industrial benefit of having renewable development in the UK.

Dr Robert Gross: I broadly second that. Having looked at the list of questions sent to me by the Clerk, I am extremely pleased that the Committee is addressing some of the issues around, for example, the specificity of policy design, the horses-for-courses argument and how we can best encourage this, most economically and efficiently.

Q94 The Chairman: We have received evidence that the drive to decarbonisation should give us economic opportunities to build industries to drive that along. What do you think that the net contribution will be from this whole process, if it goes ahead—bearing in mind that we will lose jobs in other sectors?

Dr Gordon Edge: I think it is important to compare with a credible counterfactual here. Bills will be rising anyway through the additional cost of carbon and the rising cost of fossil fuels as demand grows globally, notwithstanding any potential for unconventional gas and oil supplies. We need to be clear that the net cost of this may not be very large and may even be negative, depending on where those other costs go. Given that we have specific mechanisms supporting renewables which are clear and visible—there was an announcement last week of the levy control framework and the addition of £7.6 billion in 2012 money to 2020 bills—you will get a lot of net savings out of that. There will be a depressing effect on wholesale prices that renewables will bring through the merit-order effect, which I know you are interested in exploring. There will be the avoidance of fuel import costs resulting in balance of payments benefits. We will see the economic multiplier effect from retaining that money within the UK economy, instead of exporting it to Qatar, Russia or wherever the imports come from. There is also potential for a neo-Keynesian kick to the economy through the high capital spending. Renewables generally have a high-capital, low-running, cost. All the money is spent up-front; and that gets spent in the UK economy in the near future but is paid back over a long period. All these, we think, should have a net positive effect on the economy, but it is difficult to untangle those and work out magnitudes on all this, but I am hoping to do some research work on this in the very near future.

The Chairman: At this moment, it is an assertion, rather than a model. Mind you, most models are assertions. However, is there no model that tries to combine these multiple strands?

Dr Gordon Edge: I have not seen one yet, although I have seen a piece of work that was commissioned by one of our member companies, Acciona, which looked at the relative benefits to the economy of gas and wind. Across most of Europe, it was a net positive for wind instead of gas. It was not in the UK, because we have domestic supplies at the moment, but the more we import, the more that that balance would change. I can easily point the Committee towards that report, if you so wish.

The Chairman: You do not think that your contention that there will be rising prices will be affected by shale gas in the short term.

Dr Gordon Edge: Certainly not in the short term would we see significant quantities of shale gas, even if it was exploitable at a reasonable cost, ahead of 2020. It takes time to build up those kinds of supplies, and it is not clear to me that shale gas is economical. Prices are low in the States only because there is a complete glut of shale gas there and the economy is at a low point.

Dr Robert Gross: Can I just pick up on that? I will deal with the shale gas point, but on the first question on the net economic contribution of renewable energy, one of the hats that

you have me listed as wearing is that of the UK Energy Research Centre, which I will call UKERC from now on, because it is less of a mouthful. We are in the middle of a major systematic review of the evidence on net job creation in renewable energy and energy efficiency. You get studies of a variety of quality, depending on how carefully the studies' authors or their commissioning body want to look. Some count jobs destroyed in other sectors or through prices going up, as well as jobs created; others do not. Some have sophisticated modelling techniques, whereby there are computational general equilibrium modelling, input-output tables and econometric models. Other studies do not do that. The overall story at the moment is that the impact on jobs is difficult to quantify. Macroeconomic quantification is extremely complicated. You are moving money around within the economy. You may be moving money around so that there are regional benefits. You are certainly moving money around so that there are benefits to the producers of wind turbines, for example. It would be good for the UK bill payer if more of them were located here, because at the moment we are, in effect, providing premium prices, and that then flows into expenditure in other countries—albeit our near neighbours in Europe. Perhaps it is kind of us to do that for them. However, it is also important to look at the wider macroeconomic context, which is that it is a great time to build infrastructure. We are in a recession; we need to stimulate the economy; we can borrow money cheaply, or, at least, we ought to be able to—and certainly if the Government backs it in some way, we should be able to—and we are, in effect, with renewables and non-fossil technologies, potentially swapping assets for fuel at some point in the future. It should be a good time to do renewable energy, to do transmission upgrading and get the benefits of that in terms of jobs, but proving that through an econometric model is difficult and challenging. On the prices and shale gas issue, I share Gordon's general scepticism on shale gas as a kind of miraculous game-changer in Europe and outside the US. One of the things that it is doing is making coal flow around the world more cheaply. We are benefitting from that at the moment because we have a bunch of old coal-fired power stations that have written down their capital costs and the wholesale price is following their marginal cost, their fuel costs. That means that wholesale prices in this country are below least-cost, new-entrant levels. What that means is that regardless of renewables, nuclear and the rest, when we close those old coal-fired power stations and replace them with gas-fired stations, it is likely that bills will rise.

Q95 Lord Lewis of Newnham: Can I turn to emission trading systems? We have heard a lot of evidence and various views on this arrangement. It was initiated in a very much different economic situation than we are in at the moment, but one of its features was that it certainly was hoped that it would encourage investment in renewable energy. Has there been a significant contribution from the ETS, and how would you design it to increase or deliver this form of investment? Have you any views on how this could boost the carbon price, perhaps through a floor price?

Dr Gordon Edge: The short answer in terms of whether it has encouraged directly more investment in renewables is no, because the price has been too low and too volatile, and the system has seemed to be too political. There is a lot of discussion and bickering at EU level as to what level of emissions should be allowed through the system. The difficulty that the Commission has had in making its proposal just to back-load the €900 million tonnes of allowances in the current period, let alone actually withdraw them or set some kind of reserve price on auctioning, makes it difficult to depend on that. We would like the system to be dependable, because in the longer term, for our technologies, we would like to move away from a situation where we have a specific support that is obviously easy for people to take pot-shots at. We would eventually like to move to a situation where it is clear that this is about supporting low carbon across the board, but we are not yet in that position. I know

that Dr Gross has a lot to say about targeting support. We very much believe that you use a target to get you to the point whereby being supported under a carbon price alone is feasible. That may happen relatively soon for onshore wind; it will take longer for offshore wind. For marine technologies, it is a long way down the line. However, it would be politically safer for us to be in that situation, but it would require there to be reform of the system. A reserve price on the auction would be the kind of step that you would need to take, in order to have that base level of carbon price in the system.

Lord Lewis of Newnham: What sort of price would you anticipate to be reasonable?

Dr Gordon Edge: We do not have a direct view on where the price needs to be exactly, but where the Treasury has pitched the carbon floor price, at least for 2020, is not a bad starting point.

Dr Robert Gross: I share much of that, actually. If we had a more stable price regime and higher prices, very few economists would dispute the notion that that should be a good thing in terms of encouraging low-carbon investment and discouraging high-carbon investment. However, the carbon floor price, carbon trading or a carbon tax affect marginal decision-making, but not necessarily long-run decision-making, unless they rise to a very high level. In particular, a more stable carbon price would help to insulate us against the shale-gas displacement effect that I mentioned earlier when coal prices fall. It would make it more likely that we would invest in gas. It would make it more likely that we would try to make industrial processes as efficient as possible, although, to be honest, the incentives to do that are already strong because they are energy-intensive, and energy bills make up a large fraction of their entirety. It is therefore in their interests to do that. What we are essentially looking at with things such as renewables and nuclear is building assets. Financing those assets requires the kind of revenue stability that the Government are hoping to deliver through their electricity market reform, a reform which other Governments have been delivering for a long time through their feed-in tariffs for renewable energy, or which you could imagine delivering through treating those assets as equivalent to the national grid, putting them on to the regulated asset base, and allowing monopoly owners to make a regulated rate of return that, again, provides investors with the financial security that they would require. Although I certainly hope very much that the Union can continue to make progress on improving the ETS and send a stronger price signal, I do not see it in this decade as being particularly relevant to most renewables, to CCS or to nuclear. It will be relevant to the cheapest renewables some time fairly soon. It might apply to wind or co-firing of biomass.

Q96 Lord Whitty: You two are agreeing too much. I wonder whether on this question I can discern a difference between you, which relates to the wholesale price and its effect on investment. Gordon Edge mentioned the merit order, and the paper from RenewableUK argues that, partly because of the merit order, high levels of wind generation will lead to lower wholesale prices for electricity and, therefore, in one sense, offset the up-front costs of investment. Whereas, Dr Gross says that because of the uncertainties relating to renewables in general and wind power in particular, those projects are more risky and there is therefore a deterrent effect on investment. Am I representing you both correctly? If so, please discuss.

Dr Robert Gross: I hate to disappoint, but I think we agree on this as well. We do disagree about things and I am sure that we will find some more. We will try to be more disagreeable with one another. The merit-order effect has been documented recently. Moody's published something looking at the relationship between wholesale price movements and windiness.

Two things are being conflated here. The paper that you cited certainly argues that we need something more like a fixed-price support system, such as a feed-in tariff system, because of the uncertainty of wholesale prices over a period of years. I always ask people to cast their minds back to the early 2000s, when wholesale prices were extremely low because gas was extremely cheap, and British Energy had to be bailed out by the Government, despite the fact that a large amount of assets were bequeathed to it at privatisation. That was because British Energy could not cover its debts when energy prices were low. If I was investing in a wind farm or a nuclear power station, I would have a long enough memory and would know enough about the uncertainties that we have discussed with regards to shale gas and other things to be able to envisage a period of perhaps years when gas prices fell, wholesale prices also fell, and I struggled to finance my investment. That is the main case that the Government have accepted in electricity market reform for their contracts for difference. That is slightly different from the merit-order effect, whereby over a shorter-term period, when it is windy, marginal prices fall. The difficulty that that can create, if we are in a system where wind, for example, gets part of its revenue stream from the sale of electricity, is that it—although I do not like the term—cannibalises its own economics. In effect, that is what happens. When it is windy, the wind plant comes on, wholesale prices fall and wind farms get less revenue for their electricity sales. We want wholesale prices to move up and down and to encourage efficient dispatch of plant. If it is windy, we want the fossil plant to come off the system because, basically, that is the idea—wind is a fuel saver. The trick and the challenge is to maintain those incentives for efficient dispatch, while at the same time ensuring that investment stability is created for would-be investors in renewables.

Dr Gordon Edge: There should also be stability for investment in non-renewables, because the merit-order effect—the impact of having a large amount of low marginal cost renewables, and zero-carbon and low-carbon nuclear, which also have low marginal costs—pushes the market price to be very volatile and uncertain. It makes the economic case for investment in, for instance, an unabated gas plant very difficult. We therefore understand why the Government are putting forward a capacity mechanism under their electricity market reform, but it is, frankly, the flip side of having a large amount of high-capital, low-marginal cost technology on the system. It makes the system uncertain for other investors. That Moody's report to which Rob referred was very much focused on the impact on the traditional thermal generators of having a lot of wind and solar, particularly in Germany.

Dr Robert Gross: The point in your question about lower wholesale prices partially offsetting the cost of supporting such technologies is a correct assertion. When the Government calculate the cost of the renewables obligation to consumers, they run some models of the functioning of the power market, which allows them to calculate the effect on the current fleet of power stations of having these renewables on the system. Although that is not of equal magnitude, it partially offsets the cost of providing support for renewables through the renewables obligation. The Government do actually report that in one of their graphics on the DECC website, showing the merit-order effect giving some money back to consumers after the renewables obligation has taken some money away from consumers. Unfortunately, the renewables obligation takes more money away from consumers than the merit-order effect gives back. The Germans, in particular, have looked at this quite carefully in accounting for the costs and benefits of renewables.

Q97 Lord Whitty: One other effect of price instability is what happens in the wider global market. Two years ago, Mr Putin more or less set the gas price. Now, shale is undermining all that and a lot of other presumptions about pricing. Given that, how far can you get closer to stable prices in the European and domestic market?

Dr Robert Gross: Do you mean for gas?

Lord Whitty: I meant for anything, really—relative prices.

Dr Robert Gross: What we see at the moment is essentially three prices for gas globally. The Henry hub American price is the lowest, there is an intermediate price in Europe and a much higher price in Asia, for various reasons to do with the tyranny of distance and the difficulty of transporting gas. That obviously creates an opportunity for arbitrage and one would expect those gaps to narrow. How quickly that will happen will depend upon some decisions that the Americans will make about how much of this they desire to retain to give them a competitive advantage; and it will depend upon investment flows in response to high prices in Asia. I suppose the fundamental question is: should we expect gas prices to be less volatile? I just do not see any reason why we would expect that, given that gas and oil prices are high. That is moving us into unconventional resources in both instances. Exploiting those unconventional resources is, by definition, more expensive. That is why we have not gone after them before. We will get better at that, and the costs of exploiting those unconventional technologies will come down. Similarly, we can get better at exploiting non-fossil alternatives if we try, and the costs of those alternatives will come down. It is almost as if the world is facing a path-dependent choice of where it puts its effort in response to high prices, volatile prices and prices that are still high in the face of a huge global downturn.

Dr Gordon Edge: To answer Lord Whitty's question in terms of equalisation and stability across Europe, they are dependent on two things. One is physical interconnection, so that we can trade those resources across borders, and there is regulatory intervention—market coupling and market integration. Being able to trade across borders will then dampen the volatility and equalise the prices more across Europe. That will be of benefit to the whole European Union and consumers across it.

Q98 The Earl of Caithness: I want to move on to picking winners. We heard from our previous witness the dangers of government trying to pick winners by giving too much money to one particular sector. Do you agree, first, that renewable policy is too driven nationally—our previous witness argued that it should be much more European? Secondly, how can you justify wanting an increased amount of money for renewables when a perhaps technologically neutral approach would be more beneficial to the UK? The third question is, when you have got your renewables how are you going to apportion them on a fair basis, so that tidal energy, geothermal and biomass are given a fair crack of the whip and we get a slight reduction in support for wind power? I say that living in a county where I now see seven wind farms from my window.

Dr Robert Gross: Do you mind if I go first on that? I deliberately wrote a slightly provocative paper called *On Picking Winners*, and I am aware that picking winners is anathema to many British economists and policymakers, and people's memories of failed industrial policy in the 1970s, when I was a child, resonate. I do not advocate preferential treatment for renewable energy over others. I advocate horses for courses, and I would say that the needs of carbon capture, which we should be putting much more effort into, are different from the needs of nuclear power, which, in turn, is different from the needs of renewable energy technologies. As you have just said, those renewable technologies are quite a diverse family and each have different needs also. It is very difficult to envisage a working, workable, effective and technology-neutral approach to that diversity. Some argue that we should have a higher price on carbon, stick some money into research and just wait and see what happens. I would argue that that would lead to: nothing happening, apart from more money going into the academic sector—and I am at Imperial College where we are quite keen on

research—than it is effectively able to make use of; technologies falling into the so-called valley of death, where they cannot be commercialised; taxpayers' bills going up; and not very much decarbonisation being delivered. Delivering cost reduction is all about learning by doing. It is partly about research, which is terrifically important. However, if you want to get the costs of offshore wind down, you have to try. If you want to get the costs of offshore winds down to scale, you have to try at scale. If you want to build offshore wind, you need to provide a financial package that is appropriate to potential investors in offshore wind farms. I would say that that means providing them with some form of long-run, fixed-price contract for their output, because by doing that you get a consortium in to build them. There may be issues around the absolute volume of finance that we need, and we will come to those later. When the consortium comes in, there will be tech providers, including companies such as Dong and Siemens, some of the utilities, and perhaps some of the rich equity funds from the Middle East. They will then take the risk and refinance the projects, once they are operating and have been proven to work and not to fall over. That would get the cost of their electricity down. I just cannot see in the immediate term a technology-neutral approach to providing that. We might be able to provide a technology-neutral approach along the lines of a single fixed price for low-carbon generation, or a single fixed price for non-fossil generation in the future, when the technologies have been improved; but I do not think that we can do that now.

Dr Gordon Edge: My view on this is that we as a country need to be looking at where our natural advantages are. We are a very windy country that sits in the middle of the sea. It is only natural for us to exploit those resources. It is also about the industrial opportunity that is available to us on this. Offshore wind is really interesting, because while wind power has been developed for 20 or 30 years, the facilities to make the large, dedicated offshore wind turbines and their supporting infrastructure do not really exist, as yet. If we are smart about this and move early, we can get this once-in-a-technology opportunity to secure those factories, not just for UK business but across Europe. We will develop expertise that we can then export to other markets. This could be done in spades for wave and tidal, where we are by far and away the leading country, although admittedly the technology is way behind offshore wind in terms of where it is technologically and in deployment, but where we are well in front in terms of being the lead country. Therefore, all these opportunities are there and, as Rob says, a technology-neutral approach does not allow us to recognise that and exploit those relative advantages that we have here in the UK. With a technology-neutral approach, I would use the following analogy. It is like trying to play a round of golf with only a single driver in your bag. You need an ability to have more control on the putting green, instead of just hitting a ball as far and as fast as you can go. If you have a single price for carbon as your only club to make things happen, it has to be set at the marginal cost of that last tonne of carbon. People who are cheaper get the major benefit and an extra windfall profit that they do not deserve. If you are focused in, so that particular technologies get the right reward for their technology, and you pick the sectors that you want to encourage for the best benefit for your economy, that is the best economic solution overall.

Dr Robert Gross: I should not underestimate the significance of this, because what you would effectively be doing by trying to take a single approach is providing old nuclear power stations, existing wind farms and hydro with a windfall that is completely unnecessary, and you are taking that money away from consumers and giving it effectively to the owners of those types of plant. There were a number of questions that I did not address, including the Europe-wide question. If you look at the kind of feed-in tariff levels in different countries around the world for particular categories of technologies, they are similar because Governments have equipped themselves with the wherewithal to be reasonably well

informed about those technologies and provide them with an appropriate level of subsidy. We could talk about moving to auctions, and it might be appropriate to do that in some instances. We should certainly be talking about targets that drive down the costs through what is called degression. We deliberately say, for example, we are going to give you, tidal power, some generous support for a number of years but that will not continue for an indefinite period because we want you to improve your technologies and become cheaper. We have seen dramatic cost reductions in photovoltaics for a number of reasons; it is an innovative technology. I think that we could see cost reductions in offshore wind. That will take some time, but they are certainly feasible. Could we see more harmonised levels of support across Europe? To the extent that resources are the same, the answer is yes. It would need to be tailored by resource, so one would pay less for solar in the south, obviously, and the same in reverse applies to wind. Could we have a common system across all Europe? We flirted with this idea in the late 1990s with the first renewables directive and the idea of tradeable certificates. Essentially, the then in-the-lead countries for renewables, such as Germany and so on, with their own policies, resisted that. That would continue to be difficult to deliver and might bring back some of the problems to do with complexity and so on that we are trying to move away from with the RO. It would be good to have, and I can imagine, more harmony across the EU. There is just one final thing I should like to mention in terms of this issue, and it points to your investment question later. We can get the technical details of policy as right as we like and do all of the kind of derisking that investors might be asking us for. If we then completely screw up the politics and make investors think that this or any other country is not universally keen on this, that the goal posts will be moved, and that by the time they finish making their investment the support will not be available any more, you would not be surprised if the cost of capital went up or if those investors went elsewhere. That would appear to be an exercise that the Government have been indulging in rather a lot in the past few months.

Dr Gordon Edge: I agree with that. I would also say one thing that I did not say when I was talking about focusing on sectors that have benefited the UK economy. The deal here is that we commit to a cost-reduction trajectory in order to justify that cost. Certainly, with offshore wind, we are seeing a strong commitment in the industry towards this £100 per megawatt/hour target by 2020.

Lord Renton of Mount Harry: Could you say that figure again?

Dr Gordon Edge: £100 per megawatt/hour by 2020. That figure was set out in last year's renewable energy road map. We have had a process through the cost-reduction task force run by our chairman, Andrew Jamieson, alongside work done by the Crown Estates on its cost-reduction pathways project, which set out how we could be doing this. This week the first meeting of the Offshore Wind Programme Board is happening and it will take forward that programme of cost reduction, chaired by DECC, and has buy-in across the industry and government. We are very much buying in to the sense that in order for us to justify that up-front investment, we commit to bringing the cost down. Also, there is very much a European aspect. Europeanising some of this policy is important for offshore wind in the UK. In order to justify building out the tens of gigawatts that we are taking about, there needs to be a demand pool from the rest of Europe; the UK market is not big enough to absorb that amount of power, and UK consumers are not necessarily in a position to afford to support that amount of power. Therefore we need some form of European demand pool. I am not quite sure what that looks like. I agree that it is very unlikely that we will get a harmonised system, but some kind of club of interested Member States providing some kind of pool of support to allow that to happen would be essential to getting the benefit here in the UK for building the UK resource.

Q99 The Earl of Caithness: Who are the other Member States who would help us with tidal energy, because that is the one that is sitting off my doorstep and Lord MacLennan's doorstep? Secondly, what is the maximum amount of renewable energy that one could go for in order to keep the lights on and businesses going in this country, because when we get a nice high in the middle of January, and it is very cold, one is going to need something other than wind?

Dr Gordon Edge: On the tidal point, France is certainly making a big play for tidal stream. There will be hotspots around Ireland, Spain, Portugal and Norway. Those are the other European countries where there will be a lot of interest in tidal, in particular. Then there are places such as Canada, Korea and Japan, which are all very interested in tidal energy as a resource. To address your other point, how much we can absorb is one of those "how long is a piece of string"-type questions, because the answer depends on the level of connection, how well we do in terms of rolling out a smart grid and demand response, and how we do in terms of rolling out cost-effective storage and other technologies. One of my particular hobby horses is a very interesting technology that is being supported by some German companies, whereby you take electricity, you electrolyse water to produce oxygen and hydrogen, then take that hydrogen and react it with CO₂ from the air, and form synthetic methane. You can put that straight into the grid, store it in the usual gas-storage caverns, and you could completely defossilise the gas grid. That therefore becomes a 100% renewable option. The efficiency of that is not great and the cost is, at the moment, high. However, if you were able to develop those kinds of technologies, there is no limit. As things stand, we are not anywhere close and we will not be for 10 years, at least. Other technologies are coming down the track that may keep pushing that limit further and further. The more we interconnect with places such as Norway, which has a lot of hydro capacity that it can trade with us, the more we will be able to absorb a variety of renewables.

Dr Robert Gross: On the tidal issue, I can send some information through to your Clerks. UKERC produced some road maps on tidal energy internationally. I think that they are fairly current, although they were produced a couple of years ago, and give us an overview of the potential. We have to be aware that tidal technologies are location-specific; they relate to the coastline, the concentration of the tides, and so on. There are other countries in northern Europe and Scandinavia that could do that along with us, as well as in other parts of the world. On the intermittency question, it is important in the short term that we have gas as a back-up. That is the simple answer to your question. Your specialist adviser, in one of his previous lives, did some of the seminal work on intermittency, and I am sure that he can give you a tutorial on managing the grid. There are very real electrical engineering issues that we need to be mindful of. There are issues to do with system balancing and response—that is, the speed of change. For example, if the wind output is dropping very quickly in the opposite direction to increasing demand, we need to be able to manage your lull. We also need to be aware of the amount of what is called synchronous regeneration—the kind of mechanical inertia of having a load of power stations spinning at the same speed. The Irish have been contending with some of these issues. Because they have made good progress with renewables and their system is smaller, they have had to deal with some of these things before we do. However, we are quite well versed in the longer-term solutions—interconnection, demand response, storage and having a diverse portfolio of renewables, rather than relying overly on one source. There are also interrelations with electrifying heat, which has good and bad effects in terms of moving demand around, and electrifying transport, which potentially has beneficial effects. As we look out to the very long term, there is a good paper by some colleagues at, funnily enough, Imperial College which looks ahead to 2050 and costs the value of having more flexibility of various forms on the system,

on the assumption that we are going a long way further than we are at the moment, or are likely to go in the next 10 years, with renewables.

The Chairman: Perhaps we can spend five minutes on the next three questions and we might cover the ground and stick to our timetable.

Q100 Baroness Parminter: I want to move on to the issue of tackling carbon lock-in. Given the high discrepancy between coal and certain renewable technologies now, what impact will that have on the carbon lock-in? More topically, given the Government's announcement last week on not setting the carbon emission targets for 2030 until after the next general election, what impact will that have on carbon lock-in?

Dr Robert Gross: I see in Britain the carbon lock-in as being gas rather than coal. We are not going to build new coal-fired power stations. Personally I think it is a shame. It is unfortunate that we are closing a bunch of perfectly serviceable older thermal power stations early (older coal and oil stations), at a time when we are trying to transform the system that is effectively obliging us to build gas stations that we will then be in danger of stranding. However, we are committed to doing that now and that door is probably closed, but it is unfortunate. I am not convinced that the Government have properly thought through the implications of a kind of dash for gas, renewables and nuclear all at the same time, which then, in order to meet the carbon targets, requires that gas fleet to be used at very low factors. Some overly simplistic assumptions have been made about the willingness of the owners of those plants to retire them, just because it has paid down its capital expenditure. That completely fails to engage with the economics of owning those plants. This is an important area for the Government properly to get to grips with because, in simple terms, we need to have enough gas plant to make sure that the lights stay on, and we then need to make sure that the inbuilt incentive to use that plant more than our carbon targets would suggest we must is overcome. That will be a significant challenge in 20 years' time.

Dr Gordon Edge: I would argue that the failure to set the 2030 decarbonisation target makes it less likely that we will get investment in gas plant. In the longer term it is inconceivable that we will have an energy policy that does not have strong decarbonisation of the power sector. By putting off the decision as to where exactly that goes, investors in gas plant will be sitting there saying, "Well, I could invest in a plant. In 2016, they could set a really strong decarbonisation target, and my gas plant is completely stranded". How can they possibly make that investment? It seems strange that if it was the Treasury that was pushing for there not to be this target, it has managed to cut off its nose to spite its face, and it will not get the investment in gas plant that it claims to want. It is an enormous missed opportunity for setting not just certainty for the low-carbon sector but the higher-carbon sector in terms of knowing how big their market will be in 2030.

Q101 Lord Renton of Mount Harry: I have listened to you both with extreme interest. My question is headed, "Investment"—investment in basic research, applied research, commercialisation and infrastructure is urgently required across energy sources. You made that clear to us already, and I am slightly reminded of the book of Genesis and the Garden of Eden. When Adam and Eve arrived there, it was very lovely, comfortable and beautiful, but they did not know where to go next. Is that perhaps slightly the difficulty at the moment in this industry—that there are so many options, and ideas are changing all the time, that to someone such as myself, who is interested but does not know very much about it, it seems that the picture of the result changes all the time?

Dr Gordon Edge: The Committee on Climate Change has been clear that there needs to be decarbonisation of the electricity sector as the precursor to decarbonising heating and transport through electrification. While I might have some reservations about that, it is worth while buying into that concept, because it then at least gives everyone an idea of where they are going in all this. There may be options for defossilising the gas grid, as I mentioned, and the Government at the same time are talking about encouraging heat networks, which would seem counter to their idea of electrifying heat. We have a sense of where we are going in a general thrust of the decarbonisation programme. That is not the problem. It is about being more specific about exactly which targets and when. I would also say that a decarbonisation objective for 2030 is still too vague. You need to be more precise about which technologies there should be and in what kind of quantities, in order to give people certainty to invest in the supply chain to make the projects and the objective happen. There is enough in general concerning the outline of where we are going, but we need to fill in the details and begin to home in on exact objectives and by when we will achieve them.

Dr Robert Gross: I shall try to be succinct. Institutional investment in renewable energy is a very tiny fraction of institutional investment across the piece. Attracting more institutional investors would appear to be where we could get the volume of funds that we will need to do this. It is very unlikely that you will get them in at the build stage, although possibly as a minor partner. You may be able to get more institutional investors in at the refinancing stage. However, the danger is that DECC has made some simplistic assumptions that this will just materialise and investors will be attracted into the British energy sector, and I do not think that that is necessarily right because there will be a fraction of investment that such investors want to put into infrastructure asset, a fraction into sterling-denominated asset, and a fraction that they will be prepared to invest in what they consider to be new, innovative and relatively risky. When you start subtracting down all those fractions, there is reason to be concerned about the volume of the investment ask. We are trying to do, as I think you were alluding to with your Garden of Eden analogy, quite a lot of everything all at once in Britain. There may be a role for the Green Investment Bank in providing comfort. There is certainly a role for looking at creative consortium construction, which is already happening in offshore wind with a diversity of partners. As I have mentioned already, the best thing to do to undermine this altogether is to sow the seeds of doubt by making potential investors think that, actually, the Government are not really behind this at all, and so the kind of political disharmony that we have seen is unhelpful. It is a big ask; we should not understate that.

Q102 Lord Renton of Mount Harry: What do you know of what is happening in the continental countries in the same area? Is there more certainty there about where the money is going to come from?

Dr Robert Gross: Not really. The balance sheets of all the big six utilities are strained, their credit ratings have been under question, and they are heavily geared. One of the main differences in Britain is that we are trying to replace more of our conventional asset at the same time because we have closure of older coal plants and life expiry of the AGRs. We invested in gas in the 1990s and because we underinvested during the 2000s, the absolute volume is unusually large for the size of the UK energy system. Traditionally, on the continent, much of this is (renewable energy investment) being done on the balance sheet. What we have also seen on the continent is that they have already done quite a lot of the investment. Germany, Spain and other places have made substantial investments in renewable energy. There are challenges across the piece and more research is needed.

What an academic answer. We need to do more to think through how we galvanise the investment that ought to be there for this sector.

Dr Gordon Edge: We have been quite critical of the UK policy stance, but to be slightly fairer and to look across the continent in a critical way, we have not in the UK had any retroactive change in our policy stance, unlike in places such as Spain and Italy, which has been absolutely toxic for investor confidence. We have not had that and the nearest we got to it was the debacle around the feed-in tariff. However, the UK is seen as a dependable policy environment; it is the politics that has been uncertain. However, the policy as set out—pace John Hayes—is staying the same, as far as we can tell, and there has not been any reverse and certainly no intention to make existing investments worse off. That is a really important point we need to retain in order to keep the UK as a safe investment hub.

The Chairman: We have time for one more question.

Q103 Lord Plumb: You said in your written evidence that the market rules have been designed without renewables in mind. You have proved to us that renewables are important and therefore have to be in mind. What you have said has been impressive. However, like Lord Renton, I find a lot of confusion out there. You ask people what they think about the issue and they say, “How much is it costing?”. Secondly, they hear about wind, waves, anaerobic digestion and all the various alternatives in renewables. Then they hear one week that wind is going out of the window and then it is coming back again, and then it is all right if it is offshore but not onshore. It creates a lot of confusion that needs clearing up. A lot of the answers that you have given have been helpful, so I will not press some of the questions, other than one. If we are successful, particularly with renewables, what future is there for trading them, because that could become quite an important factor? If I may put a personal view here, I absolutely hate wind but we ought to be doing an awful lot more in using the waste from this country. Rather than putting it into landfill, we should put it into digesters that could produce an awful lot of energy. One of the problems that we face—I have been involved in this in my area—is difficulty with the planners. We have to create a totally different opinion if we are going to move towards using up that waste that could be put into some useful product, which would of course cut costs.

Dr Gordon Edge: To address the point about necessity for trading, if we are to exploit our renewable potential to the full, we need to be exporting renewable energy to the rest of Europe. One of the interesting things about trading, however, is that it is only the expensive stuff that is available to buy and sell. Certainly under the 2020 targets of the 2009 European directive, people can trade only if they have met their indicative trajectory towards their share of that 20% target. The only things at the margin will be the most expensive things. It is not going to be the cheap biomass in eastern Europe that will be available to trade; it will be offshore wind in Sweden. People need to be clear that if they want to trade, it will be quite expensive. We need to find ways of reducing the costs of the more expensive things so that it becomes more attractive for Europe to buy particularly our offshore wind power. However, that will be more of a 2020s argument than it will be up to 2020. However, then you get into the debate. The UK Government do not want to see a renewables target for 2030, but that is what would drive that trading. Either they need to get off their high horse and agree with our European partners on a 2030 target, or face up to the possibility that we will fail to get the development we want because of the question: why should Europe buy our offshore wind?

Dr Robert Gross: We should carefully distinguish between two different facets of the trading problem. One is where, for example, consumers in country A pay a subsidy to build

renewables in country B. It may not be that the electricity physically flows between the two countries; it might just be that it is cheaper to do biomass in Bulgaria than it is to do wind farms in Britain, or because people do not like the physical appearance of them. That is one thing and, as Gordon says, for various reasons that has been pushed to the margins of the conversation. It was more prevalent in the early days of the renewables directive. The other issue is the rules around transmission and physical flows of electricity around the European Union. That is where harmonisation is important, by addressing certain pinch points where the transmission grid is weak between certain parts of Europe, such as the Iberian peninsular. If we can factor in the physical flows of electricity and allow more of them, irrespective of whether we want to subsidise one another's wind farms, that would be beneficial for consumers, help us to manage intermittency and enable the European continent to do more to unlock the resources of the North Sea, southern Spain or even north Africa. That is a very important part of this conversation, but it is often not seen as being an integrated part of this conversation, and it should be.

The Chairman: That was tremendous; thank you very much. We are better informed than we were when we started, and thank you for the energy that you brought to us. It was a most interesting dialogue. Thank you.

Q104

Fiona Hall MEP, Liberal Democrat Energy Spokesperson, European Parliament—Written evidence

Energy's contribution to economic growth

1. Decarbonisation of our energy system offers a great economic opportunity and can be one of the solutions to the current economic woes. Investment into sustainable low carbon technologies will stimulate development of new industries and growth opportunities and create new jobs as a result. The European Commission has estimated that 2 million green jobs could be created or retained by 2020 in energy efficiency, and 3 million in renewable energy.³⁶ Renewables are more capital and job-intensive than conventional technologies and therefore create more jobs for the same amount of electricity produced. The European wind energy sector has already created jobs in Europe, with direct and indirect employment increasing by 30% between 2007 and 2010, whilst EU unemployment rose by 9.6%. The EU wind industry is projected to employ up to 800,000 people in 2030.³⁷

2. One of the key conclusions of the Energy 2050 Roadmap is that decarbonisation can be achieved at the same cost as following the business as usual pathway due to considerable savings on reduced oil and gas imports. The document stresses that decarbonisation would require higher capital investments but recognises that this could be offset by lower fuel bills, with the high renewables scenario offering the lowest fuel imports.

3. The EU currently uses three main targets to 2020 to drive its energy and climate policy agenda, on CO₂ reduction, renewables and energy efficiency. A CO₂ target only, if ambitious enough to result in a strong carbon price, would lead to competition between the cheapest, already cost-effective technologies. However, the carbon price has so far languished at a level too low to incentivise low carbon investment. Moreover, renewables and energy efficiency targets offer a greater potential to contribute to economic growth than a CO₂ target alone. Stimulating faster deployment of renewables and uptake of energy saving technology will attract more investment, spur innovation and create business opportunities in the sector, which in its turn will contribute to new job creation and technology exports. Out of the three 2020 targets only the renewable and energy efficiency ones also contribute to energy security and economic competitiveness.

4. Tailored policy and long-term milestones on renewables and energy efficiency, on top of CO₂ targets, are thus necessary to achieve a long-term decarbonisation that also contributes to economic growth.

A common EU approach to transforming the energy system

5. A common EU approach to transforming the energy system is key to achieving the three pillars of EU energy policy - security of energy supply, sustainability and affordability of energy prices, in the most cost-effective way. A common approach to generation, transmission, distribution and storage of energy will ensure a comprehensive view of long-term needs and smart investment where there is market failure. A common approach will help avoid duplication of Member State action and achieve better value for money spent on infrastructure, energy research, etc.

³⁶ ec.europa.eu/social/BlobServlet?docId=7621&langId=en

³⁷ http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/Green_Growth.pdf

6. A common future EU approach should be based on the three 'no regrets options' identified in the Energy 2050 Roadmap³⁸. A substantially higher share of renewables, increased energy efficiency and savings and more flexible and smarter energy infrastructure are the common features of all decarbonisation scenarios. While EU legislation is in place to modernise energy infrastructure³⁹, long-term post-2020 milestones in the area of renewables and energy efficiency are lacking.

7. To help achieve Europe's long-term decarbonisation in the most cost-effective way, a future 2030 energy and climate change package, based on the current 2020 policy framework, should be agreed by EU Heads of State and Government as soon as possible. Such a package should include separate targets for CO₂ reduction, renewables and energy efficiency.

8. Relying on a CO₂ target only will not be enough. While the European Emissions Trading system (ETS) can be an effective tool for reducing carbon emissions, there is no evidence either in theory or in practice that carbon markets can be effective drivers for developing and deploying a wide range of clean technologies. Renewable targets complement a functioning ETS⁴⁰: while ETS limits polluting technologies, a renewables target stimulates development and deployment of new clean technologies to fill the gap.

9. Not setting a new 2030 target on renewables would send investors the wrong signal. It would undermine the current 2020 framework, put the current sector growth at risk and very much increase the risk and cost of investing in renewable energy.

The Internal Market in Energy

10. Greater consideration should be given to cross-border trading in energy. In particular, this could enable electricity to be bought more cheaply than from within the UK market alone and would mean that surplus renewable electricity could be sold to other EU countries. The key to enabling such cross-border trade in electricity is an integrated EU grid with interconnection from the UK to other EU Member States as well as to third countries such as Norway and Iceland.

11. Better interconnection is also one of the most successful ways to balance and back-up variable renewables such as wind and solar. A decrease in generation in one country can be met by excess renewable capacity in another provided the two have HVDC cables that connect their national energy grids. Interconnection also enables the use on a large scale of established and cheap storage solutions such as pumped hydro, with Norway having the largest storage potential - of particular interest to the UK.

Reducing the costs of energy for business and consumers

12. Given that the UK will have to replace a significant proportion of its ageing generation system, whether or not it moves to much greater reliance on renewables, energy prices in the medium term will be pushed upwards by the cost of investment. But the key upward driver of energy prices in the medium term is forecast to be rising gas and oil prices rather than the cost of new infrastructure. A transition to renewables would be beneficial

³⁸ Presidency Conclusions on Energy 2050 Roadmap, European Council, p.4, <http://register.consilium.europa.eu/pdf/en/12/st11/st11553.en12.pdf>

³⁹ Recently proposed, and currently under negotiation, a Regulation on the Guidelines for Trans-European Energy Infrastructure and the Connecting Europe Facility

⁴⁰ Roadmap 2050, European Climate Foundation, http://roadmap2050.eu/attachments/files/Volume2_Policy.pdf

for consumers in the longer term as it would protect them from the price rises and price volatility associated with fossil fuel imports, as well as stimulating the economy through the creation of new jobs in the UK and the rest of Europe. Furthermore, the impact of energy price rises on final consumers can be greatly minimised by investment in energy efficiency. What is key during this transition is cost transparency so that consumers know what they are paying for.

13. As the penetration of wind and solar energy increases in the UK, the wholesale market should be affected more and more by the merit order effect. This occurs when the operation in a supply system of low marginal cost technologies such as wind power reduces electricity prices on the wholesale market. As wind energy's primary energy resource, wind, is free, it pushes out of the electricity market supply chain those power plants which use much more expensive primary energy resources, such as gas, coal and oil. The merit order effect has already been observed in many EU Member States. If the benefits of it were passed on to consumers in the retail market, this would partially offset the increase in electricity prices⁴¹.

Gas

14. In every one of the five decarbonisation scenarios analysed in the Energy 2050 Roadmap, even in the low nuclear/high CCS scenario, overall gas consumption decreases by 2030 compared to today⁴², mainly because of electrification. This indicates that gas is not essential to long-term decarbonisation. In any case, gas-fired power generation can only be compatible with long-term decarbonisation if CCS is technically and economically viable on the scale needed. Gas offers flexibility but should be seen as only one of a number of ways of coping with variability, alongside trade via interconnection, more accurate forecasting tools for renewables trading on wholesale markets, increasing demand-side response, and energy storage. It should be noted that current CCS technology does not allow gas-fired generation to be used flexibly: gas can either be unabated and flexible, or have its carbon emissions captured and be slow to ramp up and down⁴³.

15. Long-term (2050) decarbonisation means that the electricity sector has to decarbonise almost completely in the 2030s since the transport and heating sectors are likely to take longer. Using unabated gas to generate electricity after 2030 would severely undermine the overall long-term decarbonisation target and should not be supported as a medium- to long-term energy policy.

16. Given serious uncertainty at present about the economic viability of CCS, great attention should be paid to avoiding lock-in of gas investments and infrastructure after 2030.

17. Replacing coal power plants with gas power plants is a temporary solution which will achieve relative CO₂ reductions in the short-term for countries such as Poland that are currently heavily reliant on coal. But it is a solution which could prove very costly for those countries in the long-term because of the cost of retrofitting with CCS if the technology is available. Looking ahead, the crucial number is the cost of gas plus CCS rather than the cost

⁴¹ Wind Energy and Electricity Prices, European Wind Energy Association, pp.26-27,

http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/MeritOrder.pdf

⁴² Energy 2050 Roadmap Impact Assessment, European Commission, pp. 68-77,

http://ec.europa.eu/energy/energy2020/roadmap/doc/sec_2011_1565_part2.pdf

⁴³ Potential for the application of CCS to UK industry and natural gas power generation, Element Energy, pp. 75-85, http://downloads.theccc.org.uk/s3.amazonaws.com/pdfs/CCC_final_report_issue2.pdf

Fiona Hall MEP, Liberal Democrat Energy Spokesperson, European Parliament—Written evidence

of unabated gas. In the UK, onshore wind will already by 2020 be cheaper than the predicted cost in 2030 of gas plus retrofitted CCS.

18. A rush for gas would mean either increasing further our dependency on imported gas, or choosing the risky route of extracting unconventional gas reserves such as shale gas. Apart from concern about the potential environmental consequences of large-scale shale gas production, the emissions associated with this energy source are often higher than those from natural gas because of fugitive methane emissions and the higher levels of energy required for the extraction process. Shale gas reserves in Europe are estimated to be much smaller than in the US and more controversial to extract because of Europe's higher population density. The global competitive advantage for Europe lies in renewables, not in shale gas.

3 October 2012

Professor Dieter Helm—Oral evidence (QQ 118-140)

Evidence Session No. 6

Heard in Public

Questions 118 - 140

WEDNESDAY 5 DECEMBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
The Earl of Courtown
Lord Giddens
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Renton of Mount Harry
Lord Whitty

Examination of Witness

Professor Dieter Helm, Official Fellow in Economics, New College, University of Oxford

Q118 The Chairman: Professor Helm, welcome. We are very grateful you have come to see us today and are very keen to hear what you have to say in response to our questions. Could I deal with some formalities before we go to those? You should have in front of you a list of interests that have been declared by Committee Members. It is a formal evidence-taking session of the Committee. We are taking shorthand notes and we will put those on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript and you can look at it and correct for minor errors. The session is on the record. It is being webcast live and will subsequently be available on the parliamentary website.

Q119 I do not know which way you would prefer to take this. Would you like to give us three to five minutes on positioning or would you like to go straight to the questions?

Professor Helm: I am very happy to go straight to your questions if that would be the best use of your time.

Q120 The Chairman: Yes, and then we can expand on those as we go along.

Professor Helm: Of course.

Q121 The Chairman: I will start with the question of the future role of gas. Perhaps we can address gas and shale gas because, in our view, they are travelling together. Could you give us a sense of the future role of gas in the EU in the short, medium and long run and possibly some words on energy security and what impetus you think policymakers should give to the general development of gas? On the question of fossil fuel lock-in and the gas bubble, do you see that as a real issue or is it something that is being suggested that may not have substance?

Professor Helm: Thank you very much for inviting me. I will try to answer your questions as best I can.

The issue about where gas fits in the European energy mix has a prior question to address, which is what is the purpose of EU energy and climate policy? If you think that the objective is to address global warming—and climate change is, unfortunately, not a European phenomenon on its own, it is a global one—then the context in which this is set is one in which the European framework of policy, the 20-20-20 framework and the EU ETS within it, is one that has had no discernible impact on global warming whatsoever yet. The trend in emissions globally is ever up. If you draw a line from 1990, the beginning of the relevant period, through to now, emissions were growing at 1.5 parts per million or just over in 1990. They are now growing at between two and three parts per million. There is not a blip in the growth of emissions.

If European policy is designed to address those questions, within the framework of European policy what you might want to ask is, first of all, has Europe been reducing its carbon consumption? That is the consumption of all the individuals, firms and so on within Europe, not its carbon production but its carbon consumption, so net of imports. The answer is no. You might also ask within that framework is it adopting or devoting customers' money, scarce resources, to either technologies that will make a difference to climate change or at least getting out of those technologies that are doing the most damage at the moment? The reality at the moment in Europe is that resources are being devoted to overwhelmingly particular types of renewables that cannot solve the problem of climate change but, much more worryingly, Europe is in the process of moving from gas to coal, in Germany most notably from nuclear to coal and from gas to coal. The context in which you should ask the question about how much gas we should burn in Europe is a context in which what we are currently doing is having a dash for coal and we have to find a relatively short-term way of heading that off.

If I could complete that bit of the comment by making the following observation. Global warming negotiations are now at Doha, from Durban, from Copenhagen. At Durban the world agreed that it would try to agree by 2015 what it might do after 2020. On current growth rates, China and India will be twice their economic size by 2020. Emissions will be way beyond 400 parts per million. The overwhelming policy driver on climate change ought to be how to head off 400 to 600 gigawatts of new coal in the world system in this decade. Gas provides one short-term option to do less damage than coal is doing. It does that because its emissions are about half of those of coal but, of course, it is not a permanent solution because as a carbon fuel it is just, compared with what would happen by allowing the world and the European dash to coal to continue, it would be a much better outcome. I think someone commented that in 10 years' time we will not make a distinction between conventional and unconventional in oil or gas. They are just different forms of production of oil or gas.

Looking forward, people point to the environmental problems associated with shale gas. I agree, they are quite serious. They should be seriously regulated. But I put to anyone who

thinks that we should ban, for example, shale gas, that, compared with coal, shale gas is phenomenally better. I think it is very important to understand how bad coal is as the counterfactual. Coal mines leak methane. They leach heavy metals. They pollute the water table. They use an intensive amount of energy to get the coal out. They damage the health of everybody who works in a coalmine; 5,000 die a year in mines in China, roughly. That is before you get to the really big bits of pollution of taking this stuff by some form of transport to power stations, the SOCs, the NOCs, the thermal efficiency, the water use of the power stations, the ash deposits, and so on. Anybody who thinks that shale gas ought to be banned must logically believe that coalmining should be illegal. It is remarkable that those who claim that we should ban shale gas make that statement. Of course, you should regulate it and you should regulate it hard. In some locations, it is not appropriate. In other locations, it might be appropriate. But all discussion of gas should be in the context of the counterfactual, which is coal.

The other question you ask is about lock-in. It is a serious problem, but just remember what we are doing at the moment—we are locking into coal. In Europe it is not just a case of burning more coal in existing power stations. We are building new coal stations in Europe. Germany has opened two lignite coal stations. These are locked on to the system. Lignite is about as bad as it gets. We are locking into coal stations at the moment so, given a choice between locking into coal or gas, I think it is a no-brainer.

How do you avoid the problem that the gas is on the system later in the next decade and you may want to take it off the system? It is not beyond the wit of man to either lay down emissions performance standards and so on that make it impossible to run gas stations except at peaking beyond, say, 2030 without having CCS and other things attached to it, just as we can, and we are for some coal stations, force them to close now even though they can carry on their running. To say that we should basically commit ourselves to coal because we are worried about lock-in and gas seems to me to be a complete failure to understand the sheer scale and nature of the climate threat we face. By 2020 you are not looking at 400 parts per million. We are well on a path by that stage to going towards the next big hurdle, which is 500 parts per million. The scientists tell us that this is extremely serious, so I do not think we have the luxury of purism here. We have to stop that dash for coal in Europe and globally as soon as we possibly can with almost whatever means are available to us.

Q122 The Chairman: Do you have any views on energy security, just to that point, and our reliance on distant sources and possibly not geopolitically secure?

Professor Helm: The first thing to say is that we could worry about all forms of trade. There are many things we depend upon from other countries and we could have an autarkic economy in which we produce all our own food, all our own clothes. We could do all those kind of things. It is a question of degree, not kind.

In terms of degree, of course you need to have concerns about security of supply, but it comes in lots of dimensions. There is security of price, there is physical supply of the substance, and then there is short-term shocks in requirements. In response to that you need storage, you need contracts, you need LNG facilities, and you have to take a view about the time horizon over which you could react if gas was short. We do not know what the future gas price is going to be. The Secretary of State and his predecessor are pretty confident that they are going to go ever upwards. I have no idea, but you do have to take certain facts into account. These are facts that are new to our energy world post-2005 that were not there before that date.

Shale gas was not in the picture in 2005. It is now a significant proportion of US production. It was inconceivable in 2005 that the United States would withdraw from importing gas. Remember, the United States is 25% of world GDP. This is non-trivial. The idea that North America as a whole will be energy independent pretty shortly was also inconceivable. The idea that we would find gas reserves in places off Israel, Cyprus, Eastern Africa, and we would be able to LNG coal-bed methane from Australia into the Chinese market are all new phenomena. I do not think anyone could deny that the supply position for fossil fuels now compared with 2005 is in theory much, much higher. Of course, it is one thing to have the reserves. If you want them, it is a good thing. If you are interested in climate change, we now have plenty of fossil fuels to fry the planet many times over with very significant consequences for the costs of other technologies and their competitiveness. But in these terms from a policy perspective physically I think you should get quite close to just assuming the potential supply of gas is close to infinite. It is not infinite, but there is just a huge amount out there for the next 100 years plus.

Will we get it? Again, the facts have changed. We used to rely on a small number of politically questionable countries to supply our gas, Russia in particular but also—perhaps not so politically questionable—Qatar and the Qatar developments, and a small number of other countries. That has changed. We are now looking at a much more diverse set of potential supplies. Qatar is no longer needed for America at all, so that becomes available to us. The world has absorbed the entire shock of the events of Japan and the taking offline of over 50 nuclear reactors and the gas market has absorbed that. A world in which 25% of GDP as a highly developed country withdraws from the market and thinks about exports is a remarkably different world in security terms from the one we were facing in 2005-2006 when the Russians could cut off the pipe through Ukraine and people could contemplate the possibility of shivering elsewhere.

We should always worry about it. We have inadequate gas storage. We have inadequate gas infrastructure. We have not thought about how to use the LNG facilities in the security terms. These things really matter but they are not as serious as they were 10 years ago. The news from shale gas is that it is all over the place rather than in a very small number of highly politically sensitive nations. That must be good news from a security supply point of view.

Q123 The Earl of Caithness: Can I follow up the Chairman's question on storage? From the UK policy point of view, is it acceptable to have 4% to 5% of our annual consumption in storage when Europe is having 20% to 25%, or is Europe now totally out of date and having too much storage?

Professor Helm: There is no generic answer to the question of the percentage of storage you want independent of your circumstances. Clearly, if Britain was to build more CCGT plants and its electricity system became more dependent on gas, you would take a different view about marginal security than you would if it is of less importance.

Secondly, you have to think about what you do if your gas becomes either expensive or scarce in the limit. If you have lots of coal stations sitting around, as they do in Europe, you can just switch from the gas to the coal. That is exactly what is going on. Right now, gas storage in some European countries is arguably way above what they actually need for the circumstances they find themselves in, provided they are prepared to burn their coal stations. But suppose we in Britain were to get out of coal. Seriously, suppose we actually cared about climate change and we wanted to do the cheapest and most straightforward thing—close the coal stations as quickly as possible—there is nothing that will fill that gap in the next 10 years. Nuclear is 2020-something beyond, and remember that many of our

nuclear power stations are coming off. Your coal has gone. You are never going to build wind farms at that kind of rate to fill up that gap. Then you need to rely on gas and then you need to think really hard about storage.

I suspect the right answer to your question is the current level is almost certainly too low. When we get to 10% or something like that, we can have the luxury of having a nice academic discussion about exactly what the right number would be, but we are way adrift of it at the moment. Storage is extremely important and, by the way, in the Energy Bill it is quite interesting that although the mechanism to my mind is badly designed, at least there is a recognition in talking about capacity contracts that storage, and especially the demand side, might play into that.

Maybe I should add that point finally. If we really develop smart meters, smart technologies, and we can flex the demand side from being historically for 100 years passive into active, then you do not need as much storage because you have other ways of responding to a shock that comes to your system. Again, the answer depends on what the other things are. Remember, this is not a static energy system. We have the move from a passive system for 100 years to potentially an active demand side. We have the potential for batteries and all sorts of other forms of storage coming in alongside gas storage. This will change the structure of the industry and the answer to your question.

Q124 Lord Giddens: Thanks very much for coming along this afternoon. Can I take up the issue of carbon price, which features so importantly in your book? I do not know if you have seen this yellow thing, but there are basically three questions I think we would like your views on, although one is not actually on the yellow sheet. First of all, how would your idea of a carbon tax, as you propose it in the book, work in relation to the ETS? I will just go through the questions. Do you want to keep them in your mind or answer them one by one?

Professor Helm: Shall I take that one first because the EU ETS is quite—

Q125 Lord Giddens: It seems to me politically very unlikely that the EU will give up the ETS. We heard from a prominent member, let us say, of the European Commission, and it figures crucially in its future planning. Most people would think the ETS has not worked at all, but nevertheless politically—like the CAP that also could be said not to have worked at all in an effective way—it is probably extremely hard to get rid of it. How would you relate the two, assuming the ETS will be here to stay?

Professor Helm: The first thing to say is that I agree with you: there is so much political capital invested in the EU ETS that for the EU to scrap it would be an enormous setback, which I do not think commissioners or many member countries are prepared to do. The second observation is that, like the common agricultural policy, so many people have a vested interest in continuing it that it is very hard to get out of it. Traders make a lot of money. It is very helpful to polluters to have a low price. The fact it is volatile makes it more difficult for entrants. If you ask yourself why would the Australians want to join the EU ETS, one cynical answer is a carbon tax would be much more painful. They might actually have to pay for their pollution. A lot of people have an interest in keeping this thing going.

Unfortunately I cannot show you a graph, but we have to remember how this thing has performed. We want, I think, in climate change terms, a stable, long-term and rising carbon price. The EU ETS has produced a short-term, volatile and low price. You could not think of a worse mismatch between what you need and what you have. The price today is, what, five or six? This matters because when we come back to the point I made about the dash for

coal in Europe, the main thing the carbon price does in the short term is influence the gas to coal switch. It is so trivially low it has no effect whatsoever. That is why we are able to have a dash for coal in Europe and apparently have a carbon price at the same time. It is just too low. Will it drag on? We saw at Durban the commitment of the European Commission and the Europeans to ensuring there was a second commitment period to 2020 because that is what keeps the EU ETS going. That tells you in spades how politically important the EU ETS is.

As I say, I think a carbon price is extremely important. I think the EU ETS is never going to deliver that outcome. Therefore, I have always been in favour—and I proposed it before the 2008 EU package—of a floor and a ceiling; a ceiling politically because there are some people in Europe who worry the price was going to go too high, a floor because that is what is going to influence people's investment decisions and have an interest in that floor price being one that there could be cross-party consensus on that it would never fall. I had in mind trying to build on some of the consensus around the Climate Change Act to put that in place.

We have a floor price of carbon coming in next year. There are many people who object to this saying it just displaces carbon production to Europe from the UK. It is both true and inevitable because if you have a unilateral carbon target in Britain that is exactly what you will do. It is a consequence of the unilateral target that the proposed carbon floor price will not have the intended effects that it is going to have.

The next question is what sort of tax and—

Q126 Lord Giddens: Are you saying there should be a floor price within the ETS as a whole?

Professor Helm: It would be much better if it was—

Q127 Lord Giddens: I do not think it is politically very likely.

Professor Helm: No, I agree and I do not want to in any way suggest that what I am proposing I think is necessarily going to happen. My view is that probably we are going to limp on doing very little about climate change for a long time to come. I am trying to set out what you would have to do if you really wanted to address this but took some political realities like the EU ETS as given. It is a pragmatic comment. If you ask me to predict what is going to happen, we are in for another five years or so of faffing around while we go way beyond 400 parts per million and we are going to burn a great deal more coal.

As to what we should do, first of all it is much better to have a carbon price at the European level than it is at the national level. A floor price that has the characteristics of looking more like a carbon tax is what I would like, and I would hope over time that the floor price of carbon could take the strain and slowly the EU ETS could go away but with all the political capital left in. It can bubble along at five to 10 or whatever ineffective price it wants to bubble along at, but we need a price that is going to pick up long term.

Q128 Lord Giddens: Can we just stop you there? I have several questions and other people have other questions, so we need a certain economy. I think you have stated your point very clearly. To me, I think the practical chance of achieving a floor of a trans-European kind in the near future is really low.

Q129 The second question was how would you apply such a tax to consumption since you make a lot of, I think quite rightly, play of the idea that we have simply transferred a good

deal of our emissions abroad to China and, therefore, you have to tax consumption. But we know all the troubles there have been in trying to do that, and you discuss the Jevons paradox at some length and so forth. Could you give us a succinct idea of how that could work on a European level?

Professor Helm: The first baseline for this is what matters from a global warming perspective is carbon consumption, not carbon production. It does not matter where the carbon is emitted and responsibility for emissions depends on what you consume. The book is not by any means the best study but there have been subsequent studies that come to roughly the same sort of notion. I give you the ballpark: 1990 to 2005 carbon production in Britain, as measured under the Kyoto framework is down by 15% and carbon consumption is up by 19%. By the way, that explains how Europe could be apparently reducing its carbon emissions under the Kyoto framework—Kyoto is basically just a European treaty or European framework—but world emissions keep going up. It is all that stuff in China and elsewhere that is being produced for us. It is not about factories moving, it is just the composition of our consumption. But it is also factories; there are not steel mills in Llanwern any more, I think, but there are plenty of them in China. If you care about climate change, there is not much point in focusing on carbon production.

Q130 Lord Giddens: I do not think you have to say to most of this Committee, “If you care about climate change” because to me it is just such a fundamental, and you agree with that in your book.

Professor Helm: Yes. If what you want to do is address global warming, then you have to address carbon consumption rather than carbon production. Working out the carbon composition of everything from this pen to this watch to this bottle of water is obviously an impractical and complex exercise that we could not conceivably carry out in the tax frame. However, there are shortcuts. If you tax your carbon production at home and you look at the small number of imports that make up the vast bulk of carbon trade, you have made a significant step in the right direction. If you take in chemicals, fertilisers, cement, steel, things like that, a small number of industries, and you say that the same price of carbon will be paid for those if they are imported as opposed to produced at home, you have started to get your answer roughly right rather than the current answer, which is precisely wrong.

Q131 Lord Giddens: The “you” is who in this context, the nation or the EU?

Professor Helm: It could be an individual country. It could be the EU. The objection that people come up with is they say, firstly, this is protectionism and, secondly, it violates the WTO rules. It is absolutely the other way around on protectionism. China has an export subsidy on its carbon-intensive goods because it does not pay for the pollution and we do. It is a distortion of trade not to have a carbon price, so I cannot see any argument for saying this is protectionist. If it leads to slightly less trade, the optimal level of trade is not the largest number you can think of. It is the optimal level of trade.

On the WTO, there are very clear rules in respect of environmental considerations. In a separate paper that Cameron Hepburn and I have done, we suggest that these things can be crossed successfully. Do bear in mind that we do have border adjustments already, so carbon standards are border adjustments. You cannot produce a Chinese car and sell it in the European market unless it meets our requirements, and similarly in the United States. On even the aviation case, which is the most sensitive one, I would put the question this way. Could you imagine that the world aviation business will be talking about doing anything about carbon in the absence of this problem about being included within the EU ETS?

Everyone says this shows why it cannot work. On the contrary, it forces us to confront an issue that is profound and international, and if we cannot solve it then we are not really serious about climate change. I see the aviation thing as an example of getting something on the agenda and getting it addressed, which would not otherwise have happened.

Very pragmatically, just do it for some of the really bulky carbon emissions imports and then see how it goes. If any country then reacts by imposing their own carbon price, so instead of paying the money to HMG they keep it themselves, then they are exempt. This encourages and incentivises everybody else to follow the carbon price route in a way that the Kyoto negotiations and the EU ETS type frameworks are clearly not doing.

Q132 Lord Giddens: I have just one more question. I read your book and I have always supported the idea of carbon taxes as essentially the same sort of thing, but I do not see how it can be that fixing a carbon price is any more realistic than negotiations going on at a world level. In other words, I just cannot see that is likely to happen in the next few years.

Professor Helm: It is precisely for that reason I said in answer to an earlier question, “if you care about climate change”. The reality about not being willing to confront people with the costs of their carbon emissions is that either we do not want to elect people who are going to make us pay for our carbon emissions or politicians do not want to impose that upon us. If you do not want to have a price of carbon, and anything you do in the climate change territory implicitly has a price of carbon in, then you should be honest and admit you do not want to tackle climate change. When you say that, you see it is about as realistic as the negotiations at Doha producing a coherent set of actions, precisely.

What I tried to do in the book and what I try to argue more generally is, first, that this is an incredibly serious problem and, secondly, if you want to tackle it these are the best things you can do to try to address that. Do not kid yourself that reducing carbon production will do any good on its own without addressing the carbon consumption point of view, and do not kid yourself that by supporting very expensive technologies rather than having a carbon price you will make much difference to that problem. That is essentially what I am doing. It is supposed to be realism. If you look at the United States there is some hope of a carbon price, not because of climate change but because they need the money. That is the one hope I think one could hold out for getting carbon pricing in place.

Q133 Lord Lewis of Newnham: On this carbon leakage, which I think is the term you used in your book, and the fact that, for instance, a large amount of the substances we are pulling in from China will be taxed, where does this money go? Who uses it? For what purpose will it be employed?

Professor Helm: Two things. First of all, be very careful about carbon leakage. People say there is not much carbon leakage. What they are really measuring is firms that have relocated. I am talking about consumption patterns and content of consumption. That is where the difference between carbon production and carbon consumption numbers tells you an enormous amount is going on here.

In terms of the money, it goes to the Government who are doing the importing unless the other country has a carbon price, in which case it does not get charged. This is the incentive mechanism, which means it is much better for the Chinese to keep the money, to be blunt, than to pay it to HMG. That is why this mechanism is designed not to raise money in the long run but to create an incentive mechanism for other players in the world economy to adopt carbon prices, given that I do not think Kyoto is going to get us there any time soon.

Q134 Baroness Parminter: You seem to be supporting a gas-led strategy to move us away from coal, but what about renewables? It could be argued that some of the things you have said are slightly dismissive of the current high-priced technologies that we have. In your Spectator article you talk about future renewables and research going into that. Talk us through how realistic you think it is that with the current technologies we have we are going to meet the legally binding targets that we have.

Professor Helm: David MacKay, the chief scientist at DECC, sets out in his book the arithmetic for particularly wind generation. The thing about wind, and indeed current rooftop solar, is they have two characteristics. One is they are very expensive and, secondly, they are low-density power sources. David MacKay does some calculations, and I quote them in my book. I would need to check the exact words of this but it goes roughly along the lines that if you want to replace the energy used in our cars, for half of that energy you would need wind farms four kilometres deep round the coast. He does some other calculations for covering Wales. The reason these numbers are important is global warming could never be solved by these kinds of low-density energy sources. There just is not enough land, there is not enough shallow water to address the global problem. We are not going to solve climate change with wind generation in its current form or with the current forms of solar that we are using, and they are extremely expensive.

That does not mean I do not think we should not develop some wind. We should certainly develop some offshore; we should certainly develop some onshore. We should see if this technology can improve and we can see where its cost structure may go. But what the EU has done is put all our eggs into these particular short-term renewable technologies by 2020. The sad fact is that we do not have unlimited resources to address climate change because all this money comes out of customer bills. We will have about 25% of households by 2015 spending 10% plus of their disposable income—the old definition of fuel poverty—by that stage before we have really got into the scale of the subsidies required. What I do in the book is ask the question: what would have to happen for us to actually tackle global warming? Not British warming or European warming but global warming. I make the point that we will need new technologies to get there. You can object to that by saying, “Well, no, we think existing technologies can do it”. My guess is, and following the logic of David MacKay’s analysis, the answer is no, but that is a line of objection to my argument. As I say, I do not think they can do it.

You can then say is there any limit to future renewables, to which the answer is no. One hour of sunshine is worth the entire output of the world’s electricity industry for a year roughly, to give a ballpark. There are very, very exciting technologies out there: next-generation solar, all sorts of negative emission technologies to replicate photosynthesis, a whole range of things. There are batteries, smart networks, et cetera. The point I tried to make, which goes down very badly with lots of people, is if you spend all the money on X, it is not available to spend on Y. What I say in the book is if we really want to tackle global warming, we have to have these future renewables. There are some very exciting possibilities out there. Some of the money that is currently being spent on those extremely expensive versions of current renewables, and I have in mind particularly offshore wind, should be spent elsewhere.

I have one other point to make. There is an estimate I read today, which is that half of European renewables will come from biomass or are coming from biomass. You have to ask yourself when you look at large-scale biomass whether that is a sustainable technology or makes any serious inroads into emissions. The idea of cutting down trees, which are CCS stores, with a view to releasing the emissions as fast as possible, turning them into pellets,

shipping them across the Atlantic, putting them on to a dockyard, unloading them and taking them to a power station and thinking that represents a sensible strategy towards climate change, my suspicion is the biomass will end up in the same kind of difficulties that biofuels currently are. The consequence to Europe will be to put even more emphasis on these very narrow lines of technologies, which must be produced by 2015 because that is what the directive instructs. I think that is not making any difference to global warming. It is not making much difference to carbon consumption. It is putting up electricity prices in Europe when they are going down in the United States and elsewhere and, therefore, reducing competitiveness. It does not add much to security because it is intermittent, but it does produce very large sums of money for those people investing in it. It is an extremely rich source for lobbyists to collect rents from and, just as with the EU ETS, it is not going to go away.

Q135 The Earl of Caithness: You mentioned biomass. I wanted to ask you about that because of what Drax are doing, converting three of their systems to biomass. They have written to me and said that at the point of consumption the biomass is carbon neutral—has no carbon footprint; it is just as cheap to bring it from the west coast of America by ship as it is to transport it by road from Scotland; and the biomass they are using is independently verified as sustainable. You say that biomass is the reverse of CCS. It is just a fast-track release system. I cannot correlate those two points.

Professor Helm: I do not want to comment on a particular project or a particular investment. My comments are general. If you take account of the projection of future carbon emissions and if you think there is some prospect that new technologies may come along to make things better in 20, 30, 40 years' time, it matters enormously that you do not release more carbon into the atmosphere at the moment. Trees store carbon for a period of time—80 years or whatever it might be; maybe longer. The question in biomass is do you want to release it all now or keep it locked up? You then have to distinguish between trees that are going to be felled anyway and trees that would not otherwise be felled. You have to look at waste products, all sorts of other characteristics.

I would say two things. I would say that the conventional way of estimating the sustainability of biomass, like some of the conventional ways of working out the sustainability of biofuels, in my view is seriously flawed. I would want to suggest that there are quite a number of areas in biomass where you should have serious concerns about the consequence of what is being done. In your example, you talk about transport from Scotland or transport by ship. These are all emission-rich activities. Biomass is not putting emissions into a negative territory. It is releasing those emissions, so all the carbon that is emitted in the process of getting the stuff to being burned and then on transmission and so on should be taken into account.

I note that the ROCs, as I understand it under the renewables obligation, are conditional upon continuing to pass the sustainability test. I think across Europe—and you can see it already at the commission, you can see it in lots of researchers' work—people are beginning to ask very serious questions, as they have about biofuels and we have had to go into a very fast reverse, about biomass. Compared with ethanol in the United States, these things are probably not that serious, but these technologies are not all that they seem. Remember, too, water use is part and parcel of this framework as well.

Q136 The Earl of Caithness: I was just going to ask you about water. If Germany is going for these coal-fired plants and trying to create itself as the dirty man of Europe again, how is that going to impact on water, which is an equally scarce resource?

Professor Helm: There are very few ways of making energy without using a lot of water. Coal power stations use a lot of water. Fracking uses a lot of water. People say you should not do fracking because it uses water, but they forget that coal power stations use it. When we think about biocrops and land usage, we also have to think about water—water taken out from the soil, irrigation and so on. Again, look at the United States' corn for ethanol. Look how much land is used up. Look at the water composition of that. This feeds into this general observation that it would be nice to believe that if we use some biomass, some biofuel, some ethanol, some wind farms and some solar panels that somehow we are going to solve global warming. There is not the water and the land available for these energy crops in their various forms. There is not the shallow water to do it to cover the bulk of it.

Remember the dimensions: three coal power stations a week in China and India, 400 to 600 gigawatts of new coal coming on to the system, 2 billion more people by 2050. These are enormous challenges and global warming is not solved by having some wind farms in the Outer Hebrides. They might be very useful in the Outer Hebrides because it is the end of a decentralised electricity system, but we have to think seriously about what technologies could actually crack this problem. I happen to be very optimistic. I may be wrong. If I am wrong, I suspect we are doomed to a very hot planet. I would like to buy us some time by getting out of coal quickly to give us a bit of space. I would like to take some of the money from biomass and other areas and spend it on developing these new technologies.

I would like to add one other thing here. There is an order of magnitude question. If you are going to spend 100 billion—this is the number bandied around; whether it is right or wrong is a very open question—if you are going to spend a very large sum of money doing stuff in the North Sea and beyond, compare it to what you could have spent the money on. There are very few research projects in the world that cost a billion. CERN probably cost more than that. But ask the question: how much money would you need to devote to a project in the UK to drive forward next generation solar—a billion? How much would you need to drive artificial photosynthesis forward—a billion? There is 98 left. When you look at the costs of big research programmes and compare them with the costs of large-scale wind deployment or large-scale rooftop solar and so on, you get a lot of bucks for your money in R&D even though it is quite a wasteful process. All I am really arguing is to tip that balance a bit from all in one basket to a bit less in that basket and a bit more in these other areas.

Q137 Lord Renton of Mount Harry: I wanted to comment on what you have been saying. I found that extremely interesting, and I am sorry I was late arriving. I am a person who has put solar panels round very large stables in Sussex. I also have a house in the Outer Hebrides and there is a lot going to go on very close to that part of the world. Where I would disagree with you is I think that these, in a sense, small things happening are very necessary to get everyone involved. It is only perhaps because of feeling you have done a bit and so I have to do a bit more that actually we are going to do enough to solve the problem.

Professor Helm: Let me give you two answers to that. My fear is that people think that when they have done that we are cracking climate change and we do not need to worry about the other bits. I think personal responsibility and personal ethical and moral judgments are very important in this frame, but you could have spent the money on some offsets elsewhere at a much lower cost and to much greater effect than you actually have done. I worry that people look round and they see rooftop solar, as happened in Germany, and they think they are being very green and ignore the issues of substance about coal and so on.

The second thing is quite worrying, too. It is not just that your rooftop solar is hideously expensive. It is that you are not paying that; poorer electricity customers are. In a world

where fuel poverty and people's ability to pay is a real big restriction on the willingness to provide resources to deal with climate change, remember that essentially rooftop solar is a subsidy to the middle class, which poorer people who do not have these options available to them will be paying now and for a long time in the future. In Germany, it is really very substantive and the costs that have been imposed are great. Even more worrying—and I have heard this comment made in Germany—is because so many of the vocal middle class or the better off now have rooftop solar, it is like the common agricultural policy, you could never repeal it because there is now a political constituency to support that.

I think, firstly, you delude yourself that you are really making a difference; secondly, you could have spent your money making a much bigger difference if you cared about your moral carbon footprint; and thirdly, I worry that this distracts you into the belief that you are actually doing something about climate change and that it is all going to be all right and we can ignore some of these other areas. I am probably being grossly unfair, but this issue is too serious.

Q138 The Chairman: I think “severe” is possibly the word.

Q139 Lord Renton of Mount Harry: I just have to say that I am very glad I am actually getting rather good revenue.

Professor Helm: Absolutely. As a profit-maximising strategy, you have to realise that many of the current renewables are very profitable for the people doing it. That is why there is a massively powerful subsidy. I am on the receiving end of the lobby groups who find any challenge to these subsidies difficult for them. Of course they are difficult, they are doing exactly what you would expect them to do, going out of the subsidies. We had the same problem with the common agricultural policy, but it does not make it right.

Q140 The Earl of Courtown: You were talking about how important it is instead of these large offshore schemes to actually put investment into R&D, and we can do an awful lot of R&D for a comparably small amount of money. Instead of the large offshore schemes, would this also apply to some of the tidal schemes that are being talked about at the moment?

Professor Helm: I think there is a strong distinction between offshore wind and tidal. Although people say that offshore wind is an immature technology and there are significant technological advances being made in the form of the turbine, the amount of wind it captures, actually a lot of the cost gains are made in the ability to run the logistics support systems and so on, as an aside. That is why I am in favour of doing some of it. You just do not need to do all of it.

Tidal is a genuinely immature technology. If you think of the low-carbon options we have, we have nuclear, solar, geothermal and gravity. That is what tidal is. That is all we have, but it is a lot. Tidal is very location-specific. There are some aspects of the technology that are generic, but we have deep locations, shallow locations, big range locations and so on. Of course we should spend some money on that. Similarly, after six or seven years we have not got anywhere with the CCS project. I do not know whether CCS will work in the sense of will it make a great deal of difference to emissions if you know you can store carbon offshore, but we are hell bent on 100 billion for this. But 1 billion for a CCS project to demonstrate in the shallow North Sea? What a gift to the world that is. If you cannot make it work in the shallow North Sea, you cannot make it work anywhere. We cannot do that, but we can do this other stuff.

This is not about right and wrong, this is about balance. This is about saying there is a scarce amount of customers' bills and if we use some in some areas we cannot use as much elsewhere. So tidal, yes, and a whole host of other things on the shopping list. R&D will be very wasteful, it always is. Lots of ideas will not get there, but it is quite cheap to get to the point you realise it is not a good idea compared with a really large-scale deployment as of offshore wind.

The Chairman: Could we go to Lord Whitty? I am conscious of time now, if we could just briefly finish this session.

Q141 Lord Giddens: We are finishing at 3 pm, are we not?

Q142 The Chairman: No, I think a little later but, given the pace of this, I want to make sure we maintain it.

Q143 Lord Whitty: Two quick questions. One is you have not talked a lot about nuclear but, to square the circle, in view of your disparagement of renewables and our need to get rid of coal as fast as possible, then nuclear must feature not only in Britain and Europe but also internationally. That is the first question. The second is to see if there is anything behind what you said very early on that we should try to stop the dash for coal globally by any means possible. Behind "any means possible", does there lie some means that we have not yet talked about?

Professor Helm: To take the first one, I am not disparaging about renewables. I am very, very strongly in favour of shifting resources from almost everything we are doing to future renewables and I am very keen that we deploy offshore wind and onshore wind. All I am saying, and I get repeatedly misinterpreted if I put it this way, is not on this scale. That is what I am saying. It is very simple, just a matter of proportion. It is not anti-wind or anti-rooftop solar or whatever. It is simply saying, "Not all the eggs in the basket" for the silly reason of pursuing a short-term directive in the EU if it is not achieving the objective of that directive and more generally.

You ask about nuclear. It is true that nuclear is a low-carbon technology. It is true that some people claim that it can be done at scale and at reasonable cost. That is yet to be proven. I think the question are you in favour of nuclear is not a good question unless you either say "at any cost" or "is there some reasonable cost?". Suppose it costs twice as much to build a nuclear power station as an offshore wind farm. Would I be in favour of building a nuclear power station? No. If nuclear turns out to be cost competitive against a current wholesale price of about 50, then it seems to me there are very good reasons for thinking that you would want to have that in your portfolio. Is nuclear going to solve our problem? It is going to take until 2030, even on the Government's ambitious plans, to get back to the current level of nuclear generation in this country as we closed. What I am against is policies that say things like, "I will tell you what, let us close as many nuclear power stations we have going today that are working now and switch from nuclear to coal". That is Germany.

There are many aspects of the Energy Bill I am critical of, but I think it is a perfectly reasonable position to arrive at that says governments are encouraging people to bring this technology forward, but there is going to have to be a price and there is a reasonable price and an unreasonable price. I think the real difficulty in nuclear going forward is how anyone can sign a fixed-price contract to deliver a nuclear power station. That is what the FiTs envisage. How can you possibly, given the experience in Finland and now in Flamanville with the latest cost overrun, as a private shareholder commit yourself to a fixed-price delivery cost? I think that quite a lot of thought has to be given. I understand the argument that says

ex ante you want to say, “No, it is fixed and we are not going to change it”, but supposing the thing is half built and the costs turn out to be much greater, what then happens? I think we should be seriously thinking about nuclear in that context.

It may work, it may not. As I say in the book, we are going to lose at least a quarter of all the nuclear reactors by 2020 around the world. We are on an exit strategy that is pretty close to the German one. We have already closed quite a few reactors and we are supposed to close them by the midyears of the next decade. Germany will do a bit more life extension, I suspect, when they find their difficulties. All we will have left is Sizewell B and the new ones after that. America will be closing them. Japan will not bring all of its reactors back on course. Lots of these things were built in the 1960s and 1970s. Nukes are on the way out for quite a long time and in precisely that window in which the coal burn is going up. I am very concerned, as is Germany, that coal does not replace nuclear. That is the residual limited role I see for gas.

In answer to your question about coal burn and getting out of coal, there is obviously a limited number of things we can do, but clearly if you go around the world trying not to develop shale gas and do not have the technology and the technology transfer to help those countries that really are going to coal to burn gas, that is a setback. For example, in China it turns out that, as with Argentina, they may have massive deposits of shale gas. It is in awkward positions. If you care about global warming and the global community, we should be using our fantastic engineering skills, oil and gas skills from the North Sea and so on, to help these people develop this gas reserve as fast as we possibly can. We should be doing CCS to help them cope with the coal. We should be thinking about what it is that we here in Britain and in Europe can do to address the global interest rather than just our own interest.

Q144 Lord MacLennan of Rogart: You said in an answer to an earlier question that R&D was wasteful, was always wasteful, it was inevitable. We have 27 different countries in the European Union, and more applicant countries, pursuing different energy policies. How do you think we can get the resources shifted to what you consider to be the most important way ahead, which is R&D, with that background? I know you are an adviser to Governments and go beyond that. Are you saying that there is a possibility of getting enough member countries of the European Union to come together to produce the kind of solutions that you have been advocating?

Professor Helm: I have one ground for optimism. You might think it is a very odd reason for being optimistic, but this commission comes to an end in 2014. The new commission that comes in in 2014 will do all the big stuff in the early years. That is what happens in the lifespan of a commission; it happens early on. We are now in the fag end of the existing one. The overwhelming political problem confronting the major European economies is competitiveness and their economic performance. The price of gas in the United States was as low as two, it is now four. Somebody pointed out in the *FT* the other day it has doubled. Well, it has doubled from two to four. The price of gas in Europe is 10 to 12 or 10 to 16. The competitive advantage the United States has, even at four, five, six on a gas price given its supplies, is so great that at least in energy-intensive industries its energy cost advantage vis-à-vis countries like China is greater than China's labour cost advantage. That is why you are seeing the repatriation of energy-intensive industries, major petrochemical stuff, all being developed back in the United States. This is really serious for European competitiveness. If you are a big chemical firm in Germany, you used to say, “Do you produce in Germany or do you produce in China?”. Imagine if the choice was whether you produce in the US or in Europe. This competitive threat is right out there as we drive our electricity prices up on

the basis of very expensive and, in my view, pretty ineffective renewables. The price gap with the United States will get bigger.

If you are an incoming commission in 2014 and you confront that, you have to start thinking about competitiveness and you have to start thinking about the technologies. I hope that point, the competitive argument, will be powerful enough for countries like France to stop what I regard as ridiculous policies like banning shale gas, but I also think it girds the Europeans to think what is their growth and competitive strategy. R&D is something that finds a ready audience in general across Europe. How would you do it? There was a proposal for a European MIT to pool together the R&D resources across Europe and it is exactly those kinds of institutions you want. Most of the universities in Europe opposed it. Why? Because they thought some of their budgets would be usurped by this institution. You found a framework—a classic small “p” political framework—and everyone defends their own budgets, so exactly the institutions that you think might support a new research base are opposed.

In the context of a competitiveness programme and the need for Europe to get on the front foot on technology post-2014, I think these are real runners and I think that is the agenda that ought to be put out. In other words, presenting this as an argument about competitiveness, economic growth and so on is probably a more fruitful argument, sadly, than presenting it as an argument about climate change. If its consequence is beneficial to addressing climate change, great.

Q145 Lord MacLennan of Rogart: The political stance of most of the members of the European Union on the economic questions is very different. Some are run by people like Mario Monti, some are running behind. There is an internal composition and competitive issue in the European Union. How can we bridge those gaps and those conflicts of interest, as they seem to be or as they are judged to be by some of the politicians, to get the awareness of the point you are making? I know you said the commission, but the commission at the moment is not being listened to by very many people.

Professor Helm: There is national competition and there always will be, but within the EU budget there are a lot of structural funds and other considerations that are about developing infrastructure and interconnection, and R&D is part and parcel of that framework. It is true that Member States are not thinking purely in a European way, but it is also true they are not thinking purely in a nationalist way.

The second thing is to say that everybody is cutting their renewable subsidies. In all the public projection about pursuing renewables, everybody is cutting the subsidies, including Italy, Germany, France—which does not have much outside its hydro and its nuclear—the Netherlands and here. Everybody is cutting them because everyone realises these are just not sustainable. These are promises that future customers will pay by politicians who will not be there to take the consequences of the bills that come through people’s doors. We are having a retreat and I think there is a final bit. At some point the Europeans have to realise that Kyoto is not going anywhere, that they are not world leaders, that the Americans and the Chinese are going to find an architecture outside Kyoto to take these negotiations forward. At some point—and it may come through the media, it may come through all sorts of different channels—the reality will dawn about the dash for coal and the inconsistency, to put it in its polite form, between what is actually going on in Europe and the aspirations that Europeans are portraying on the world stage of being world leaders in this territory. Whether it is a *Panorama* programme on the German coal industry or whether it is an investigation into what is really going on in biomass, we have already done it

in biofuels. It has now been seen not to be sustainable. In the end, rationality has begun to win that argument. You might think I am an ivory tower academic, but I have quite a faith in rational argument eventually getting somewhere in this debate.

Q146 Lord MacLennan of Rogart: You have given us reasons for being pessimistic about public money being spent on the kind of research you want. Is there anything you can say that might encourage private investment anyway? What would be the balance between those two?

Professor Helm: The response to that is that for about 100 years there has been virtually no serious technical development in the electricity industry, which is the core of this. The coal power station is 19th century; the CCGT and the PWR are about 1945, 1950, the Second World War or that kind of period; the cable in London is 19th century. It is one of the industries that has been almost immune to any serious technical development apart from computers helping you run your power station and run platforms and markets. People look at energy and electricity and they look out the back window and see all these road maps—I have been involved in them—to 2050 and what they have in mind is a world that looks like our current one. If you think about other industries and technical change in those industries, the one thing that ought to be fairly clear is the probability that in 2050 the technologies in front of us and the options in front of us will look anything like the ones that are in front of us now is quite low.

There are massive amounts of R&D going on here. If you ask yourself what transformed the communications industry, it is true that the original ideas of the internet, the web and so on came out of military and other state spending, but Google and Microsoft are not state constructions. In the end, the way market systems have worked in the 20th century is that we have had one innovation after another. Governments have had a role in those things, particularly in the primary research area, but the private sector in the end is after profits. If you could come up with the next Google idea, that is something you might well spend time in your garage trying to work out how to do. I do not think that we should be stuck in the idea that all this technical progress is simply going to come from the public sector and from government. They are a partner in R&D, but we have a vibrant private sector and, indeed, that is why the US is particularly good in these areas. It has such a vibrant, private technology sector. Ours is a bit more limited, but you can think of all sorts of ways to genuinely stimulate R&D within an economy to give incentives to people.

I will be long gone by then, but my guess is, if we sat in this room in 2050 and we got our history book out we would say, “What were they doing in 2012? They were just talking about a coal station, a CCGT, a PWR, windmills and a bit of rooftop solar”. They will be, in my view, probably in a world that is almost unrecognisable, in the same way I did my thesis on the typewriter with Tipp-Ex and carbon paper, and communications were completely unrecognisable. The private sector is very important in this and there will be all sorts of surprises.

Q147 Lord MacLennan of Rogart: Is there not a risk that your indication of a multiplicity of R&D going on across a broad spectrum could continue without any focus upon the most advantageous?

Professor Helm: Yes, but that is why you want a carbon price. You want to say to this world going forward, “You are going to make money out of reducing carbon”. If there is no carbon price, if there is no money to be made from reducing carbon, you make money instead out of subsidies from the Government for wind farms, so you build wind farms. If

you pay farmers to rip up hedges, they will rip up hedges. If you pay them to plant them again, they will plant them again. Prices matter in this circumstance, and unless you create a price and a value for carbon and convince people that you are going to carry on paying it in the future and it is going to go up through time, you will not make much progress. That is why the three bits of my strategy fit together. The carbon price is the incentive mechanism. Using gas instead of coal buys us time and frees up resources from stretched households that can be spent on renewables, of which more should be spent on future renewables and R&D than on current renewables. That is it.

Q148 The Chairman: A perfect end, I think. You have ended on the high note with the three points of your strategy there. We are very grateful for that. It is of great interest. Does anybody have any final bits? Professor Helm, thank you very much.

Professor Helm: Thank you very much for inviting me.

INEOS—Written evidence

Executive Summary

- Decarbonisation policies are likely to drive energy prices up in Europe. This will undermine the competitiveness of industry in general, but particularly threaten energy-intensive industries, for whom energy represents a very significant proportion of production costs.
- It is vital to prevent these vulnerable industries from being forced out of the EU, otherwise jobs, investment and tax revenue will be lost. Furthermore, due to carbon leakage, global emissions would likely increase as production moves to more carbon intensive jurisdictions that lack plans to promote low-carbon energy.
- Energy-intensive industries make a significant environmental and economic contribution to the green economy and must be protected from the effect on energy prices of punitive fiscal decarbonisation measures. Examples of best practice in this regard come from Germany and France, in the form of tax rebates and long-term energy contracts respectively.
- Shale gas is an important opportunity to reconcile decarbonisation objectives with economic goals. As an affordable bridging fuel for the medium term, it would displace coal, reducing emissions, while lowering energy prices and driving economic growth.
- Shale gas would especially benefit energy-intensive industries, helping secure their future in the EU and addressing concerns about a growing competitiveness gap due to decarbonisation policies.
- Shale gas is not only a source of fuel, but also raw materials for the petrochemicals industry, namely ethane and propane. Extracting shale gas in the USA has led to huge investment in the petrochemicals sector due to the double cost saving on energy and feedstocks. Europe could replicate this by extracting shale gas.

1. INEOS is a global manufacturer of refined oil products, petrochemicals and plastics. Our products are the raw materials used by the manufacturing sector and can be found in a wide range of essential items including construction materials, medicine, clothing, vehicles, and computers. INEOS is the largest chemicals company in the UK and the third largest in the world. With 51 manufacturing sites in 11 countries, we employ around 15,000 people, and our sales in 2011 were \$43.5 billion.
2. INEOS operates processes that are necessarily energy-intensive. At our chlorine plant in Runcorn, where we use electrolysis, electricity accounts for approximately 70% of our production costs. As a consequence, we are acutely vulnerable to fluctuations in energy price. We sell our products in fiercely competitive international markets and cannot pass on costs to our customers. We cannot afford to operate in jurisdictions with uncompetitive energy prices.
3. The EU has ambitious goals to reduce emissions, promote renewables, and develop energy infrastructure. Insofar as the EU is looking to the market to pay for this, decarbonisation will place significant upward pressure on energy prices over the next few decades. This will increase costs for manufacturers and consumers alike, but it poses a particular threat to energy-intensive industries.
4. Energy-intensive industries must be protected from steep price rises otherwise production will be forced out of Europe to more competitive locations. This will not reduce global emissions, which, in fact, could increase significantly if production moves to more carbon intensive jurisdictions. If Europe is serious about decarbonisation, energy-intensive industries must be kept within the fold and supported while the EU makes the transition to affordable low-carbon energy.
5. Energy-intensive industries employ hundreds of thousands of skilled workers across Europe, making a huge contribution to GDP and tax revenues. The sector is also the start of value-chains for everyday goods and damaging these linkages will lead to negative consequences for downstream industries. The EU can ill afford to lose the economic contribution of energy-intensive industries through carbon leakage. Europe will continue to need all the essential items made by energy-intensive industries, so it is better to meet this demand with domestic production, rather than losing jobs, investment and tax revenue. Decarbonisation cannot mean deindustrialisation—the aim must be to connect industry to green energy supplies, not push industry away.
6. Indeed, energy-intensive industries have a large environmental contribution to make to the low-carbon economy—they are not “sunset industries” standing in the way of environmental improvements, but a vital source of raw materials and innovations required to make the green economy a reality. Operating in a highly competitive global market, energy-intensive industries continue to be at the forefront of employing technologies that improve performance, make better use of raw materials and drive efficiencies that reduce waste and energy consumption.
7. The chemicals industry in particular is leading developments in energy efficiency and emissions reduction. It is estimated that for every tonne of CO₂ used in the chemicals industry, more than two are saved downstream by its products, which include catalysts, insulation, components for wind turbines, and solar cells.
8. INEOS is committed to improving energy efficiency and reducing emissions. At Runcorn, for instance, we have reduced CO₂ emissions by over 33% since 1998 through replacing mercury cell rooms with the most up-to-date modern membrane technology. INEOS

also invests in developing the sort of new low-carbon technology that will help deliver the green economy. We are seeking to introduce a biotechnology on Teesside, for instance, that can turn local waste into green energy and fuel, reducing emissions while providing a flexible solution to local waste management.

9. Certain Member States have an effective long-term strategy for ensuring that energy-intensive industries can continue to make their important environmental and economic contribution to the green economy. Germany, most notably, provides significant energy tax rebates and reductions for their domestic industry. This long-standing arrangement provides industry with the certainty it needs to invest and thrive.
10. France, meanwhile, has facilitated long-term energy contracts (such as the Exeltium deal), which give energy suppliers the confidence required to invest, and offer industrial energy consumers affordable energy. This approach has proven effective in promoting the transition to low-carbon energy and is less injurious to business than relying on punitive taxes to create market incentives that will deliver low carbon investment only over a relatively long period of time.
11. In contrast, other Member States lack a long-term strategy for energy-intensive industries. The UK is soon to announce details of a mitigation package for energy-intensive industries affected by the introduction of a unilateral Carbon Price Floor in 2013. While thoroughly welcome, this mitigation is only a short-term solution for one spending review.
12. Indeed, a report recently published by the Department for Business, Innovation and Skills (*An international comparison of energy and climate change policies impacting energy intensive industries in selected countries*) shows that the UK is pursuing policies that will disadvantage its domestic energy-intensive industries more than any other country. The report demonstrated that Government policy will lead to a growing electricity price differential between the UK and the rest of Europe, right through to 2020. By this date the incremental cost impacts of energy and climate change policies on electricity price in the UK will be £28.3/MWh, much higher than the cost in Germany (£17.3/MWh). In contrast, a Government-proposed £250 million package of mitigation measures for UK energy-intensives is too little to compensate for these increases and is too short-term in nature. Industry in Germany already benefits from support amounting to around €5 billion.
13. The policy outlook varies from Member State to Member State, so there is an uneven playing field. The EU recognises that energy-intensive industries are especially prone to carbon leakage, and has recently announced state aid guidelines for compensating companies for indirect costs associated with the Emissions Trading System. It is important that the EU continues in this direction, and encourages and facilitates Member States to adopt effective strategies for supporting energy-intensive industries while the EU pursues decarbonisation policies so they can thrive and compete fairly.
14. The EU might in particular look at advocating the use of long-term energy contracts, as in France, to expedite the transition to low-carbon energy in a business-friendly manner. Relying on fiscal correction of the market can take a long time to deliver changes, and the money is often not hypothecated for the purpose of decarbonisation. The outcome is money accrues to countries' treasuries while industry and consumers are hit hard for little environmental gain.
15. The EU has ambitious goals to develop renewables and some Member States are looking to invest in significant new nuclear capacity to deliver reductions in emissions. This will

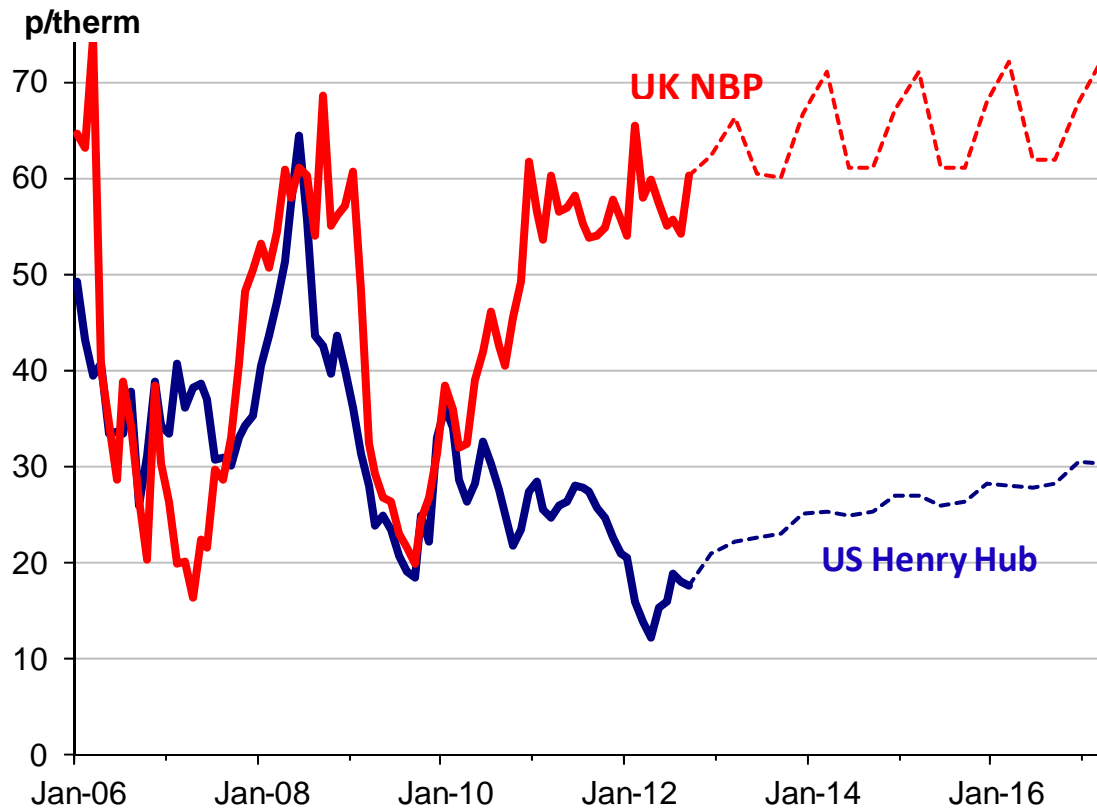
take decades to deliver, so the Commission is right to recognise the important role that gas will play in Europe's energy mix in the medium term. Gas is less carbon intensive than coal, so is the best option as a bridging fuel, but it must be competitively priced if it is to successfully displace coal.

16. Unconventional gas is an opportunity for Europe to have an affordable and secure supply of gas in the medium term that would displace coal and reduce emissions. This would improve economic competitiveness at the same time as advancing decarbonisation objectives, and help protect energy-intensive industries from the effects of fiscal decarbonisation measures.
17. The situation in the USA is illustrative. Shale gas extraction there has transformed the energy market, causing gas prices to tumble. American reliance on gas imports has dropped dramatically, and exports are also forecast to grow from 2015. This has driven economic recovery, lowering industry costs and encouraging growth.
18. US natural gas prices are now among the lowest in the world—certainly of the transparent liquidly traded gas markets. Rather than being a net importer, the US is now expected to be a net gas exporter, with a number of major liquefaction projects announced (in part using terminals that were originally constructed to import gas). Rather than exporting money to buy gas, the US will now have a large new revenue stream. Addendum 1 compares US and UK gas prices.
19. Lower gas prices have in turn resulted in lower electricity prices, giving a massive competitive advantage to US electro-intensive industries. Addendum 2 provides a price comparison across select countries.
20. As a consequence of falling prices, gas is now far more competitive than coal for power generation in the USA. In direct contrast to the situation in Europe, gas has displaced coal in the power generation sector and the USA has seen a significant reduction in CO₂ emissions.
21. In addition, shale gas extraction in the USA has significantly lowered the price of ethane and propane—vital raw materials used by the petrochemicals sector in a wide range of applications. Ethane and propane are currently sourced from naphtha and conventional gas in Europe, but can also be found in shale gas deposits. The USA is currently seeing huge expansion in the petrochemicals sector due to the double cost saving on energy and raw materials as a result of shale gas extraction.
22. Investment has increased significantly in ethane crackers in the USA. On 1st June 2012 ICIS Heren reported that “US-based ExxonMobil Chemical’s announcement of a new 1.5m tonne/year cracker in Texas by 2016 brings the tally of new US ethylene capacity announcements to 33% of existing capacity”. A list of announced ethylene expansions is shown in Addendum 3.
23. Although it is difficult to estimate precisely the impact shale gas could have in Europe, it is clear that there are very significant reserves across the EU that if extracted would exert heavy downward pressure on prices and improve energy security. This would in turn bring economic and environmental benefits as seen in the USA. A general overview of the impacts of shale gas in the USA is included in Addendum 4.
24. Given the vulnerability of energy-intensive industries to rising energy prices, and the current policy outlook, shale gas is an opportunity the EU cannot afford to turn down. It would close a growing competitiveness gap and allow energy-intensive industries to prosper during the transition to the low carbon economy. Shale gas would be especially

25. INEOS notes that recent reports have indicated that the risks associated with shale gas extraction are commensurate with existing fuel extraction technologies and can be managed safely with the right regulatory framework. This includes reports from independent academics into the Preese Hall fracking operations, as well as studies from the Royal Society and Royal Academy of Engineering, the Institute of Directors, and three recent EU reports.
26. It is important to put in place the right regulatory framework for managing fracking operations and wastewater injection, so that seismic and groundwater risks are effectively mitigated. While it is appropriate for the EU to allow Member States a certain degree of freedom in these matters, it should play a facilitating and coordinating role, ensuring that EU environmental regulation is up to date with technological advances, and recommending best practice.
27. INEOS welcomes the EU's efforts to inform the public about shale gas with a view to having a dispassionate evidence-based discussion about introducing this new technology in Europe. The debate to date has suffered from sensationalism and misinformation, which risks holding up progress in delivering significant benefits to the EU.
28. Shale gas is an opportunity to unite economic and decarbonisation goals in the medium term, and with carbon capture and storage perhaps in the longer term too. It would act as an effective bridging fuel, displacing coal, and thereby reducing emissions. At the same time, it would reduce energy prices for industry, and raw material prices for the petrochemicals sector, driving economic recovery and helping secure the future of energy-intensive industries in Europe.

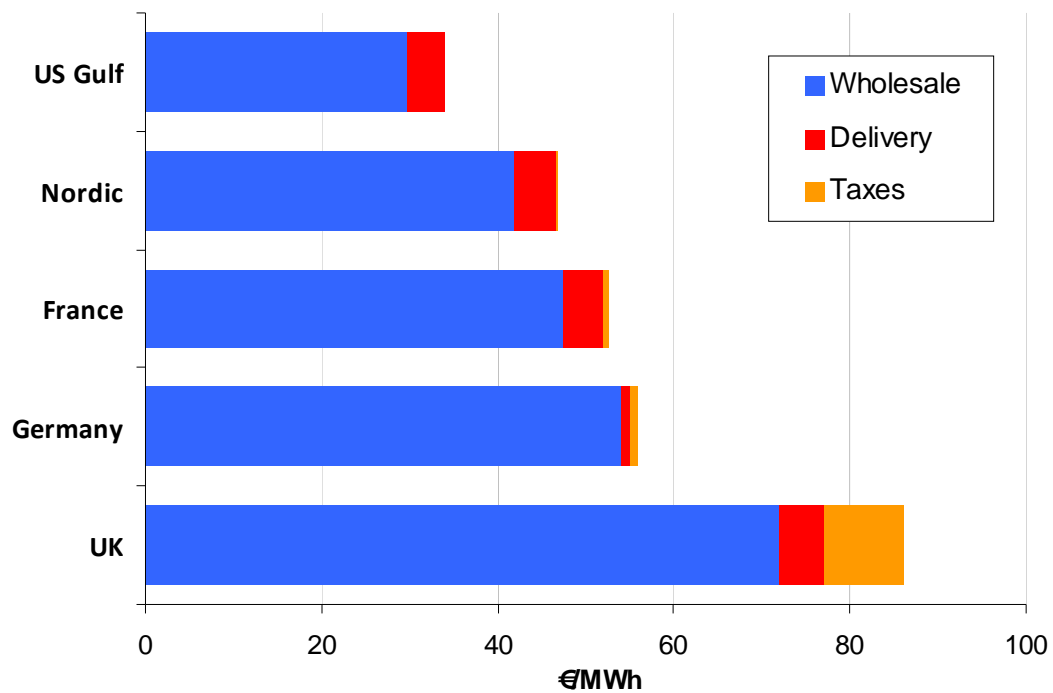
Addendum I – Wholesale Gas Price Comparisons

The chart below shows the evolution of UK and US natural gas prices since 2006.



Addendum 2 – Wholesale Electricity Price Comparisons -2015

The chart below shows our view of delivered electricity prices (for a very large user) in 2015.



Source: INEOS

Addendum 3 – Ethylene Cracker Investments**ANNOUNCED ETHYLENE EXPANSIONS BASED SHALE GAS**

Company	Project	Capacity	Location	Cost	Start-up
ExxonMobil Chemical	New cracker	1.5 tonnes	Baytown, Texas	NA	2016
Chevron Phillips Chemical	New cracker	1.5m tonnes	Cedar Bayou, Texas	NA	Q1 2017
Dow Chemical	New cracker	World-scale	US Gulf Coast	NA	2016-2017
Shell	New cracker	World-scale	US Northeast	NA	2016-2017
Formosa Plastics	New cracker	800,000 tonnes	Point Comfort, Texas	\$1.7bn	2016
Dow Chemical	Restart	390,000 tonnes	St. Charles, Louisiana	NA	end 2012
Westlake Chemical	Expansion	108,863 tonnes	Lake Charles, Louisiana	NA	H2 2012
Williams	Expansion	272,158 tonnes	Geismar, Louisiana	\$350m-\$400m	Q3 2013
INEOS	Debottleneck	115,000 tonnes	Chocolate Bayou, Texas	NA	end 2013
Westlake Chemical	Expansion	113,399 tonnes	Lake Charles, Louisiana	NA	2014
LyondellBasell	Expansion	386,000 tonnes	La Porte, Texas	NA	2014
Considered expansions					
Sasol	New cracker	1.0m-1.4m tonnes	Lake Charles, Louisiana	\$3.5bn-\$4.5bn	NA
Indorama Ventures	New cracker	1.3m tonnes	NA	NA	2018
LyondellBasell	Expansion	NA	Channelview, Texas	NA	NA
SABIC	New cracker	World-scale	US	NA	NA
Braskem	New cracker	NA	US	NA	NA
Occidental Chemical	New cracker	NA	Ingleside, Texas	NA	NA
Aither Chemicals, Renewable	New cracker	NA	US Northeast	\$750m	2016

Source: ICIS

Addendum 4 – US Economic Benefits

The quotes below from recent reports and US media give an indication of the positive effect that shale gas has had on the US economy and petrochemical sector.

U.S. energy supplies have been transformed in less than a decade, driven by advances in technology, and the economic implications are only beginning to be understood.

U.S. natural gas production will expand to a record this year and oil output swelled in July to its highest point since 1999. Citigroup estimated in a March report that a “reindustrialization” of America could add as many as 3.6 million jobs by 2020 and increase the gross domestic product by as much as 3 percent.

[Bloomberg](#)

Chemical companies from around the world are flocking to the Houston area to lay down millions, and sometimes billions, in investments to take advantage of vast amounts of cheap natural gas, which is used as a chemical feedstock.

Thousands of jobs have been proposed in the Houston area from recently announced plants and expansions from chemical companies such as Irving-based Celanese Corp. (NYSE: CE) and The Dow Chemical Co. (NYSE: DOW), based in Midland, Mich.

[Houston Business Journal](#)

[L]ow and stable gas prices in the U.S. are contributing to a 10 percent reduction in electricity costs to consumers and a 1.1 percent increase in the level of 2012 GDP. Perhaps more importantly, it is encouraging manufacturers to expand operations in the U.S., building new production facilities, or reopen plants that were shuttered during the recession.

In its 2012 study, the IHS found that shale gas production alone will contribute \$332 billion to U.S. gross domestic product (GDP) by 2035

[CNBC](#)

The increase in US gas production has also led to the rebirth of the domestic chemical and manufacturing sectors, Ken Bromfield, North American commercial director with Dow Chemical, said.

"We have an unprecedented opportunity with shale gas to push the reset button on the US energy economy," he said.

"Manufacturing is back," he added, saying industry has announced plans to build about \$80 billion of projects in the next five years, as a result of reasonably priced natural gas. Dow alone has announced \$4 billion of new manufacturing projects, Bromfield said.

[Platts](#)

Access to vast, new supplies of natural gas from previously untapped shale deposits is one of the most exciting domestic energy developments of the past 50 years. After years of high, volatile

natural gas prices, the new economics of shale gas are a “game changer,” creating a competitive advantage for U.S. petrochemical manufacturers, leading to greater U.S. investment and industry growth.

America’s chemical companies use ethane, a natural gas liquid derived from shale gas, as a feedstock in numerous applications. Its relatively low price gives U.S. manufacturers an advantage over many competitors around the world that rely on naphtha, a more expensive, oil-based feedstock. Growth in domestic shale gas production is helping to reduce U.S. natural gas prices and create a more stable supply of natural gas and ethane.

[American Chemical Council](#)

Unconventional gas activity is having a dramatic impact on employment and economic growth across the US lower 48 states and the District of Columbia, in terms of jobs and its contribution to gross state product (GSP) and, by extension, US gross domestic product (GDP).

In 2010, unconventional gas activity supported 1 million jobs; this will grow to nearly 1.5 million jobs in 2015 and to over 2.4 million in 2035.

By 2015, unconventional gas activities will contribute nearly \$50 billion in federal, state and local government tax and federal royalty revenue; between 2010 and 2035, continued development of unconventional gas will generate a cumulative total of nearly \$1.5 trillion in federal, state, and local tax and royalty revenue.

[IHS](#)

3 October 2012

Institute for Public Policy Research (IPPR)—Written evidence

1. Energy's contribution to economic growth: How can EU energy policy reconcile the objectives of decarbonisation and contributing to economic growth?

1.1. As CBI Director General, John Cridland has said, "The so-called 'choice' between going green or going for growth is a false one. With the right policies in place, green business will be a major pillar of our future growth." The CBI have found that the UK's green business has continued to grow in real terms, carving out a £122 billion share of a global market worth £3.3 trillion and employing close to a million people. It is expected to roughly halve the UK's trade deficit by 2014/15. The CBI have also shown that the UK's green businesses grew in real terms by 2.3 per cent in 2010/11 contributing a third of overall growth.⁴⁴

Research by Pew Charitable Trusts demonstrates that clean energy investment rose 6.5 per cent worldwide in 2011 to a record \$263 billion. Excluding research and development, investment in the sector is more than 600 per cent higher than in 2004.⁴⁵

In partnership with the EEF, early this year IPPR consulted over 60 businesses in the UK from the energy, transport, manufacturing and energy-intensive industries.⁴⁶ We found a mixture of opinions.

1.2 For many companies, climate change targets, policies and regulations are helping to create new market opportunities and boost turnover. New clean-tech industries are sprouting up, and established companies are adjusting their business models to take advantage of low-carbon technologies. By harnessing energy efficiency opportunities and cleaning up production processes, manufacturers are cutting costs and increasing their productivity. Even for energy-intensive industries such as steel – often described as the chief losers in the transition – there are opportunities to tap into supply chains for clean-energy infrastructure projects.

1.3 For others, the weakness of the economic recovery is focusing minds and many businesses are increasingly wary of any measures that may hamper their competitiveness and increase short-term operating costs. Some in the business community also argue that ambitious climate change policies in the UK and EU may even be self-defeating if they lead to 'carbon leakage' where production (and therefore emissions) is merely offshored to countries with less stringent carbon regulation. Hence, it is unsurprising that proposals to raise the EU's 2020 target to 30 per cent have been met with stiff resistance from some industry quarters.

Nonetheless, we found no evidence that carbon leakage was actually taking place at present. The costs attributed to climate change policies and regulations as a proportion of total

⁴⁴ http://www.cbi.org.uk/media/1552876/energy_climatechangerpt_web.pdf

⁴⁵ http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/FINAL_forweb_-_WholsWinningTheCleanEnergyRace-REPORT-2012.pdf

⁴⁶ http://www.ippr.org/images/media/files/publication/2012/06/growingpains-lowcarbontransition-May2012_9183.pdf

energy costs facing energy-intensive industries are still relatively small. DECC figures⁴⁷ suggest that a typical energy-intensive business consuming 100,000MWh of electricity would have incurred an average electricity bill of between £9.75 and £10.20 million in 2011, of which between 7.5 and 11.6 per cent would have been attributable to climate change and energy policies.

However, these costs are projected to increase. DECC estimates that the average electricity bill of an energy-intensive user consuming 100,000MWh of electricity will rise to £10.3-12.2 million in 2020 and £12.8-14.2 million in 2030. Of these totals, between 2.4 and 17.7 per cent of the average energy-intensive user's electricity bill will be attributable to climate change policies in 2020 and between 18.6 and 26.6 per cent in 2030.

I.4 The challenge facing policymakers, therefore, is to establish a low-carbon policy framework that balances these conflicting interests and manages the trade-offs. The aim should be a suite of policies that enables innovative businesses and start-ups to capture new low-carbon growth opportunities and helps existing and hard-to-treat industries adapt their business models to the transition. According to industry executives from the sectors we consulted, there is some way to go to achieve this.

I.5 In a separate report which put the UK business attitudes in the context of business attitudes from four countries in the UK,⁴⁸ we recommend that stable, consistent and long-term policy in favour of decarbonisation should go hand in hand with support for energy-intensive industries and new policies to prevent carbon leakage. At the EU level, this could include:

- **Raising the carbon price to provide a better incentive for low carbon innovation.** The most efficient way to raise the carbon price in the absence of an EU-wide increase in the emissions reduction target to 30 per cent would be a large-scale set aside of emission reduction allowances. Proposals to withdraw 1.4 billion of allowances from phase III of the ETS (which would effectively increase the carbon price by 20 per cent) should be supported but this is only a start. Given the volatility in demand for ETS allowances, a more interventionist role may be needed to ensure that the EU delivers its emissions reduction targets and provides greater certainty for investors concerned by the low price. A central carbon bank could guarantee that emissions reduction targets are met by auctioning allowances. If prices were seen as too low to achieve the goal, the carbon bank could hold back allowances. By contrast, it could issue allowances if prices rose too high.
- **Expand the EU ETS to include imported energy-intensive goods to prevent future carbon leakage.** An extension of the ETS to include imported goods such as cement, aluminium, steel, paper and pulp, and chemicals would create a level playing field for goods competing in the European marketplace. This would be WTO-compatible if there was a fixed requirement for importers to purchase ETS allowances equivalent to the best available technology. Markets that imposed their own carbon price or cap-and-trade scheme could be excluded.
- **Ensure that ETS revenues are spent low-carbon projects.** The ETS is partly undermined by concerns that it has become a fiscal policy to raise revenue rather

⁴⁷ <http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/3593-estimated-impacts-of-our-policies-on-energy-prices.pdf>

⁴⁸ http://www.ippr.org/images/media/files/publication/2012/05/europesnexteconomy-lowcarbontransition-May2012_9182.pdf

than a climate policy to reduce emissions. This perception is not helped by the fact that revenue collected by national governments from the sale of permits at the start of each new phase generally go into member states' central government pots. While member states would almost certainly reject the central collection of ETS permit revenues by the EU, there is a strong case for strengthening reporting requirements to make sure that national governments spend these funds on low-carbon projects. There is a precedent for this in the UK: a small portion of the funds raised by the climate change levy is invested in energy-efficient and low-carbon technologies. The rest is directed to businesses, which receive a 0.3 percentage point cut in employers' national insurance contributions. Similarly, the EU's 'NER 300'28 programme contains a provision to invest the proceeds from selling 300 million allowances currently held in the ETS' new entrants reserve – an estimated €4.5 billion based on the market price in November 2011 – in CCS deployment, smart grids and a range of renewable technologies.

2. Common EU approach: how true is it that a common EU approach will help keep the costs of transforming the energy system down?

2.1 A common EU approach is important in a number of areas in relation to keeping the costs of decarbonisation down. One area is innovation and investment for low carbon growth. As we argue in our report *Growing Pains: British Industry and the Low Carbon Transition*⁴⁹, in the current climate of austerity there is a strong case for greater EU coordination of major strategic low-carbon investments. Instead of having relatively small and overlapping RD&D initiatives conducted by individual member states, pooling member state resources and encouraging countries to work in partnership in areas of mutual interest is likely to be more cost effective and could deliver greater returns. Developing and demonstrating CCS technologies – coal, gas and industrial CCS – and offshore wind are priority areas for the UK, and progress is already being made in these areas through the EU's NER 300 programme. However, more impetus is needed. By pooling investments and sharing risk, EU governments are likely to increase the attractiveness of major innovation projects to private sector investors.

2.2 Another area is energy infrastructure, specifically grid upgrades and greater European interconnection. In its *Energy Roadmap 2050* the European Commission stresses that investment to modernise infrastructure must start now to avoid more costly changes in the future⁵⁰. Key to this is moving towards greater interconnection in Europe to upgrade grid infrastructure and integrate power markets. The European Climate Foundation (ECF) has argued that the lowest cost route to a decarbonised power sector by 2030 would require twice as much additional grid capacity across Europe as compared to planned expansion in the current decade⁵¹. For the UK, greater interconnection could have significant benefits. The government's own research shows that total generation costs are likely to decrease with higher levels of European interconnection and that this could even lead to the UK becoming a net exporter.⁵²

⁴⁹ Available at www.ippr.org

⁵⁰ European Commission [EC] (2012) *Energy Roadmap 2050*, available at: http://ec.europa.eu/energy/energy2020/roadmap/doc/com_2011_8852_en.pdf

⁵¹ European Climate Foundation (2012) *Power Perspectives 2030*, available at: http://www.roadmap2050.eu/attachments/files/PowerPerspectives2030_FullReport.pdf

⁵² Available at: <http://www.smartpowergeneration.com/spg/files/library/Poyry%20DSR%20follow%20on%20April%202010.pdf>

2.3 But European cooperation is clearly necessary to realise these benefits. This will be needed to reduce the barriers to greater cooperation and market integration, such as regulatory complexity, decisions on cost allocation and ensuring a shared vision is maintained. It will also be needed to secure the pooled funds that will be needed for anticipatory investment in shared assets⁵³. As the ECC Committee have warned⁵⁴, a strong political lead will be necessary from UK Government to overcome obstacles such as this and to ensure an ambitious, shared vision between member states.

3. The Internal Market in energy: should competition throughout the whole of the supply chain be afforded greater attention?

3.1 Yes. There are competition issues in the retail and generation markets that warrant greater consideration.

Retail Market:

There are a number of reasons for thinking that competition in the energy supply market is not in good health. First, the market is dominated by six large energy companies (the 'Big 6'⁵⁵) that retain 99 per cent of all energy consumers⁵⁶. A number of smaller suppliers exist but they are too small to constitute a substantial 'competitive fringe'⁵⁷. Second, the number of consumers that switch supplier annually (often taken as a measure of competition) has reached an historic low. In Q4 2011, the Department for Energy and Climate Change recorded the lowest number of people to switch electricity supplier since records began in 2003, while the numbers switching gas were second-lowest only to Q1 2003⁵⁸. In total, the proportion of consumers who switched in 2011 was around 15 per cent⁵⁹.

3.2 In May IPPR published a major investigation into the retail market called *The True Cost of Energy*⁶⁰ which confirmed that there are problems with competition and that some consumers are losing out as a result. The report investigated how competition and efficiency in the energy supply market affects the costs of the major suppliers and as a result consumer bills. The report shows that:

- **Contrary to what we would expect if the energy market was fully competitive, operational costs per customer account across the Big 6 suppliers have diverged since 2007.** In 2007 the energy market regulator Ofgem found that the least efficient supplier was spending 90 per cent more on each customer account than the supplier with the lowest costs. We estimated figures for 2010 and found that the least efficient supplier was spending 113 per cent more than the most efficient.

⁵³ This is particularly where it is not clear how the 'beneficiary-pays' principle will apply, for example in relation to grid interconnections among two or more energy markets

⁵⁴ See <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/1040/1040.pdf>

⁵⁵ British Gas, EDF, E.ON, Npower, Scottish Power, SSE

⁵⁶ <http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents/1/RMR%20Domestic%20-%20Consultation%20December%202011.pdf>

⁵⁷ <http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents/1/Energy%20Supply%20Probe%20-%20Initial%20Findings%20Report.pdf>

⁵⁸ http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/prices/prices.aspx

⁵⁹ <http://www.publications.parliament.uk/pa/cm201213/cmselect/cmenergy/writev/consumer/m01.htm>

⁶⁰ http://www.ippr.org/images/media/files/publication/2012/04/true-cost-of-energy_Apr2012_9040.pdf

- If competition was working effectively then the major suppliers should be driven to constantly improve their operational efficiency. **Ofgem's own data shows that the suppliers' operational costs per customer account have in fact increased in real terms since May 2007**, suggesting that competition is not fully effective.

3.3 Ofgem has identified that competition is not fully effective in the retail market and is undertaking actions to try and improve competition through the Retail Market Reform⁶¹. In the *True Cost of Energy* we raise a number of concerns about Ofgem's approach:

First, existing licensing requirements on the suppliers that are intended to ensure the tariffs they offer are reflective of their costs are not being enforced effectively. In March 2011 Ofgem launched an investigation in to one of the suppliers who they believed was in breach of the licensing requirements but Ofgem has yet to provide an update on this investigation or take action against the supplier, if indeed the supplier has breached the requirement. This sluggish approach to enforcement by the regulator is an insufficient deterrent to bad practice by the suppliers. IPPR also found that that some suppliers were engaging in loss-leading pricing, overcharging 'sticky' customers who tend not to switch in order to offer big discounts to others. Ofgem has refused to investigate the issue of loss leading even though it may be acting as a barrier to effective competition from new entrants.

Second, Ofgem has proposed reforms to tariff structures that could decrease competition in the retail market. Ofgem has proposed to restrict suppliers to offering one standard tariff per payment method while allowing them to offer an unlimited number of fixed term tariffs. Ofgem has decided to reform tariff structures based on the correct belief that making it easy for consumers to regularly switch suppliers is an effective way for keeping the market competitive. However, the two-tier system Ofgem has proposed is likely to add complexity to the market and dampen switching rates. It will also restrict the ability of suppliers to innovate in the type of standard tariffs they offer. A better approach would be to introduce an absolute restriction on the number of tariffs that suppliers can have in operation across both types of tariff. This would improve simplicity in the market and allow suppliers to continue to innovate.

3.4 Ofgem have also proposed reforms to improve liquidity in the wholesale market. HMT and DECC⁶² identified illiquidity in the wholesale market as the main barrier to independent activity in both the retail and generation markets and Ofgem is right to take action on this issue. However, the proposed reforms may not go far enough. In particular, they are focused primarily on the retail market and the needs of independent suppliers when the generation market is arguably more important (see below). Moreover, Ofgem has recently suggested that it may choose not to take action in favour of voluntary action by the major utilities.

For full details of our recommendations to improve competition in the retail market, please see our report, *The True Cost of Energy*⁶³.

3.5 Generation Market

⁶¹ <http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents/1/RMR%20Domestic%20-Consultation%20December%202011.pdf>

⁶² webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/d/budget2010_energy_market.pdf

⁶³ Available at www.ippr.org

The UK needs to achieve in the region of £110bn new investment in energy sector infrastructure by 2020⁶⁴. The major utilities do not have sufficient space on their balance sheets to make all of the necessary investments in new generation. Therefore the UK needs to attract investment capital from a wide number of alternative sources.

A key aim of the Electricity Market Reforms proposed as part of the Energy Bill was to encourage investment from independent operators. However, this aim appears to have been lost and in their pre-legislative scrutiny of the Energy Bill⁶⁵ the Energy and Climate Change Committee concluded that the bill as proposed will lead to a greater level of market concentration – the exact opposite of what it set out to achieve.

3.6 A particular concern is that, with the Renewables Obligation coming to an end in 2017, renewables operators face uncertainty about their future route to market. This has largely been overlooked in the Electricity Market Reforms although DECC has belatedly acknowledged the concerns of industry and issued a consultation on the power purchase agreement arrangements. It is important that this consultation results in a favourable outcome for independent renewable operators.

A liquid and transparent wholesale market with secure routes to market is vital for ensuring that independent operators feel confident to make the necessary investments in new generation. Ofgem must ensure that the requirements of independent generators and the implications of the Electricity Market Reforms are fully considered in its wholesale market liquidity reforms.

4. Gas: should the EU encourage the development of unconventional gas?

4.1 Gas is a vital part of the UK's energy mix, accounting for almost a third of the UK's final energy consumption in Q1 2012⁶⁶. UK domestic production of gas peaked in 2001 and the country became a net importer in 2004. A boom in shale gas development, both domestically and abroad, could significantly benefit the country, in particular by reducing prices. But there are many questions about the potential scale of these benefits and there are local environmental concerns and risks to decarbonisation objectives that must be considered.

4.2 Despite some conflicting estimates, there does appear to be a significant amount of shale gas in the UK⁶⁷. Whether these resources can be developed and converted into a secure, domestic energy supply that reduces prices is, however, uncertain. 'Fracking', the process by which shale gas is extracted, can have significant impacts on a local area, including causing earth tremors, which raises concerns around public safety. There are also risks that ground water can become contaminated with pollutants. Research carried out for Ofgem suggests that high population density, environmental regulations, land ownership rights and the views of local communities could all make it difficult to develop resources⁶⁸.

⁶⁴ <http://www.decc.gov.uk/assets/decc/11/consultation/call-for-evidence-barriers-independent-renewable-generation-investment/5684-call-evidence-barriers-ind-ren-gen-inv.pdf>

⁶⁵ <http://www.publications.parliament.uk/pa/cm201213/cmselect/cmenergy/275/275.pdf>

⁶⁶ <http://www.decc.gov.uk/assets/decc/11/stats/publications/energy-trends/5626-pn-12076-energy-stats.pdf>

⁶⁷ See for example: <http://www.bgs.ac.uk/research/energy/shaleGas/howMuch.html> and <http://www.cuadrillaresources.com/news/cuadrilla-news/article/financial-times-drilling-results-spur-hope-of-big-shale-gas-reserves>

⁶⁸ http://www.poyry.co.uk/linked/en/news/The_Impact_of_Unconventional_Gas_on_Europe.pdf

Across Europe, Ofgem believes these factors mean significant shale gas development will not come forward until 2025⁶⁹. If the UK Government and the EU are to encourage the development of shale gas it should only do so once with sufficient safeguards for local communities in place.

Meeting emission reduction requirements

4.3 The UK Government is currently struggling to balance the opportunities presented by shale gas with its legal obligation to decarbonise. The Government has indicated that it sees a major role for gas in the short to medium-term to fill a gap in electricity generation capacity that will emerge as inefficient coal plants and old nuclear power stations are shut down⁷⁰. This view was expressed by the Energy and Climate Change Secretary, Ed Davey MP, when he said, “we can’t take our foot off gas for some time yet.”⁷¹ The government is due to publish a Gas Generation Strategy⁷² in autumn 2012 to outline their plans in more detail.

4.4 The Committee on Climate Change, which has responsibility for advising the government on how to reduce emissions in line with its obligations in the Climate Change Act 2008, has made clear its concerns about the Government’s approach to gas. The Committee recommended that that “there should be a clear statement as part of the government’s planned Gas Generation Strategy that there will not be a second ‘dash for gas’, but rather gas will play a back up role by 2030” (p.28-29⁷³). Lord Smith, Head of the Environment Agency, has also raised his concerns that the UK is heading for a second dash for gas and said a greater use of gas should only occur if carbon capture and storage (CCS) technology is developed. As it stands there is some way to go before CCS technology can be deployed commercially⁷⁴.

4.5 In the UK unconventional gas must only be developed in a way that is consistent with the legislated requirement to decarbonise the economy. The 2008 Climate Change Act obliges the UK to reduce its carbon emissions by at least 80 per cent by 2050 and 34 per cent by 2020, based on a 1990 baseline⁷⁵. The Committee on Climate Change (CCC) has stated that to do so “will only be achievable if electricity generation is almost completely decarbonised by 2030”⁷⁶, more specifically that “the carbon intensity of power will need to fall from around 500g/kWh today to 50g/kWh in 2030”⁷⁷. The Government has published a Draft Energy Bill with a lower level of ambition than that of the CCC. It sets out a longer timescale for decarbonisation stating “power sector emissions need to be largely decarbonised by the 2030s” (HM Government 2012: 10), and specifies a carbon emissions intensity target of 100g/kWh in 2030 (DECC 2012a: 12), twice that recommended by the CCC. The government should adopt a clear decarbonisation target of 50g/kWh for the power sector in 2030. This would enable the development of shale gas in a way that meets the requirements of the Climate Change Act.

⁶⁹ http://www.slideshare.net/carbonbrief/ofgem-presentation-at-economist-energy-summit?from=ss_embed

⁷⁰ http://www.decc.gov.uk/en/content/cms/news/hendry_wilton/hendry_wilton.aspx

⁷¹ http://www.decc.gov.uk/en/content/cms/news/pn12_025/pn12_025.aspx

⁷² http://www.decc.gov.uk/en/content/cms/news/pn12_056/pn12_056.aspx

⁷³ http://hmccc.s3.amazonaws.com/2012%20Progress/CCC_Progress%20Rep%202012_ExecSumm_1.pdf; p.28-29

⁷⁴ <http://www.decc.gov.uk/en/content/cms/emissions/ccs/ccs.aspx>

⁷⁵ <http://www.legislation.gov.uk/ukpga/2008/27/contents>

⁷⁶ <http://www.theccc.org.uk/pdf/TSO-ClimateChange.pdf>; page 197

⁷⁷ http://downloads.theccc.org.uk/s3.amazonaws.com/4th%20Budget/CCC_4th-Budget_interactive.pdf; page 293

4.6 Local environmental and community concerns mean domestic shale gas development in the UK and EU will be challenging. Nevertheless shale gas could play an important role in reducing energy prices and domestic production in the UK would be a useful way to reduce the reliance on gas imports. The government should seek to benefit from these opportunities but only in the context of a secure commitment to decarbonisation.

3 October 2012

Institution of Engineering and Technology (IET)—Written evidence

Energy's contribution to economic growth

The dominant theme of the Commission's Energy 2050 Roadmap is decarbonisation, with a particular focus on renewables. How can energy policy make its contribution to both decarbonisation and to economic growth? In what specific ways can energy drive economic growth in the EU?

Energy efficiency

1. The lowest cost and most neglected form of decarbonisation is to **use less energy** and to use what energy we have to use more **efficiently**. Other things being equal this will release more resources for use elsewhere and hence drive growth. This area is complex because of the vast range of technologies and policy mechanisms that can be involved, ranging from regulating for more efficient consumer goods to enabling smart demand via smart grids and other infrastructure.
2. There are major opportunities to drive economic activity and energy efficiency through programmes such as major improvements to home insulation (above and beyond conventional roof space and cavity wall techniques). The major contributions from EU policy are its direct role in regulating product standards, e.g. for vehicles and appliances. We welcome recent progress in these areas, but believe that more can still be done to address delays to inclusion of new products standards within the Eco-design Directive. The forthcoming Energy Efficiency Directive provides a useful framework for action across the EU, although we expect mandatory targets will be needed if the EU's energy efficiency goals are to be delivered.
3. The IET fully supports the Government's energy policy objective of maintaining **energy security**, while **reducing carbon emissions** and **minimising the additional costs** to industry and householders. It is notable that whereas most interventions to solve one of these issues increase the challenges in the other two, energy use reduction and energy efficiency are the only measures which improve all three.

Renewable Energy

4. Some forms of renewable energy sources are at or close to "grid parity", meaning that power at the point of connection is the same cost as power sourced from the grid. An example of this is solar photovoltaics in Spain. Other technologies will reach grid parity as they continue to develop, and there are many initiatives in the UK and elsewhere to drive down the cost of renewable energy.
5. Countries around the world are committed to de-carbonising their energy supply to a greater or lesser extent and this opens up world markets for low carbon energy equipment and services. Renewable technologies can drive growth in the EU, but in many cases the high value components will be sourced from outside the EU. All technologies are more expensive in the early commercial stage when learning from doing takes place. The UK has an opportunity to lead in large scale offshore wind and potentially marine technology but this

is dependent on a commitment to develop volume orders and the necessary port infrastructure in order to bring down the currently quoted high costs.

6. Unlike most renewable energy technologies Biomass to energy projects employ significant numbers of people when in operation, both at the plant and in the fuel supply chain, which can contribute to economic activity, often in rural regions.

Employment and Skills

7. All energy activity, and in particular the major transformation on which the EU is embarking, requires large numbers of skilled engineers and technicians, and these are in short supply. The education, training and development of such personnel, and their subsequent deployment, will be a significant economic opportunity.

A common EU approach to transforming the energy system

To what extent will a common European approach help keep the costs of transforming the energy system down and assure security of EU energy supply? Where do you see economic growth and decarbonisation benefitting from a common approach to generation, transmission, distribution and storage? And what are the risks?

8. Much power system equipment is already designed for global application with only limited country or regional variation. Common environmental policies will act as a catalyst for change and create opportunities for scale benefits.

9. Common EU legislation governing end use equipment and its application is a major benefit, driving up scale, driving down costs and forcing compliance across the whole of the EU.

10. The issue as to whether common regulation of energy and/or common market environments across the EU is beneficial is rather more complex, as each EU member state faces different challenges and priorities. There would however be benefit in developing a pan European regulatory environment to support the development of major sharing infrastructure such as a potential European supergrid, should this prove viable in the future. A supergrid could reduce energy costs for member states and it can also contribute to security of supply thereby potentially reducing the amount of generation capacity required. However, differences in the functioning of the energy markets connected may lead to unexpected distortions. For example, in the UK a Carbon Price Floor will be introduced from 1 April 2013 and this will increase the cost of carbon producing generating plant in the UK. As a consequence this plant could be displaced by less efficient carbon producing plant in other parts of Europe. Such distortions need to be identified and investigated with action considered if we are to reap the full benefits of an integrated European energy market.

The Internal Market in Energy

The internal market in energy is focused on transmission. Should competition in the rest of the supply chain be given greater consideration? What economic opportunities might arise from such consideration? What risks arise?

I1. We do not wholly agree that the focus of the internal market is on transmission. We acknowledge that the EU 3rd Energy Package does include a number of transmission related provisions but we consider this to be driven by the fact that electricity transfers between member states will be almost exclusively via transmission networks. Electricity networks are thus the key enabler of greater competition in energy. However, as can be seen by what has been achieved in Great Britain, competition can be introduced in the rest of the supply chain under the 3rd Package. The networks themselves are natural monopolies, but competition in the development, construction, financing and ownership of individual assets within networks is possible provided systems are planned and operated as integrated wholes. There is international experience of this in transmission, but the smaller nature of individual projects in distribution makes the transaction and commercial costs of such arrangements less likely to provide overall value.

I2. It is true that the 3rd Package requires Transmission System Operators (TSOs) to be separated from generation and supply activities. This separation is intended to address the potential risk of discrimination by a network operator both in relation to the operation of the network but also in its expansion and in the provision of new connections. This is designed both to expedite the connection of new generating sources and to promote efficient use of the electricity network as a whole system.

I3. While in principle an energy market in **distributed generation connected at distribution level** is conceivable, considerable work would be needed for it to be a practical concept in the short or even medium term. The reasons for this are the present small scale of such generation in relative terms, its uncontrolled nature (e.g. output is a function of sun or wind) and the burden of complexity for very small players to engage in a market-based system. In the longer term however, developments in storage (that could enable such sources to have a controllable output) and the development of aggregation services (that create scale and stronger engagement capabilities) could open up new market possibilities. We understand that the Commission's Smart Grid Task Force is currently considering the development of market models that will promote competition.

I4. In the shorter term, areas for market opportunities may have greater potential in the provision of ancillary services for example **aggregated demand response**, with new opportunities being created as we see a greater penetration of Heat Pumps and Electric Vehicles.

Reducing the costs of energy for business and consumers

Energy is a significant manufacturing input and household cost. Is it appropriate to seek to reduce the costs of energy in order to boost EU competitiveness and, if so, how can it be achieved in addition to energy efficiency? To what extent might price reductions jeopardise attempts to decarbonise? What implications,

if any, do consumer preferences over the energy mix, such as onshore wind and nuclear power, have for price?

15. Minimising the cost of energy should always remain an important goal. Costs can be reduced either by improved efficiency (see above) or by lower prices, but the price for energy should increasingly recognise environmental externalities such as carbon emissions. The current EU emissions trading arrangements do not adequately do this, which is tending to mean that low carbon solutions are only making headway when supported by legislative preferences, and incentives to improve energy efficiency are blunted. Solutions to this are arguably more the province of economists than engineers, but a carbon tax at emissions source would seem one logical way forward.

16. Certain low carbon technologies carry a high price, or highly uncertain pricing. For example, at present offshore wind is expensive and the costs of nuclear and of carbon capture and storage add-ons to thermal power plant are uncertain. However there are difficult issues during the transition to low carbon energy. Cheap technologies (e.g. unabated gas) are likely short and medium term bridges to a lower carbon future, but do not condition customers for the higher costs of genuinely low carbon options later. Also they risk increasing dependence on imports with the consequential impact on energy security. In contrast, greater deployment of lower carbon technologies will bring price discovery and the reductions, (maybe substantial) that come from scale deployment.

17. For some technologies, notably offshore wind, significant price reductions are likely to need major commitments to large construction programmes, to give the industry confidence to invest in radical change in its supply chains and delivery processes. The earlier this change takes place the better the UK will be able to capture global markets for these low carbon technologies.

18. Continuing effort will be needed at EU level to deliver policy alignment with other major trading states, otherwise the net impact would be industries and associated economic and employment benefits being exported from the EU to lower cost countries, with a net global increase in emissions from their higher carbon energy systems.

Gas

Do you agree with the Commission that “Gas will be critical for the transformation of the energy system”, until at least 2030 or 2035?

19. We agree that gas is critical, particularly following the major global expansion of gas supply and price reduction that has come from the US developing its shale gas resource. However, we caution that as other countries such as Japan, Germany and perhaps France reduce their reliance on nuclear, demand for gas will remain high.

Does an active renewables policy require gas in support of it?

20. Should renewables (especially “flow” renewables such as wind and solar PV) become a significant part of an electricity system, it will be necessary to deal with the matching of supply and demand when renewable generation is not available. Gas fired capacity (possibly partly open cycle, rather than the more expensive combined cycle plant generally deployed

in Europe) is a technically proven approach. Other approaches which can make a contribution are smart demand (shifting certain demand to when supply is available), and the use of storage, which might be in the context of the electricity system, or another energy vector such as heat. These all require development of technologies and of the systems integration and control necessary. Hence it is probably wise to say that at the current state of technology there would be a role for gas as back-up on a renewables-heavy electricity system for the foreseeable future.

What mechanisms are required to boost the role of gas, securing appropriate investments, but on the proposed interim basis?

21. Gas fired power plants are reasonably cheap and quick to build, but still require investors to have confidence in their future revenues before they commit. This is challenging as the business case for gas fired power plant will require assumptions of load factors and pricing out to the late 2030s, and this is difficult to predict given the uncertainties over deployment of lower carbon sources such as renewables and nuclear.

22. To secure investment in combined cycle gas fired capacity now, some level of commitment to future minimum dispatch levels (or perhaps “deemed dispatch” should real dispatch not be needed) and pricing, or a capacity payment, would seem to be important. This needs to be designed to support a shifting of the plant towards peaking duty later in its life.

23. The role of gas in electricity generation is explored in greater detail in the joint Engineering the Future evidence to the Department of Energy and Climate Change (DECC) which was led by the IET⁷⁸.

Should the EU encourage the development of unconventional gas?

24. It would seem perverse not to at least explore the EU potential for unconventional gas, so that this option is understood and the techniques for its deployment are developed. The extent of development can be decided later depending on the evolution of global LNG prices and other technologies. A recent report by the Royal Society and Royal Academy of Engineering considers the scientific and engineering evidence relating to the technical aspects of the risks associated with hydraulic fracturing. It concludes that the health, safety and environmental risks associated with hydraulic fracturing as a means to extract shale gas, can be managed effectively in the UK as long as operational best practices are implemented and enforced through regulation.⁷⁹

Research and innovation

We would welcome views on how the EU can most effectively support research and innovation as catalysts for decarbonising energy and driving growth, and how EU energy policy can be sufficiently flexible to take into account emerging new technologies.

⁷⁸ Engineering the Future response to the DECC call for evidence on the role of gas in the electricity market. June 2012 <http://www.theiet.org/policy/submissions/s930.cfm>

⁷⁹ Shale Gas Extraction in the UK: A review of hydraulic fracturing. June 2012 <http://www.raeng.org.uk/shale>.

25. We suggest that decisions on EU support for research and Innovation are taken in the context of understanding of Europe's role in the global energy innovation ecosystem. Focussing on the application of innovations in a European context, and areas where Europe has a comparative advantage in realising economic value from the intellectual property it develops will drive growth.

26. We also believe that two elements should always be included in the funding mechanisms for research, development and demonstration. Firstly, there should be a clear focus on the problem that is being addressed, thus reducing the risk that ideas/technologies are pursued for their novelty or intellectual challenge alone. Secondly, wherever possible, a competitive element should be part of the funding allocation process to ensure quality and value for money.

27. Much of the challenge of the future is not in individual technologies but in their integration into an effective low carbon energy system. This challenge includes the institutional and legislative environment necessary to realise that system and in how users are to be engaged and become part of the system.

About the IET

28. The IET is one the world's leading professional bodies for the engineering and technology community. The Institution provides a global knowledge network to facilitate the exchange of knowledge and to promote the positive role of science, engineering and technology in the world. This response has been prepared by the IET's Energy Policy Panel and is approved for submission on behalf of the IET Trustees.

3 October 2012

Dan Jorgenson MEP and Chris Davies MEP—Oral Evidence (QQ 248 – 253)

Dan Jorgenson MEP and Chris Davies MEP—Oral Evidence (QQ 248 – 253)

[Transcript to be found under Chris Davies MEP and Dan Jorgenson MEP](#)

Sir Donald Miller F.R Eng, FRSE.—Written evidence

1. Can energy policy contribute to both decarbonisation and economic Growth ?

The Industrial Revolution, sparked by low cost and readily available power from coal using steam power, led to a rapid improvement in living standards. Today our economy is even more dependent on reliable and economic power supplies so that modern life grinds to a halt with even the shortest interruption of supplies. In the UK we spend an increasing proportion of GDP on energy with over 30% of the population now in fuel poverty; indeed it currently absorbs 4.5% of our GDP and accounts for half of all industrial investment. It is therefore vital that any policy initiative aimed at decarbonising energy should first be subject to a thorough analysis as to its effectiveness in relation to costs and living standards. Unfortunately this has not been the pattern; instead independent professional advice has been and continues to be ignored; nor has there been any attempt to carry out meaningful audits of present policies. Had this been done from the outset there can be little doubt that greater decarbonisation could have been achieved at significantly lower costs..

2. Can a common EU approach help keep down the costs of transforming the energy system.

Whilst there are areas where a common EU approach could in principle offer benefits in time and costs (standardisation of nuclear designs as well as cooperative working on CCS are examples) our immediate objective, because it takes a decade or more for changes to take effect, should be to achieve stability in energy policy. The rapid changes in policy (dismantling our nuclear industry and selling off the assets during a previous decade) before an abrupt change of course in recent years have done and continue to do untold harm. The UK is off course not alone in this, the volte face in Germany , undertaken without any detailed analysis, will have implications for energy supply throughout Europe.

While greater collaboration in specific areas would be a desirable aim it seems unlikely that this goal could be achieved in the foreseeable future so long as major changes of policy continue to be made, apparently as the result of political whim. At the moment the more pressing objective should be to set the UK electricity industry on a more effective and less costly path. This has yet to be addressed successfully by Governments in the two decades since privatisation.

3., Should competition in the supply chain be given greater consideration

Transmission of electrical power is essentially a monopoly activity in that there can be no possibility of competing transmission systems in the same area. In some countries, as for example Germany , companies operate their own networks in their areas of supply although these are linked to allow power interchanges where it is economic to do so. In the UK, whilst the two Scottish companies each own the transmission in their traditional area of supply, the charges for the use of these systems are determined by National Grid in conjunction with the regulator Ofgem. The same is true in respect of the matching of generation and load demands (commonly called system balancing) on an hour to hour and minute to minute basis.

The model adopted for the UK electricity system on privatisation has not resulted in significant competition between suppliers – it could not be otherwise when it takes months

and much complexity for consumers to change suppliers (a nominal rather than an actual change) and a decade or more for a generator to significantly change his generation mix. There have been major attempts by Governments to address this issue by tweaking the operation of the model adopted at privatisation. These were unsuccessful, notably resulting in a short term disruption of the markets which led to uneconomic operation of our generation assets and bankrupted National Nuclear. It is this that led to the sale of the UK's nuclear generation to a foreign owned Nationalised Organisation. More recently Government have recognised that the present model provides no incentive for generators to establish a proper mix of generating plant aimed at maximising security of supply and reducing costs to consumers. Instead the present system provides every reason for the Companies to milk the subsidy regime for renewables gaining faster returns at minimal business risk. Government are shortly to publish new methods of working which will entail inviting tenders for specific types of generating plant and fixing the price to be paid for output. This represents an unprecedented level of Government control and one which has little prospect of benefiting consumers by achieving a proper mix of different types of generating plant at realistic prices. The Royal Academy of Engineering has warned Government of the risk of unintended consequences with these proposals.

There are good reasons for thinking that a different model for the Industry would achieve lower costs, more competition and a better energy mix with less complexity and with limited Government involvement.

4. Reducing the costs of energy and effects on Decarbonisation

In any discussion about costs we need to be clear about the basis being used. DECC have made a practice of quoting discounted levelised costs but this is at best a rough and ready, and sometimes misleading, approach for costing alternative generation policies. In an electricity supply system the operation of any generating unit has implications for the operational costs incurred by other units and for this reason utilities assess costs of alternative generation investments using a model of the whole system. With their greater resources, there should be no difficulty in DECC, in conjunction with National Grid, using this more rigorous approach, but in what follows I have necessarily employed the levelised cost basis as currently used by DECC. The Department in their report 'Estimated Impacts, have provided estimates of costs to consumers but they make it clear that not all the costs (e.g. system effects), have been included. As these are very significant they have been included in my costings, although on a conservative basis.

The history of energy use since man first harnessed draught animals to improve his productivity has been the steady development of increasingly intensive (and consequently lower cost) energy sources. The present emphasis on renewable sources attempts to reverse this trend. Wind (and marine) energy is essentially a low intensive energy source requiring very large and slow running machines which are and will remain inherently expensive. No amount of development can have more than a marginal effect on this.

To generate electrical energy equivalent to 30% of UK requirements in 2020 in accordance with Government targets would, after allowance for smaller amounts of hydro, biomass and other outputs, require some 36,600 of wind plant .With high levels of wind penetration on the system, because of wind's unpredictability and short term variability, it is necessary at all times to have fossil fuelled plant running in reserve at part load. This involves capital and running costs which are inseparable from wind power and which must necessarily be included in the equation when comparing the costs of alternative generation such as nuclear or CCGT which do not require this back up.

In what follows I have examined cost data on capital and running costs of different types of generation as given in published reports commissioned by DECC from the following firms of Consulting Engineers.

Mott MacDonald Consulting Engineers.

Parsons Brinkerhoff Consulting Engineers

Arup Consulting Engineers

Poyry Consulting Engineers

For transmission costs I have referred to a Report by the Institution of Engineers and Shipbuilders in Scotland - (Author Colin Gibson, retired Power Network Director National Grid) and have cross- checked these with data in a report by DECC/Energy Networks Strategy Group in which they estimate an investment on new transmission of £15.6 bn by year 2020 , virtually all for wind power.

. Consistent with these data sources the total cost for energy from onshore wind is typically £187/MW hr. This is the cost of bulk energy at a point on the high voltage transmission system where it is delivered into the lower voltage distribution systems to service consumers. It comprises capital costs, return on capital (including profit) for the developer, operation and maintenance, costs of additional high voltage transmission including losses, the provision of back up generating capacity equivalent to some 92% of the wind capacity (for when the wind does not blow or blows too strongly) as well as the costs of running the back up plant inefficiently at part and varying loads. The £187/MW hr has to be compared with the current cost of bulk energy from conventional generation of some £60/MW hr. The whole of these costs have to be borne by the electricity consumer whether in the form of costs for bulk energy, direct subsidy (one ROC per MWh to be reduced by 10%), levies by National Grid for additional transmission costs and higher bulk energy prices from the provision of back up plant and its operation at lower efficiencies. For offshore wind the costs are significantly higher at £265/MW hr with much of the additional costs recovered via a larger subsidy, (two ROC per MWhr).

In summary therefore the total additional costs to domestic consumers in year 2020 of meeting the UK target of 36,600MW with a mix of on shore and off shore wind installations amounts to £192/consumer. Based on an average household annual bill of £500 this £192 represents an increase of 38%. . These costs, large as they are, are further increased as a result of other aspects of energy policies such as the Carbon Trading and Emissions and Energy Consumer Obligations. DECC estimate (they say conservatively) that in total these will result in an increase of some 20% in electricity prices to domestic consumers in year 2020. Added to the above system costs the total increase in electricity price for the domestic consumer would amount by 2020 to 58%. These are very significant increases in price when one third of domestic consumers are already estimated to be 'in fuel poverty'. Even higher wind penetrations are proposed for the years beyond 2020 entailing further substantial increases in consumers' bills.

It should be emphasised that these increases are not a result of any changes in world commodity prices but are a direct result of current energy policies. Moreover two thirds of electricity is consumed by commerce and industry and if say, 90% of commercial and industrial costs eventually find their way through to consumers, the total additional cost to consumers of present energy policies averaged over the 25M households in the UK, would amount to some £590 per annum by year 2020, more than doubling their electricity costs.

These enormous costs are being imposed by Government in the name of reducing our carbon footprint, disregarding the fact that they will have a negligible impact on world CO₂ emissions. But the question needs to be asked as to whether these policies are effective even in terms of their limited objectives. The assumption that each MW hr of electricity generated from wind saves the equivalent in CO₂ emissions from fossil fuel power stations

(as claimed by DECC) would not be supported by any engineer with experience of operating power plant. The considerably lower efficiency of the back up thermal plant running at part loads together with the additional losses from frequent de-loading and re-loading as the wind strength varies, all consume additional fuel. The jury is still out on the exact implications of this but there is accumulating evidence from analysis of actual system operations both in the USA and more recently for the Irish Grid that high wind penetrations save little or negligible emissions of CO₂ and can in some circumstances actually lead to increases.

It may seem surprising that UK governments, before adopting energy policies which have such drastic effects on the UK economy and electricity consumers, have failed to carry out comprehensive audits either of costs to consumers or the effectiveness of wind energy in reducing CO₂ emissions. If such audits are to carry the weight they should, they would best be carried out under the auspices of a professional and independent steering agency such as The Royal Academy of Engineering.

5. Will Gas be crucial for the transformation of the energy system?

Gas already plays a crucial part in our electricity supply system and this is expected to become even more important both to supply an increasing proportion of our base load as existing coal fired and nuclear plant is withdrawn from service and to provide back up for renewables assuming these continue to be installed in accordance with present plans. However whilst gas fired stations produce less than half the amounts of CO₂ compared with coal they will still be major CO₂ emitters – even if CCS can be technically proven it seems unlikely that we should be able to afford the reduced efficiencies and high cost of applying this technology on any scale.

Heavy reliance on gas raises the question of security of our electricity supplies. North sea supplies are steadily reducing and although new sources from ‘fracking’ may make a useful contribution it is not thought that UK can be a major producer. As gas is difficult and expensive to store other than for short term interruptions in supply, increasing reliance on imports carries with it a much greater level of risk to the security of our energy supplies than has been the case in the past.

Within the planning timescale nuclear is the only technology which can be relied on to provide economic and carbon free electricity – in the planning timescale, both for economics and security of supply we should probably set a target of some 40 % of our electricity from nuclear (Scotland has for many years generated over 50% with up to six commercial nuclear reactors and at costs which allowed significant exports to England and Wales).

6. Research and Innovation

There are no grounds for thinking that new technologies which will deliver economic electricity with low carbon emissions in any acceptable planning timescale are only waiting to be discovered.

Engineering developments progress by successive development from earlier designs – thus for any new coal fired generation. the application of supercritical steam cycles has probably more to offer than CCS which appears to have captured the political limelight Similarly although the latest designs of commercial nuclear reactors (the Westinghouse 1000 MW PWR and the French 1600MW PWR offer greater ease of construction and better economics) there remains considerable scope for further development of reactors with differing fuel cycles, using our existing stocks of fissile material or to achieving better burn up of waste products. It is unlikely that these objectives will be pursued without Government

Sir Donald Miller F.R. Eng, FRSE.—Written evidence

funding – and certainly more should be affordable from collaborative international working whether with Europe or elsewhere.

25 September 2012

National Farmers' Union (NFU)—Written evidence

The National Farmers' Union of England and Wales (NFU) represents 47,000 farm businesses in England and Wales, involving an estimated 155,000 farmers, managers and partners in the industry. We also have an additional 40,000 members with an interest in farming and the countryside. The NFU is pleased to respond to the EU Sub-Committee D Inquiry: EU Energy: decarbonisation and economic competitiveness.

With 75 per cent of national land area in the agricultural sector, NFU members are well-placed to capture renewable natural energy flows, while maintaining our traditional role in food production as well as the delivery of other environmental and land management services. It is the NFU's aspiration that every farmer should have the opportunity to become a net exporter of low-carbon energy services.

The NFU is already engaged with DECC, Defra, DfT and other government departments and advisers in directing climate change and renewable energy policy into real economic opportunities for growth, rural diversification and job creation. Agriculture and horticulture can help to mitigate climate change, while contributing to both energy security and food security (many experts agree that a worldwide oil supply 'crunch' is likely before 2020). The NFU works closely with other trade associations and non-government organisations with an interest in renewable energy, including the Renewable Energy Association (of which we are associate members) and RenewableUK (representing the wind power industry) and the Anaerobic Digestion and Biogas Association.

The NFU is also a member of the CBI Trade Association Forum, and we support the new CBI Energy and Climate Change Campaign, agreeing with the CBI Director-General that a more coherent government approach is needed towards energy and climate change – there is indeed no choice to be made between 'going green' or 'going for growth'.

Deployment of renewable energy goes way beyond just managing UK carbon emissions - the land-based sector, in particular, will contribute to domestic supply chain development, supporting rural diversification and job creation, and will help with environmentally-sound management and utilisation of organic wastes and co-products (manures, crop discards, agricultural residues, food processing and packing waste).

For example, there are particular opportunities for the Renewable Heat Incentive (RHI) scheme to support farm businesses and rural communities, many of which are not connected to the gas grid and are reliant upon more expensive heating fuels. We anticipate significant business opportunities for farm businesses to provide heating services and renewable fuels (solid, liquid and gas) to rural communities, e.g. where new development and refurbishments are made to affordable rural housing. In other EU member states such as Austria, heat from wood fuels, agricultural residues such as straw and farm biogas plants is supplied to large local heat users and local communities through district heating networks. The NFU would like to see such new business opportunities for bulk heating supply from about 200 kW to 3MW actively encouraged by the RHI.

According to Britain's target agreed under the EU Renewable Energy Directive, by 2020 renewable energy in the UK should be meeting 15% of our total energy needs - about one-

third of all electricity, 14% of heating and 10% of transport. The land-based renewables (wind power, solar, micro-hydro, ground source heat and the many forms of bioenergy) can make a significant contribution towards these goals – around 8% of the national renewable electricity supply by the end of this decade, as well as a growing source of domestic fuels for heating and transport. It has been estimated by the NFU that replacing fossil fuel energy sources with land-based renewables could reduce UK greenhouse gas emissions by the equivalent of 12 million tonnes of CO₂ by 2020.

Farmers are already delivering on the clean energy challenge. Independent surveys have shown that, this year:

- One in six NFU members will be generating solar power;
- Twenty per cent of farmers and growers are producing clean electricity;
- Almost one third of all agricultural enterprises are involved in some form of renewable energy production and supply.

Many forms of renewable energy production are complementary to food production, making valuable use of materials such as crop residues which would otherwise go to waste. The NFU has called for the development of 1000 anaerobic digester (AD) plants on farms by 2020, and we can foresee by the end of this decade the deployment of at least 5000 solar roofs on farm buildings, the baling of millions of tonnes of extra straw to support both existing users and new energy markets, and the growing of new low-input energy crops that support biodiversity while deriving a farming income from the land. Only modest changes to land use will be required, little more than are seen operationally in the countryside from year to year in response to agricultural market pressures.

In the near future, the NFU expects the diversification of farming into renewable energy production to become as important as tourism in terms of its significance and contribution to the wider rural economy. Farmers and growers with an additional source of income from renewable energy will contribute to sustainable development, no longer so dependent upon depleting fossil fuel resources, and able to invest more in all-round efficient resource management – with benefits in the form of improved yields and farm profitability.

3 October 2012

National Grid—Written evidence

1. Introduction to National Grid

- 1.1. National Grid owns and operates the high voltage electricity transmission system in England and Wales and, as National Electricity Transmission System Operator (NETSO), operates the Scottish high voltage transmission system. National Grid also owns and operates the gas transmission system throughout Great Britain and through the low pressure gas distribution business, distributes gas in the heart of England to approximately eleven million offices, schools and homes. In addition, National Grid owns and operates significant electricity and gas assets in the North-Eastern US.
- 1.2. In the UK, National Grid's primary duties under the Electricity and Gas Acts are to develop and maintain efficient networks and also to facilitate competition in the generation and supply of electricity and the supply of gas. Activities include the residual balancing in close to real time of the electricity and gas markets.
- 1.3. Through its subsidiaries, National Grid also owns and maintains around 18 million domestic and commercial meters, the electricity Interconnector between England and France (jointly with RTE, the French electricity Transmission System Operator (TSO)), BritNed the electricity interconnector with the Netherlands (jointly with Tennet, the Dutch TSO), and a Liquefied Natural Gas importation terminal at the Isle of Grain in Kent. Through our wholly owned subsidiary National Grid Carbon Limited, we are working to advance the transportation and storage elements of the Carbon Capture and Storage (CCS) supply chain.

2. Executive Summary

- 2.1. Energy is vital to the UK economy: our society is dependent upon it. From the warmth, light and technologies we rely on at home, to powering commercial and manufacturing enterprises across the UK: high quality, secure, reliable and affordable energy is essential.
- 2.2. Developing an energy system which is secure, reliable and efficient will require significant investment in new energy sources, such as offshore wind, tidal, marine, CCS and also in more familiar energy sources.
- 2.3. The EU-wide electricity Ten-Year Network Development Plan (TYNDP) published in 2012 by the European Network of Transmission System Operators for Electricity (ENTSO-E) identifies a need for €104bn of investment in electricity transmission projects of European significance (including €23bn in subsea cables). At a national level, DECC estimates that £110 billion of investment is needed by 2020 to build low carbon generation and network infrastructure.
- 2.4. This response considers three matters which we consider to be central to the issues of decarbonisation and economic competitiveness:
 - Electricity interconnection with mainland Europe;
 - The EU “supergrid” concept;
 - Carbon Capture and Storage (CCS)

- 2.5. Greater interconnection will improve energy security of supply and subsequently reduce the amount of back up generation required to cover the expected level of variable output of some potential renewable sources, but regulatory complexity and incompatibility can increase perceptions of risk and inhibit interconnector capacity development.
- 2.6. Similarly, a high-voltage, multi-user electrical network in the North Sea could deliver benefits such as increased security of supply, the ability to balance output from variable generation sources and enhanced capacity for cross-border trade. However, there are significant risks associated with the regulatory environment (e.g. determination of asset ownership) and the supply chain (e.g. asset standardisation).
- 2.7. The UK's current regulatory approach for developing electricity transmission assets to connect renewable energy offshore is not consistent with other European arrangements. We recognise that improved co-ordination is required to prevent sub-optimal network development. Currently it does not meet the needs of generation developers, potential transmission asset owners or equipment suppliers, and risks stalling progress while other countries like Germany have taken decisive action with their *Energiewende* (Energy Transition) policy. We recognise that improved co-ordination is required to prevent sub-optimal network development and we welcome the Integrated Transmission Planning and Regulation (ITPR) considering this.
- 2.8. CCS is vital to the attainment of the least-cost decarbonisation pathway to 2050, and it is essential that the European Union and the UK Government continue with their support programmes for the technology.
- 2.9. A recent study by Redpoint Energy foresees a long-term role for gas in providing both domestic and industrial heat until 2050. The study looks at the least cost approaches to decarbonising heat in the UK economy and the analysis suggests that the least-cost pathway is dependent on the successful commercialisation and large-scale deployment of a number of key existing and developing technologies, including:
 - Large scale usage of CCS, not just in power but across the energy system; and
 - Use of hydrogen (produced via CCS routes) in parts of the energy system with more limited abatement alternatives, such as freight transport and high-temperature process heating.

3. Economic Benefits and Competitiveness through Energy Investment

- 3.1. We believe investment in energy infrastructure to support decarbonisation of the energy sector provides opportunities to support the UK and wider EU economies both in the short and the long term, delivering sustainable economic benefits through a number of channels:
 - Energy infrastructure creates a competitive advantage – ensuring the UK and EU energy systems remain secure, reliable and efficient will be vital to attracting investment both by domestic and foreign firms;
 - Trade opportunities: with enormous potential for renewables such as wind, marine and tidal in the UK, investment in an integrated offshore network which supports interconnection with Europe will enable growth in electricity exports, and potential export of expertise in low carbon technologies such as CCS;

- Industry retention: decarbonisation of industrial processes, for example through CCS, will enable existing energy- and carbon-intensive industries and jobs to remain in the UK/EU;
 - Job creation and skills development: in the short term (construction and supply chain) and longer term (technology/engineering) leading to employment opportunities
- 3.2. In this response we will focus on three technologies contributing to decarbonisation and competitiveness: electricity interconnection with mainland Europe, the European “supergrid” concept, and CCS.
- 3.3. As well as contributing to decarbonisation and competitiveness, these also contribute to the third element of the energy policy “triangle”: security of supply.

4. Electricity Interconnection

- 4.1. Greater electricity interconnection represents a vital part of the UK’s low carbon economy. They:
- enhance competition and the discovery of efficient prices by bringing more participants into the GB market
 - enhance diversity and security of supplies by accessing capacity and reserves across Europe
 - help efficiently accommodate renewables by enabling diversity in renewable output to be exploited and backup to be pooled.
- 4.2. The optimal level of interconnection, in the UK,, depends on the generation mix and demand-side factors in the UK and mainland Europe.
- 4.3. Our UK Future Energy Scenarios document⁸⁰ describes three possible scenarios for the development of the UK’s energy system.
- 4.4. In our *Slow Progression* scenario we see moderate scope for new interconnection, with total GB capacity reaching 6.6 GW by 2030; GB would continue to be a net importer from continental Europe with imports increasing by 2030 in line with the gradual increase in interconnection capacity.
- 4.5. In the *Gone Green* scenario, the beneficial level of interconnection capacity would increase to 8.6 GW by 2030. We would expect both annual imports and exports to rise from current levels in line with the increase in interconnection capacity, with exports increasing markedly from the latter part of this decade onwards as renewable generation increases so that GB becomes a net exporter to the continent by the early 2020s.
- 4.6. Under *Accelerated Growth* the beneficial level of interconnection capacity would increase significantly to 11.6 GW by 2030; growth in renewable generation and

⁸⁰ The UK has legislation in place setting limits on the emissions of greenhouse gases as far ahead as 2050. There is also legislation mandating a minimum level of renewable energy in 2020. A single forecast of energy demand does not give a sufficiently rich picture of possible future developments so National Grid carries out analysis based on different scenarios that between them cover a wide range of possible energy futures.

<http://www.nationalgrid.com/uk/Gas/OperationalInfo/TBE/Future+Energy+Scenarios/>

increase in interconnection capacity would result in GB becoming a net exporter at the end of this decade with significant increases in exports and reductions in imports by 2030.

- 4.7. UK energy policy is aligned to that of Europe in its aim to deliver secure, sustainable, affordable energy supply. As our generation mix changes over the coming years, the implications for UK energy policy of greater interconnection with other power markets are positive. The European Commission's recent paper on the Internal Energy Market addressed a number of issues currently affecting the market, and considered how the benefits of cross-border trade can be realised and enhanced; the interaction between national capacity mechanisms, interconnectors and cross-border markets is one such issue which needs to be resolved.
- 4.8. Greater interconnection will improve energy security of supply and subsequently reduce the amount of back up generation required to cover the expected level of variable output of some potential renewable sources (Wind, Hydro, Solar etc). Similarly, for periods of high wind in GB but at times of low demand, greater interconnection will reduce the need to curtail wind generation, thus harnessing all the benefit of renewable generation.
- 4.9. Increased interconnector capability will allow for increased competition in the electricity supply market, allowing for greater choice for UK consumers and improving affordability. This may result in lower prices for consumers but will depend on the price differential in the various energy markets.
- 4.10. Greater interconnection is regarded as desirable by the European Commission, the European Parliament and by individual Member States. However, there are significant differences between the "merchant" regulatory regime for interconnector development which has been the typical approach in the UK and the "regulated asset" regime prevalent in mainland Europe. As an interconnector, by definition, links two systems, it can only be developed if there is a degree of compatibility between the legal and regulatory regimes at both ends. This has required some UK interconnectors to go through a complicated approval process which has added to the time needed to develop projects and to associated risks with a consequent impact on capacity development.
- 4.11. The difference between GB and other Member States' default regulatory approach is particularly important because our experience suggests that, in order to achieve a successful interconnector development in practice, it is important to act in partnership with a competent and experienced developer and integrator of interconnectors at the other end. This will often mean forming a partnership with another system operator. We have noted that such operators have different views concerning the desirability or appropriateness of restructuring in order to take forward a development under unfamiliar regulatory arrangements.
- 4.12. Following a number of consultations, Ofgem is developing a new regime for interconnector development, incorporating a regulatory approach which ensures that consumers continue to be protected from excessive costs but developers are better able to manage the policy risks. Interconnector developers will still have incentives to deliver projects which bring benefits to the market, but will have more clarity on minimum (and maximum) returns, providing more clarity around risk management and allowing projects to move ahead more quickly. It is important that this regime is completed and implemented quickly.

- 4.13. We are hopeful that these developments will allow new projects to be developed soon, allowing the market to gain the benefits of additional interconnection.

5. The European “Supergrid”

- 5.1. The connection and integration of offshore wind energy is critical to meeting EU and UK environmental targets. Whilst any network should offer a solution that is consistent with the policy goals of energy security, sustainability and affordability, it must also be practical.
- 5.2. The North Seas Countries’ Offshore Grid Initiative (NSCOGI), with the support of ENTSO-E, the Association for Cooperation of Energy Regulators (ACER) and the European Commission, has already begun evaluating how the potential volumes of wind energy can be efficiently and economically connected to provide reliable access to market. Discussion on how to maximise opportunities to provide cross-border trade opportunities, consistent with the EU ambition for a single, integrated energy market, is integral to this work.
- 5.3. A European supergrid would entail the evolution of a high voltage, multi-user offshore electrical network that interfaces with a number of different European countries. The benefits of pursuing a European supergrid in the right geographic region, in this instance the North Sea, are many. A coordinated, integrated North Sea grid will deliver significant benefits, including:
- An overall reduction in costs to the consumers through:
 - Lower capital and maintenance costs associated with the establishment of an offshore supergrid due to the need for fewer, larger assets. For the North Sea, the ENTSO-E initial findings suggest this to be in the region of 7bn Euros (or 10%) if all the potential renewable generation proceeds to commissioning;
 - Increased capacity for cross border trade and access to other energy markets (also providing a route to allow the UK to become a net electricity exporter);
 - An ability to balance the intermittency of wind generation more effectively and efficiently by allowing the cross border transfer of power flows, thus offering the potential for shared plant margin
 - Improved security and network resilience for export/import.
 - An ability to reduce the onshore network reinforcements required through additional flexibility to inject power into stronger parts of the onshore network under outage conditions,
 - Significant environmental benefits given the reduction in required corridor routes, landing points onshore and supporting onshore transmission reinforcements such as new overhead lines or substations,
 - Removal of some of the expected supply constraints, further enhanced through standardisation, thus improving deliverability of offshore wind, and
 - A reduced risk of asset stranding since close to 100% utilisation of the asset can be achieved by complementing wind generation with cross border trade. At present, dedicated transmission asset to wind generation would only be utilised approximately 40% of the time.
- 5.4. As part of the discussions under way within the UK regarding the best design to connect offshore wind generation, we have been looking closely into the issue of

technology and the challenges that this may pose. It is our belief that the technology itself is not the main issue. Whilst it is true that cables at the required rating and other technologies such as voltage source convertors are not yet in service to the required level, this technology is already in development. We do not believe this development will be significantly challenging, a view which is further supported by all major European manufacturers.

- 5.5. The more important challenge will be ensuring that the necessary research and development occurs in a timely fashion. Timely signals will be required to ensure sufficient supply chain capacity is available and asset standardisation is developed. Without standardisation, the incremental build of any such network is likely to be more complex and reduce competition, hence exacerbating the risk of higher costs and asset stranding.
- 5.6. A further significant risk is that the issues posed by the regulatory regimes may not be fully addressed and remain inconsistent. It is our belief that a network can be designed and physically delivered but until issues of ownership, subsidy, who pays, who operates (amongst others) are addressed, it is unlikely that a European supergrid will proceed in any meaningful integrated manner.
- 5.7. The existing UK regime for the provision of offshore transmission capacity is incompatible with the development of a wider European supergrid. The multi-State nature and magnitude of the necessary investments will almost certainly require a new approach to delivering infrastructure investment, and policy-makers need to facilitate the best designs and delivery bodies whilst achieving the economy-of-scale benefits of a coordinated solution.
- 5.8. As discussed above (paragraphs 4.10 & 4.11), complexity in the regulatory environment may deter investors. For example, complex decisions would be needed on the ownership split of a European supergrid and how the responsibility for operation is allocated. Such issues need to be addressed before it is possible to agree on the funding arrangements.
- 5.9. Such uncertainty around regulatory arrangements which do not meet the needs of generation developers, potential transmission asset investors and supply chain companies risks stalling progress while other countries like Germany have taken decisive action with their *Energiewende* (Energy Transition) policy⁸¹
- 5.10. National Grid has a wide range of skills and expertise which we have applied in various regulatory regimes and market contexts. We are very keen to share our experiences with policymakers in order to develop a workable regulatory approach.
- 5.11. To ensure that the UK meets the binding EU environmental targets, the concept of a European supergrid represents a crucial part of the infrastructure investment required. We therefore make the following recommendations.
 - Support the development of an EU wide strategic plan to ensure clarity of objectives and timelines,
 - Continue to support the further development of a European supergrid through the various industry groups, NSCOGI and ENTSO-E in particular, to ensure that

⁸¹ In cooperation with all stakeholders from politics, society and industry, the German government is working on its master plan for the new energy supply of the future. This will document how the different elements interact and ensure that the system as a whole works, energy prices remain affordable and goals are reached – supply security, economic efficiency and compatibility with the climate, environment and society.

https://www.bmu.de/files/pdfs/allgemein/application/pdf/broschuere_energiewende_en_bf.pdf

opportunities are maximised through considered analysis and that the necessary enablers are in place on time,

- Develop proposals for the enduring regime for offshore wind connections which is compatible with the ambitions of a European supergrid and is compatible with other European regimes,
- Encourage the timely provision of signals to ensure sufficient research and development so that technology does not become an unnecessary barrier, and
- Understand and seek to address the various inconsistencies present in different European markets in order that the goal of a regional energy market is achieved.

6. Carbon Capture & Storage

- 6.1. Through its subsidiary, National Grid Carbon Limited (NGCL), National Grid is actively supporting the early demonstration and deployment of CCS in particular through development of a strategic large scale shared user transport and storage solution to serve CO₂ emitters in Yorkshire and Humberside (the Humber cluster). Carbon intensive clusters like Humber and Rotterdam with close access to offshore storage sites represent the most effective launch pad for wider-scale roll-out of CCS at a scale which can make a material impact on decarbonisation targets.
- 6.2. NGCL has an active Humber Cluster development work programme co-funded by the European Energy Programme for Recovery (EEPR) in conjunction with the 2CO Energy Don Valley project. The leadership shown by the EU in enabling the cluster scale development is highly valuable.
- 6.3. We welcome the positive announcement by the UK Government that it is taking forward several CCS projects in its CCS Commercialisation programme, including the White Rose Drax project which forms part of the same Humber cluster. NGCL is also supporting the development of CCS in Scotland working together with the Captain Clean Energy Project (CCEP) which has also been selected for progression in DECC's CCS Commercialisation programme.
- 6.4. We believe large-scale demonstration of CCS is a vital next step to meeting the UK and EU carbon emission reduction targets. CCS can enhance security of electricity supply by allowing traditional coal and gas thermal generation to remain part of a future diverse low carbon energy mix.
- 6.5. The early development of a CO₂ transportation grid based on multi-user pipes would be a highly cost-effective way to encourage swift demonstration and deployment of the technology. This is a view echoed in the interim report of a UK Government instigated CCS Cost Reduction Task Force. The task force was established to advise Government and industry on the potential for reducing the costs of CCS and its interim report⁸² published on 19th November 2012 concludes that "UK gas and coal power stations equipped with carbon capture, transport and storage have clear potential to be cost competitive with other forms of low-carbon power generation delivering electricity at a levelised cost approaching £100/MWh by the early 2020s, and at a cost significantly below £100/MWh soon thereafter." The top two enabling actions identified in the interim report are "investment in large

⁸² DECC commissioned a discussion paper which looks at the scope for cost reduction in CCS in the UK to enable further discussion with industry through the CCS Cost Reduction Task Force.

<http://www.decc.gov.uk/en/content/cms/emissions/ccs/facilitating/costreduction/costreduction.aspx>

CO₂ storage clusters supplying multiple CO₂ sites” and “investment in large, shared pipelines with high utilisation.”

- 6.6. The rise in unconventional gas, particularly in the United States, and continued reliance on fossil fuels globally means that there is a need for CCS capability, which will enable the continued use of these energy sources whilst also minimising the impact of the associated emissions.
- 6.7. A recent sponsored study carried out for National Grid by Redpoint Baringa⁸³ looks at the least cost approaches to decarbonising heat in the UK economy (almost half of the UK’s current final energy consumption is used to provide heat-related services in buildings and industry). The analysis suggests that the least-cost pathway is dependent on the successful commercialisation and large-scale deployment of a number of key existing and developing technologies, including:
- Substantial improvements in building energy efficiency;
 - Large scale usage of CCS, not just in power but across the energy system; and
 - Use of hydrogen (produced via CCS routes) in parts of the energy system with more limited abatement alternatives, such as freight transport and high-temperature process heating.
- 6.8. The importance of CCS as a decarbonisation enabling technology has again been underlined in a recent joint report by the Energy Technologies Institute (ETI) and the Ecofin Research Foundation⁸⁴ which examined the conditions for mobilizing private sector financing of carbon capture and storage. Over the last 4 years ETI has developed a world class modeling tool for the UK energy system, the “Energy System Modelling Environment” (ESME). ETI analysis through ESME shows that CCS has a crucial role to play in enabling the UK to meet its carbon targets affordably. If the right choices are made the extra costs of meeting carbon targets could be as little as 0.6% of GDP, but without CCS that cost could more than double. The same is not true for wind and nuclear i.e. the least cost pathway is particularly sensitive to the contribution from CCS.
- 6.9. The EU support for CCS through EEPR and its NER300 programmes, along with the UK Government’s support through the DECC commercialization programme has ensured that UK and Europe are at the forefront of this technological development, and well placed to take advantage of the resulting worldwide opportunities.
- 6.10. Government needs to ensure that its regulatory controls and safeguards that have managed a fossil economy do not in themselves block the development of infrastructure aimed at weaning us off this, for example that an enabling, proportionate and risk based approach is taken. To simply apply, say, oil and gas norms (where the prize is high) will delay and disincentivise development, leading to limited deployment, higher risks and costs. This will not be in consumer interests.

⁸³ National Grid commissioned Redpoint Energy (a business of Baringa Partners) to explore cost-optimal future pathways for decarbonising heat across all

sectors to 2050 <http://www.nationalgrid.com/uk/Gas/OperationalInfo/TBE/Future+Energy+Scenarios/Heat+Studies/>

⁸⁴ The Foundation is working on a joint initiative with the [Energy Technologies Institute \(ETI\)](http://www.energytechnologiesinstitute.com) to assess the conditions needed to mobilise private sector capital; for CCS. Through in-depth interviews we canvassed the view of key stakeholders including potential private sector capital providers, project developers and policy makers. <http://www.ecofinfoundation.org/activities/ccs>

We would make the following comments and recommendations regarding CCS policy:

- We welcome the EU and UK Government policy support for CCS through EEPR, NER and the DECC CCS Commercialisation Programme; it is vital that these programmes are maintained, and further policy support is likely to be required;
- There is an urgent need to improve the identification and characterisation of European CO₂ storage sites so that the industry can plan ahead.
- Gas is foreseen to have a continued role up to and beyond 2035; the Redpoint study foresees a need for gas to remain as a peak energy source for domestic and commercial heating right out to 2050; therefore CCS is vital for attainment of the least-cost pathway to decarbonisation out to 2050, as shown in many reports (International Energy Agency (IEA), Ecofin/ETI. Redpoint etc.), and CCS is disproportionately important compared with other sectors such as wind and nuclear.

19 December 2012

National Grid—Supplementary Written Evidence

1. About National Grid

- 1.1. National Grid owns and manages the grids to which many different energy sources are connected. In Britain we run systems that deliver gas and electricity across the entire country. We hold a vital position at the centre of the energy system.

2. CCS

- 2.1. National Grid has worked on CCS intensively for several years now. We have promoted “clusters” as a means to deploy CCS so that economies of scale are exploited and costs to consumers of meeting climate change targets are minimised. In these clusters we have engaged large carbon dioxide emitters (existing and proposed fossil fuel generators and some industrial plants) to determine viable CCS projects and we have taken some of these further.
- 2.2. With Scottish Power and Shell we secured a development grant from DECC in the first UK CCS demonstration competition (the Longannet project). Unfortunately this project was abandoned. However the underlying onshore carbon dioxide transport solution (to reuse a former National Grid natural gas pipeline) remains viable and would be used by the Captain Clean Energy Project (CCEP). The CCEP project is one of four shortlisted to progress in the current UK Government CCS Commercialisation programme.
- 2.3. In the Humber we have taken a proactive step to facilitate the development of large scale new-build pipeline and storage infrastructure which can serve the region with a shared user system. We put this concept forward to the EU in 2009 together with the Powerfuel Hatfield capture proposal (now known as the Don Valley project under ownership of 2CO Energy), and succeeded in securing a Euro180m grant for development funding. Since that time the proposed White Rose CCS project located at the site of the existing Drax power station in North Yorkshire has also been shortlisted to progress in the current UK CCS competition. The White Rose project would connect into our proposed shared user carbon dioxide transport and storage system serving the wider Yorkshire and Humber region.
- 2.4. In total our projects have enabled the potential gross spending of over £200m, largely in the UK, for CCS development. However all the grant income has to be part co-funded by National Grid and others, so the combined spend has yet to reach this total. In terms of the spend to date for National Grid activity alone, the total committed spend by National Grid on CCS is in excess of £20m, net of grants and other income.
- 2.5. If we secure DECC support through the CCS Commercialisation Programme we will be looking at private investment by National Grid of many hundreds of millions of pounds. We cannot give a more precise answer as the Government competition has strict rules around it.

3. **Subsea cabling**

- 3.1. Last year the IET (Institute of Engineering and Technology) published a report on electricity transmission costs, comparing underground and undersea cabling, as well as overhead costs, in a variety of different scenarios. Generalised costs are included in the table below, terrain and conditions play a part amongst many other factors that are considered in more depth in the IET report. The table provided gives an outline of top-line costs as requested by the committee.
- 3.2. A link to the report is here: <http://www.theiet.org/factfiles/transmission-report.cfm>
- 3.3. A summary of top line costs are included below that summarise rough transmission costs based on the IET report, however it is important to note that there are numerous caveats that can impact on these costs that are specific to each individual line.
- 3.4. Terrain, conditions, obstacles, voltage, capacity and the overall environment are all factors that can impact the costs of all types of transmission. For detailed and accurate cost analysis the independently created IET report is the best source of information.
- 3.5. For the committee rough cost estimates are provided below:

	Technology	Cost
Overhead	Overhead line	£1.6-1.8m / km
Underground	Cable direct burial (XLPE)	£18-23m / km
	Cable (gas insulated (GIL))	£16 -23m / km
	Cable tunnel	£25-45m / km
Subsea	HVDC	4-6 x £160 m converters, £3.5m / km cable

26 February 2013

National Grid and Ofgem—Oral Evidence (QQ 339 – 357)

Evidence Session No. 17 Heard in Public Questions 339 - 357

WEDNESDAY 6 FEBRUARY 2013

Members present

Lord Carter of Coles (Chairman)
Baroness Byford
The Earl of Caithness
Lord Cameron of Dillington
Lord Giddens
Baroness Howarth of Breckland
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Plumb
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Mike Calviou, Director, Transmission Network Service, National Grid, and **Martin Crouch**, Director, Offshore Transmission (Acting Deputy MD E-Serve), Partner, European Strategy, Ofgem and Chair of the Electricity Working Group, ACER.

Q339 The Chairman: Mr Calviou, Mr Crouch, you are very welcome. We are particularly looking forward to hearing what you have to tell us. We had a very interesting trip to Brussels two weeks ago and became slightly better informed on some of the issues, but we are hoping you are going to help us understand them better.

If I could deal with the formalities first, you should have in front of you a list of interests that have been declared by Committee Members. This is obviously a formal evidence-taking session of our Committee. Shorthand notes are being taken, and they will go on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript, and you can correct that in terms of minor errors. The session is on the record. It is being webcast live and will be subsequently available on the parliamentary website.

We have sent you questions. I think probably it would be better, given we have a rather large number of questions, if we were to go straight to those unless there is any—no? Okay; thank you.

If I may start with the first question—that is that we have had some evidence about interconnection in the sense that it leads to security of supply and yet we have been told

that in moments of undercapacity in the UK, none the less power is still wheeled out and taken across the Channel. We are anxious to understand that because it is rather contradictory. The question we would like to get some guidance on is: do price signals trump this? I do not know who would like to go first.

Mike Calviou: I think you are right. We believe interconnection clearly has big security supply benefits. It has benefits in terms of trading of power, between sharing reserves, and particularly with increasing intermittent generation the ability to move the power between countries and between markets is clearly beneficial. It does rely on effective market and price signals for power to move the right way, and there has been some concern expressed, so I think I will probably say the vast majority of the time the power is flowing in the way that you would expect it to, and when we have periods of tightness in GB, then we are seeing power being imported from places like France and the Netherlands.

There are some cases where the market does not appear to work quite as efficiently as you would hope and there are a number of projects being looked at to address that, particularly as part of the move towards the EU single energy market and particular I will talk about the north-west Europe market coupling project, which is a project to couple the markets in a number of countries—GB, Benelux countries, France, Germany and the Scandinavian countries—so that in a day-ahead power exchange process flow is automatically scheduled so that the power should flow in the right direction between those markets.

The Chairman: Because there is a spot price for this power, either side can bid it up at the moment and it just flows; if power does flow, it flows to the price point?

Mike Calviou: Yes, there are different arrangements on different interconnectors. With our BritNed interconnector over to Holland, there is already what we call implicit auctions that should lead to the power flowing in the right direction based on the market price. With the current interconnection to France, there is separation and trading of the capacity of interconnector and energy, and there is some concern sometimes that it should work in theory but maybe that market is not fully efficient, which is why a market coupling is being looked at.

Ultimately, you would hope, assuming that you are not having simultaneous peaks or simultaneous periods of extremely tight capacity on both sides, the market should work, and wherever the need is greatest, then the power should flow in that direction. There are probably some market imperfections that need to be addressed but fundamentally in real time, National Grid has the ability, as system operator, to work with our neighbouring system operators in the other countries to make sure the power is flowing in the right direction.

Martin Crouch: Can I just also broaden this to give a little bit of an ACER perspective as well as the European institutions? In the past there have been concerns that interconnectors have flowed in the opposite direction to what the price difference would indicate. That has led to a lot of discussion among European traders, TSOs and regulators and policy-makers. In the period of 2008 to 2010, a broad consensus emerged on a target model for how electricity wholesale markets should be organised, which includes this concept of liquid day-ahead auctions run by power exchanges that set a price at the day-ahead stage. Then the difference between prices in markets is used to determine the interconnector flows on the day so that power automatically flows from low-price to high-price countries.

In the GB market at the moment, we are part-way between the old world and the new world where this arrangement is in place. But the north-west European project that Mike refers to is now looking, by the end of this year, to have the same set of algorithms applied

by power exchanges across the whole of north-west Europe, which should ensure some improvements.

Clearly that addresses the day-ahead issue. There is then the variation in power station output and wind within-day. There needs to be an adjustment mechanism, and there is still work to be done on making that work fully, but there are improvements in train. There is still the risk that when we are tight here, our neighbouring countries are even tighter, and then the same mechanism that deals with the economics will lead to power flowing out. But it is a mechanism that is intended to be economically rational and efficient and to make the best use of relatively limited interconnector capacity that we have. It is not the silver bullet. We still need other mechanisms to address intermittency such as demand-side response, in particular, but it should provide a contribution.

Q340 Baroness Howarth of Breckland: Good morning. I want to ask about interconnection and the resistance by the TSOs to interconnection. We understand there have been instances—Norway to UK and France to UK, for example—of private operators seeking to lay down merchant lines through interconnectors but having faced resistance from the TSOs; National Grid in the UK context and Statnett in the Norwegian case. The France to UK line was to be laid down through the Channel Tunnel, thus there was existing infrastructure to be used. Do you recognise this problem, and, if you do, can you explain the issues surrounding it and any solution that you might think is possible?

Mike Calviou: In terms of UK, I do not recognise a problem, and I strongly refute any suggestion that we have been resistant to the development of interconnectors. My obligation, as a transmission-system operator for GB, is to provide open and non-discriminatory access to all to the GB market. That includes generators, and that includes interconnectors. So, interconnectors apply to connect to my network, and I will provide them with a connection offer in the same way I provide connection offers to generators. We have a number of signed connection offers with interconnectors, and that process has worked well.

Talking about the particular example of the ElecLink project through the Channel Tunnel that you are referring to, we made an offer to them late last year, and they signed that offer in December. So, I do not recognise a problem. The process leading up to making the offer—it was a technically complicated offer. They are trying to connect in very short timescales to a congested part of the grid, and they may have perceived at certain points that those negotiations were difficult, but that was just us doing our job in a way that is fair to all users of our system.

Baroness Howarth of Breckland: So, do you think it is going to happen, and if so, when?

Mike Calviou: I cannot comment really on the particular commercial viability of individual projects. I have over 80 gigawatts of generators and interconnectors signed up to connect to the GB system. Experience tells me that not all of them will go ahead. My rule of thumb would be maybe half will go ahead in roughly the timescales they have connected up, but it is a very dynamic and evolving market. There are some particular issues with interconnectors that I suspect we will come on to that make it challenging. I know the ambition for ElecLink is for their first 500 megawatts to be connected by 2015 and they are working hard to achieve that, but I do not believe they have yet achieved financial close. You would have to ask them. But it is certainly an interesting project because, as you know, it goes through the Channel Tunnel so it avoids having to lay a sub-sea interconnector.

Baroness Howarth of Breckland: Do you want to add to that?

Martin Crouch: Generally first, we came to a position in about 2009 where we recognised there was a lot of potential for more interconnection into GB but projects did not seem to be coming forward. There was some history around the BritNed case, which was an exemption and which I think shows some of the difficulties with that process. But we have consulted on and developed a regime to try to facilitate more interconnection. Part of the challenge for interconnectors is providing connection points at each end. At the GB end, Grid has a strong role clearly in providing those connections. Ofgem has a role that if the two parties cannot reach an agreement, we can make a formal determination over the connection offers. That did not happen in this case. So, the position, as we see it, is that an agreement was struck between the two parties.

In the case of Norway that you mentioned as well, the Norwegian Government seem to have a view that it is essential for their energy policy that interconnectors to Norway are controlled by their national TSO, Statnett. That is a Norwegian Government policy. It is not something that we can directly do a lot about, I think. We have tried to work with them on a regulatory framework that will allow us to have interconnector projects with Norway, and clearly Grid has a project on the go with Statnett to deliver that. We recognise though that Statnett's view is their grid, a bit like the south of England, is very congested in the south of Norway and they do not have the capacity to accommodate more interconnectors. They have said they are currently working on one with Germany and potentially another one with National Grid for implementation in 2020. But any others are a few years beyond that.

So, I think there are both the technical constraints and the Government policy constraints in that case to further interconnect us with Norway that will probably bring a bit of reality to this idea of a North Sea grid and of the Norwegians providing a battery for all the wind in northern Europe.

Baroness Howarth of Breckland: Very quickly, where do you feel optimistic, because this is very pessimistic?

Mike Calviou: We have agreements with Nemo, which is the National Grid project to connect to Belgium. We have had agreement to France that we talked about. We have two Norwegian interconnectors where we have connection agreements, the National Grid Statnett project that Martin has referred to and the North Connect project. The National Grid would connect into north-east England. The North Connect project would connect into Scotland. There are also further things talked about. There is quite a bit of activity out there, but there is lots of work to do. As I said, it is probably not completely appropriate for me to speculate which ones will go ahead. BritNed, in our view, was a great success despite highlighting some of the challenges Martin talked about, and I would have thought in the next five years that we will see some of these projects proceed forward.

Q341 Baroness Parminter: Yes, can I move on to regulatory barriers? What barriers do you see in this area, in addition to the ones you have already mentioned? In the National Grid proposal, you talked about Ofgem's plan for a new regime on interconnector development. Could you tease that out a bit for us, please?

Martin Crouch: Our so-called new regime does not feel that new anymore. As I said, we identified these challenges in 2009. We issued a consultation in January 2010 explaining how we thought we could adapt our regime to allow for regulated interconnectors. We drew initial conclusions from that in December 2011 that said we would have this cap-and-floor regime where the interconnector developers have to take some risk as to whether they have made a good decision or not. There are a lot of difficult judgments to be made in terms of where the interconnectors are built, when they are built and what capacity they are built

with. So, we feel it is appropriate that the people taking those decisions ought to bear some commercial exposures to making good or bad decisions.

But for a regulated regime, there also has to be some support from consumers. So, there is a degree of underwriting, but also if the interconnector proves to be very profitable, the benefits of that should flow back to consumers. So, that is the regime we have been developing.

Since then, we have been working with specific projects, and the link to Belgium is the first one, to try to develop exactly how it applies in that case. These are massive projects, hundreds of millions of pounds. The decisions to go ahead and reach financial closure on them do take a period of time. There are lots of consenting issues, lots of environmental-survey issues and I think the regulatory discussions we have been having have delivered at the pace they have needed to, so as not to be on the critical path as far as we can see.

Mike Calviou: Yes, the only thing I would add is that our belief is that for interconnectors to proceed you do need support both in terms of developers but political support from both ends. We cannot, as the UK, say, “This is how we think interconnectors should work”, but if then in the other country they do not recognise, for example, merchant interconnectors, which was how we historically have done them, then that is not going to go ahead. In the case of BritNed we managed to find a solution, but in our discussions with other TSOs in other European countries the solution that we managed to get to work for BritNed they did not think would be workable for those situations.

So, taking forward the work that Martin talked about to develop this new regime to a conclusion, we do regard it as very important and to be done in a timely way, and we really support that work that is being done. Ultimately, most other European countries see interconnectors as just an extension of the national TSO role as opposed to a separate activity. So, we need to find a way of linking the UK perspective where, under the Energy Act, National Grid electricity transmission is not allowed to own interconnectors and where National Grid is involved, we have to do it in subsidiary companies, with that European perspective where it is not more viewed as an extension to the National Grid.

There are challenges. The proposals do look workable, but we have to go through the legal process, get them in place and then try to get them to work in practice.

Q342 Baroness Parminter: So, as a supplementary, then, you are saying the best route forward is to test out this proposal that Ofgem have come up with, see if it works, rather than asking the European Union to come up with some other mechanism in the meantime that can facilitate this issue?

Mike Calviou: Yes, I think the main thing from the European Union is that sometimes they almost seem to work from a default assumption that interconnectors are regulated. If you read some of their statements, they almost read as though they are assuming that every piece of interconnection is going to be regulated, and that is why you need exemptions, because the cross-border regulations say any profits from interconnectors should be shared with consumers, which works great for a regulated interconnector, but if someone is paid to develop it, they obviously want to get some return on their investment. So, that is why BritNed needed an exemption from the cross-border regulations.

The main challenge for Europe is to make sure that the model that we are hopefully moving to is allowed for as the European market and all of the European regulation is developed. It normally is, but it can sometimes feel a bit of an afterthought, so that is probably the main

challenge, to make sure the full range of ways that interconnectors can take forward can be facilitated by European regulation and law.

Martin Crouch: The typical European approach would rule out things like the ElecLink project, like the North Connect project, as those are not developed by the national TSOs. So, what we have tried to do is have a regime that works in common with our neighbours. We have done a lot of work with the Belgian regulator, some with the French regulator and with the Norwegian regulator so that we have regimes that are compatible with those but still allow for these sorts of projects developed by other interested parties to happen alongside the regulated routes.

Q343 Lord Renton of Mount Harry: I would like to ask a question or two about the North Sea. There is obviously a lot of optimism and hope about what the North Sea might produce. I note, Mr Calviou, that in the paper you kindly sent us in December, you wrote, “A high-voltage multi-user electrical network in the North Sea could deliver benefits such as the increased security of supply” and so on. But then you added, “There are significant risks associated with the regulatory environment; for example, determination of asset ownership and the supply chain”. Could you develop that to us?

Mike Calviou: Yes. It is probably worth bringing in a bit of background in terms of why we believe there is great potential in terms of a North Sea grid. Clearly, to meet the UK decarbonisation targets, we need a lot of new renewable energy and offshore wind is one of those options. There are proposals in the Round 3 wind farms for very, very large offshore wind farms. Places like Dogger Bank and Hornsey have been talked about. Dogger Bank is 12 or 13 gigawatts, so absolutely vast-scale. We believe that to connect those wind farms up you need to build an offshore grid. The first wind farms that have been developed so far have tended to have single radial cables connecting them up but they have been hundreds of megawatts. For these much larger scales, we believe you need to build a grid.

Once then you start building an offshore grid, and we are also talking about some of the interconnector developments we spoke about earlier, it is clear there is potential to start stringing it all together and interconnecting them—further developing. So, for example, an interconnector from Norway, rather than landing in north-east England, as currently proposed, could land at an offshore platform at somewhere like Dogger Bank and that might make it more efficient, and then you can have the ability to share cables and you can use it for trading power, when the wind is blowing or not blowing. When the wind is blowing, then you can use it for exporting the wind energy. So, there is great potential from that.

The challenges we see are that at the moment interconnectors have one regulatory regime, which is evolving. We have talked about that. Offshore transmission has another regulatory regime. That regime, at the moment, has only worked for the single radial projects, where it tends to be that the developer builds the cable and then the offshore cable is then auctioned off under the Ofgem process. Making the amount of co-ordination to make such an offshore grid work, it feels as though it will be quite hard with all these different regimes applying for different assets. So, you need some sort of overall co-ordination and Ofgem have a project called ITPR—integrated transmission, planning and regulation—which is effectively looking at all of these challenges about how different bits of transmission and interconnection could be co-ordinated and what they call multi-user projects are being considered.

There is a process to examine it but it is early days and the ITPR project has only been going for probably about a year. There is probably a lot of work to do to work out how that can all come together so that we know who does what, who plans it, who ultimately builds it and who ultimately owns the assets.

In the meantime, what we want is the case for it to be set out, because obviously you would only do all that work if there were real benefits. So, the North Seas Countries Offshore Grid Initiative was set up by all of the countries around the North Sea to say, “Let us do some more detailed studies into what such a North Sea grid might look like and what the benefits are”. The first study was produced last year. I think probably it is fair to say it probably showed we needed to do some further studies, because there were some assumptions made that maybe we need to update. But it does at least show that there is some potential from developing a North Sea grid, but it really does depend on your assumption of exactly how much offshore wind is being developed in each of the various Member States around the North Sea.

There is certainly potential, but it is probably a potential that we will probably see realised between about 2020 and 2030 in scenarios of the future where there is a heavy development of offshore wind.

Q344 Lord Renton of Mount Harry: Do you agree with that, Mr Crouch?

Martin Crouch: Largely, yes. Certainly there is a lot of optimism, as you said, and from our side we are very hopeful that there are huge benefits from a North Sea grid. We were involved both as ACER and as Ofgem in setting up the North Seas Countries Offshore Grid Initiative, as Mike has alluded to. But maybe to be a little bit clearer, the initial studies do not show there is a material benefit from meshing the grid compared to a radial system. They show some benefit but it is smaller than the margin of error in the studies. I think there is a general feeling that that may well be due to the scenarios chosen and there may be more benefits but the case has not yet been made, certainly not for a grand design, a blueprint that should be rolled out all in one go. Each project has to build on previous projects and develop.

Through our ITPR project as mentioned, we are looking at how we can have an integrated view as to the system design that we need to move towards because we do think that is really important—a view that understands the technological challenges, because some of the technical requirements for a meshed DC grid are not really proven as yet.

So we seek to participate in these developments, which could still involve drawing on the best of the regimes that we have at the moment, and we think it probably will: we have an offshore regime where a recent report by the European Wind Energy Association said there were nine offshore wind farms fully connected to the grid in 2012 across Europe. Six of them were in the UK. That, I think, is a measure of the success of the regime we have. Germany has huge ambitions, but the reason why Germany only had one was due to delays from the incumbent TSOs in connecting up the projects to the grid. So, there is some evidence starting to emerge, I think, that the regimes we do have, although they are a bit more complicated, are working whereas not all the other regimes are.

Lord Renton of Mount Harry: I just wanted to ask you finally, what about the difficulty of asset ownership in this? Is that a real problem? If someone owns the land, what does he want to do?

Martin Crouch: Someone—sorry?

Lord Renton of Mount Harry: Is the question of asset ownership, of pulling it all together, a real difficulty?

Martin Crouch: From our perspective, it should be possible to have a regime where the person or the company responsible for constructing and owning an asset does not necessarily have to be the system operator—we have had a regime in Scotland where that

has worked for many years—as long as there is a holistic view taken for system operation and planning purposes. There are issues around ownership of transmission systems due to the unbundling rules and trying to get third-party investors to come in. They are put off if they own generation assets as well, even elsewhere in Europe. So, there are some challenges around bringing the finance into these arrangements, but I think we have had some success in bringing in third-party financing through the offshore regime, and we need to continue to push that in my view.

Q345 Lord Cameron of Dillington: I wanted to ask some very simple engineering and financial questions. Just so I am clear—I realise obviously it depends on the differences, but—what is the difference in cost per kilometre of, firstly, pylons at 450 kilovolts, 800, let us say, or 700 or whatever we are going up to, underground and then undersea? Is there a problem of durability of the cabling under the ocean when you were talking about DC light cables?

Mike Calviou: I do not have all the precise figures with me. Broadly, the choice of voltage is an economic choice. Ultimately the higher voltage you go, you get more capacity, you get lower transmission losses. But everything needs to be bigger. You need more insulation that either means bigger pylons or bigger cables.

We have done a lot of studies and we supported a study by the IET Report looking at the costs of overhead versus underground for AC transmission in this country and compared it with HVDC. Broadly, it is about £1.5 million to £2 million a kilometre for high-capacity 400 KV lines such as the lines we might be building to connect up big new nuclear power stations to wind farms in the UK. Generally, the construction cost for putting them underground is a factor of 10 bigger; that is a rough rule of thumb, and the IET Report report did confirm those figures. People also quote the whole-life numbers that tend to be five to one because the transmission losses are roughly the same. So, the absolute difference is the same but just the ratio is different.

HVDC is interesting and it is hard to do exact comparisons because the issue with a high-voltage DC is that you need to convert from AC to DC and those converter stations are expensive. So, to do even a 1 gigawatt HVDC link you are probably talking £200 million per converter station at either end. Once you have converted, it is then quite economical. So, that is why tend to see HVDC at long distances because you spend a lot of money converting from AC to DC but once you have converted, then HVDC cables are probably comparable to AC pylons in terms of maybe £1.5 million to £2 million a kilometre. If, for example, the National Grid project we are doing jointly with Scottish Power to connect a new line down the west coast of the country from Scotland to northern Wales—

Lord Cameron of Dillington: I am sorry, on the land or underwater?

Mike Calviou: Underwater.

Lord Cameron of Dillington: Underwater, yes.

Mike Calviou: So, it is going from Hunterston on the west coast of Scotland. It is cabling down, basically, skirting past the Isle of Man and landing on Deeside. That is in the early stages of construction and that is a 2.2 gigawatt capacity link and it is over 400 kilometres long and it is HVDC technology. So, we have a converter station at either end and then the entire project is about £1.3 billion investment.

That is what you can do with HVDC, and once you have converted to DC then the economics look very favourable, which is what makes long-distance transmission quite technically possible.

Q346 Lord Cameron of Dillington: What about durability in tidal waters, underwater?

Mike Calviou: There can be issues but we have had the England to France sub-sea interconnector operating since the early 1980s and the cables are still fine and in good condition. You worry more about making sure that the cable is buried to such a depth that it will not then get damaged by anchors or by all of the issues anybody has when they are laying assets on the sea floor. But generally the cables can last 40 to 50 years.

Lord Cameron of Dillington: So, they are buried under the sea all the way, are they?

Mike Calviou: It depends on different projects but you would generally want to bury them in the seabed rather than lay them on the seabed. Depending on the seabed conditions, sometimes if it is too rocky you might have to lay them on and maybe cover it with some material. When you are crossing other assets, it can get a bit technically complicated. But generally they are buried, yes.

Lord Cameron of Dillington: Ignoring the £4 million converters either end, that works out to be more or less the same cost per kilometre as pylons?

Mike Calviou: Yes, roughly. The numbers I was quoting from the ITRV Project report were looking at underground HVDC on land. I think sub-sea cable is more expensive—

Lord Cameron of Dillington: More expensive, is it?

Mike Calviou: —than on-land cable. But it is comparable. Certainly it is a lot less expensive than AC underground; that is the 10 times factor I was talking about.

Lord Cameron of Dillington: Sorry, I am being very thick here. What is the difference? If you are laying on land, underground DC cables, HVDC cables, does it not need so much cooling? What is your factor in that?

Mike Calviou: The sub-sea cables have greater reinforcement on because of the physical environment they are in.

Lord Cameron of Dillington: Yes, but sorry, the difference between on-land AC and on-land DC?

Mike Calviou: Okay. It is different technology effectively. DC tends to have lower transmission losses for given capacity and so you can make smaller cable. Ultimately, a DC link will tend to have two cables, one of each polarity. The AC cables, you will have three phases and for a high-capacity AC cable, you are talking maybe two or three cores per phase. So, when we have looked at AC transmission, as opposed to pylons, to replace pylons that would have two circuits, you are talking about up to 18 cable cores, so you can imagine why it gets so expensive.

Lord Cameron of Dillington: Ten times as much, yes. Thank you.

Q347 Baroness Byford: If I could explain to both of you that I have only just re-joined the Committee, so I am miles away from the knowledge that others have. But originally, many years ago, when we were talking about the introduction of wind farms, there was the whole question as to how much you get from wind turbines. Could you update me on that? Are they producing what you had anticipated? Are they doing better than you were anticipating? What happens when you have too much wind and they have to be switched off? What happens when there is not enough wind to keep them going? Because originally there were great hopes for them, and then in actual practicality they were not producing in the way that they were hoped to do.

My second question is on finance and, again, my apologies because the Committee perhaps knows. But is all of this—all the projects we are talking about—being financed by private investment, or is some of it coming from Governments as well?

Mike Calviou: Maybe I will do the first bit and you do the second bit, Martin.

Martin Crouch: Yes.

Mike Calviou: So, in terms of “Are wind farms developing?”, generally obviously wind farms only generate when it is windy and typically, depending on how much wind there is we will have load factors of 30, 35; people are now talking sometimes of up to 40% load factors. Where the wind farms are built, whether onshore or offshore, they are generally generating as you might expect. There are some periods where it is not that windy and they are not generating but overall, my understanding is that they are generally doing what the people were expecting them to do and are being quite successful. Recently, we had the first day when we had 5 gigawatts of generation in GB coming from wind, which was a notable milestone.

The big challenge is getting them built and the whole challenge around finding sites where they can be built either onshore or getting them built offshore, and when people are talking about the challenges, it is that challenge of getting the projects built.

From a system-operator perspective, yes, incorporating the intermittent-generation wind can be a challenge but it is the benefit of an integrated grid. The demand on my system is also uncertain. So, at the levels of wind that we have been seeing historically, the uncertainty from wind is not a lot more than the general demand uncertainty and we just manage it and we hold reserve that caters for things being not quite as we expect and forecast.

As more and more wind comes on, that does become challenging. We have also always said up to 10% wind we see is pretty straightforward to accommodate. Further, up to 15%, 20%, even more than that, wind is more challenging, but it will probably require us holding more types of reserve, and particularly going forward we have great hopes of more demand-side options. We already have some demand-side options that we hold in reserve, so large industrial companies like steelworks are willing to reduce their demand at short notice. We use those sorts of mechanisms. Going forward, when people talk about smart grids and a lot of smart demand-side, clearly there is potential to have a lot more demand participation in the market, which would then give us options to use to help us balance the intermittency of wind.

There are technical challenges, I cannot say there are not, but we feel those challenges are all things that we can meet and ultimately accommodate in order to meet the Government’s renewable targets.

Baroness Byford: Right, thank you.

Martin Crouch: Our understanding is generally that some of the wind farms have had less output per unit of capacity than they were originally expecting. But whether that is just year-to-year variation in wind speeds or a longer-term trend, it is a bit early to tell. Some of the wind developers’ associations and DECC are probably better placed to comment on that.

In terms of the finance, from the transmission companies, clearly there is a mixture. The Belgian transmission company that we are dealing with on the interconnector there is a private company but many of the European transmission companies that we talk to about interconnectors are state-owned—so the Norwegians, the Dutch, the French obviously. In terms of the wind farm developers as well, there is a real mixture again. Some of the most

active companies—some of the Scandinavian companies—do have state ownership but then we also have lots of privately owned companies, so there is a bit of a mixture.

Baroness Byford: Forgive me for coming back. Presumably the state is giving public money, as they have done for our wind farms, to have a subsidy on it to get it started in the first instance. Is that a one-off, or is there a continuous commitment of public money in there as well?

Martin Crouch: For the wind farms we are talking about, they are subsidised through electricity bills in GB.

Baroness Byford: They are indeed.

Martin Crouch: That is a per-unit-of-output subsidy essentially, so it is an ongoing subsidy not a one-off subsidy. Interconnectors generally are not subsidised in that way.

Q348 The Earl of Caithness: I just wanted to pick up on what you said, because you said the challenge really was getting the wind farms built and getting the applications through. Living in the north of Scotland, many people have said to me that it is National Grid that is the problem and there is no capacity on the grid to move the electricity. Could you just clarify that?

Mike Calviou: We are system operator for the whole of GB. We do not own the grid in Scotland. That is owned by Scottish Power and Scottish and Southern, just to clarify that. There is no doubt there is a big potential wind resource in Scotland and there are lots of projects. In terms of the number of projects, there is more activity in Scotland than any other part of GB. A lot of the current growth of onshore wind is up in Scotland. The Scottish grid, historically, has been built in order to meet the distributed hydro generation. So, in the north of Scotland it has typically been a 132 KV voltage, so a much lower capacity. So, the existing grid has limited capacity and there are some challenges. There is a big programme of work going on that we effectively co-ordinate but Scottish Power and Scottish and Southern are taking forward.

The Beaulieu-Denny line is one line that is currently under construction that is absolutely key, and then there is further work. There are certain bits of the Scottish network where there is a lot of interest, but until some of the grid upgrades are delivered it is challenging.

Scottish and Southern did announce, just before Christmas, that a number of their projects were delayed and that has led to some concern. We had a special meeting of what is called the Energy Network Steering Group, which is a group where DECC, Ofgem and companies like National Grid get together and look at the whole development of the GB grid in order to meet the Government's requirements. We concluded that there were some delays putting some of those projects back in line with what was going to happen on the ground anyway. So, there are a few projects that are being delayed: that is regrettable but ultimately SHE Transmission, who are owned by SSE, have all the challenges any of us have in terms of upgrading grid capacity. That is, getting planning consent and also co-ordinating the construction of a number of different bits of the grid with each other in a way that makes sense.

Q349 Lord Whitty: I have questions about co-operation between regulators, but just before I put that, the information you gave on cost to Lord Cameron: do you think National Grid could write that down? I got a bit confused.

Mike Calviou: Yes.

Lord Whitty: I think it would be useful if we had some clarity, some supplementary evidence if you would not mind.

Mike Calviou: We are very happy to provide that. What we can do is send you a link to the IET Report that was commissioned last year, which particularly looks at the various options for building onshore transmission and then we can see if we need to supplement anything in terms of sub-sea transmission.

Lord Whitty: Thanks very much. On regulatory co-operation, a lot of our witnesses have said they welcome the work of ACER. However, they think there is a long way to go in terms of co-operation between regulators, not just on the issue of physical interconnection, but by completing the internal market more generally and having greater compatibility or approximation between regulatory regimes. How successful do you see ACER's work? Can it be improved on? Does it need to be strengthened? What is the distinction between ACER and the Council of European Energy Regulators? It seems to us there may be a bit of duplication there. In general, do you think that the times are ripe for a greater degree of co-operation between the various regulators?

Martin Crouch: Perhaps I can start with that. ACER was formally established in March 2011, so it is just coming up to its second birthday. It is still a relatively new organisation that is still developing. They have around 60 staff in Ljubljana overseen by a Director, but a lot of the work of ACER is contributed to by national regulators around Europe, with many more than 60 people providing the input, which we co-ordinate through working groups, of which I chair one. That is a good sign, in that a lot of the work of ACER is not a wholly separate organisation but involves the national regulators co-operating together to bring their expertise and create something European.

ACER, a bit like Ofgem, is a creature of statute, European statute rather than national statute, but its responsibilities and powers are set out in the European legislation. They have been added to already on more than one occasion in its short two-year life. Particularly, there has been a big expansion to deal with the issues around market manipulation, insider trading in energy products and the REMIT Regulation. ACER has been given a lot more responsibilities. It needs to have an IT system that can accommodate the data that is flowing in, but it does not have all the budget to deliver that. So, from an ACER perspective, there is a desire that for the additional responsibilities it is given it is at least given the budget to enable it to deliver those, which has not quite been the case. ACER's priority at the moment is to focus on the single market and delivering that by 2014. It is generally perceived—and there has been some discussions with stakeholders to get feedback on that—that it is doing a good job in that so far, but clearly there is further to go.

As the European regulators, we have kept the Council of European Energy Regulators, CEER, running in parallel for a couple of reasons. One is that there are things that ACER does not address. Retail market issues are predominantly outside the remit of ACER apart from some market monitoring. International issues, relations with the Russians, relations with the Mediterranean countries outside Europe and so on are all outside of ACER's remit. So, there is a function that CEER can contribute to on retail and distribution issues, in particular, which ACER does not have the capacity or the legal mandate to deliver on.

From an Ofgem perspective, while we are wholeheartedly supporting ACER, we also recognise that that is only part of the picture. It is really important that we have good relationships with our neighbouring regulators, which we have been working on a lot, because a lot of the developments, a lot of the need for co-ordination on things like capacity mechanisms, are with neighbouring countries and things can be solved more easily between

two or three neighbouring countries than on a pan-European basis. But ACER is also trying to work on some of the topical issues like capacity mechanisms. Should those be co-ordinated among different Member States? What is the role of the Commission in trying to ensure that different countries do not come up with conflicting capacity mechanisms, which then cause problems? For the first time, ACER has been asked by the European Parliament to provide formal advice on this, which will be delivered shortly. I think that is a sign, again, of ACER's views being taken seriously and it is a good start but clearly there is more to be done.

Lord Whitty: In terms of the duality of CEER and ACER, is the distinction logical; or, if you were really looking for a step change in the integration of the market, would you all be in one organisation?

Martin Crouch: The risk of bringing it all together would be that some of the issues around retail markets, distribution networks and smart grids would struggle to find a home in ACER as its budgets are constrained and it has to prioritise the things it has to do on a European scale. Also, because of the European Union rules, countries like Norway and Switzerland have less of a role in ACER or no role in ACER at the moment. So, CEER provides a way to bring those in. Practically it is working, I think.

Lord Whitty: Okay; thanks.

Q350 Lord Giddens: Since we are running out of time, I wonder if you could briefly give us your views on the capacity mechanism proposed in the Energy Bill and its implications for the internal market on the basis that it is quite controversial, some of it.

Martin Crouch: If I can start very briefly: I am sure Mike knows more about it than I do.

We have been discussing it a lot among the European regulators recently because we are responding to the Commission's consultation on capacity mechanisms, which closes tomorrow. As I said, ACER is providing advice to the European Parliament. The general view there, which I think Ofgem would support, is that while in theory there may be arguments that energy-only markets will deliver the security of supply we need, there are some challenges to that: things like the interventions of different subsidy schemes and how those impact on the market; the lack of active demand-side response in the market at the moment, which we do see nationally, and several other regulators across Europe also see, because of the importance of security of supply and so there is value in having the ability to further incentivise capacity provision.

The devil is in the detail in how this is done and there probably should be a role for someone to check that there is no distortion of trade caused by these mechanisms, and we think that is an improvement that can come on a European scale. But the ability for national Governments to ensure their security of supply does point to enabling these mechanisms within the target models that we have and as Ofgem, we support the idea of a capacity mechanism in the British market given the challenges we have on security of supply coming up. We may have views on the detail, but this is probably not the place to go into detail.

Mike Calviou: Yes, I would add that we believe a well-designed capacity mechanism can be fully consistent with a European target model and, for the reasons Martin expressed, there is probably a good case for capacity mechanism. Obviously, as part of EMR, the details of how a capacity mechanism works are being developed. We have talked earlier about the benefits that interconnection provides in terms of security of supply. So, how that is recognised in that capacity mechanism is probably one of those areas of detailed design that needs to be

developed and probably needs some quite hard thinking about how to do that in a most appropriate way.

Lord Giddens: It is going to be pretty controversial while the Energy Bill is going through, though. There are some people who object quite radically to the whole notion and just see it as a kind of prop for renewable energy, which they do not like anyway.

The Chairman: No observations there?

Q351 The Earl of Caithness: I want to talk about voltage. We heard, when we were in Brussels, from ENTSO-E that the maximum capacity of voltage carried in Europe is 400 kilovolts but in USA, China and other places it goes up to 1,000 kilovolts. What is the desirability of making improvements up to that level in Europe? What are the practicalities and do you think it is ever likely to happen?

Mike Calviou: Ultimately the choice of voltage is an economic decision. The higher voltage you go, the cheaper it is to do high-capacity, long-distance transmission but each individual component costs more because it has to be bigger. We decided, probably in the 1960s, that 400 KV would be what we would standardise on in GB and most other European countries at the same point. So, for the AC system, given the size of our country, we believe 400 KV is the right voltage. Where you have seen higher voltages, it tends to be in places like the US or China where they are doing much longer distances.

We have done studies. So, for example, where we were looking at the options to reinforce the grid in order to connect up to Hinkley Point C, a new nuclear power station, one of the options we looked at was about increasing the voltage of that whole part of the grid, and ultimately economics did not pay versus just uprating the existing grid at the existing voltage and, with new high-capacity conductors, you can get an awful lot down a 400 KV AC line. So, for the AC interconnector system, there probably is not a case, I can see, for increasing the voltage.

The key point is that a lot of the developments we have talked about today involve HVDC. Once you have converted to HVDC you can choose any voltage you like. The western HVDC link I talked about earlier, from Scotland to England, is 600 KV. It is quite obvious that further technical developments could come along that would create credible HVDC at even higher voltage than that, and ultimately that does offer the potential for high-capacity transmission over long distances where it is worth converting from AC to DC.

Martin Crouch: The debate in Europe, at least, is more around overlay grids from a DC perspective than increasing the voltage uprates.

Q352 The Earl of Caithness: I wanted to go on to overlaying grids. We were told by ENTSO-E that there is a difference between what is a super-grid and what is an overlay grid. Can you tell us the difference, because they did not—we did not ask that question, but it seems to have been overlooked; and what would it mean?

Mike Calviou: It is probably just terminology. Super-grid is a bit of a concept. It is quite easy to look into the future, say 2030 or beyond, and say, “With all of this renewable intermittent generation, you need a lot stronger grid”, and to start drawing this very, very big grid that would involve lots of big HVDC lines. I think an overlay grid would be probably just a step along the way to a super-grid, so maybe starting off with maybe one or two really big HVDC links. At one point, people were talking one from the middle of London maybe going down the Thames that would go into Germany or France or something.

There are lots of visions of what you might get to as a super-grid. I would probably agree with what Martin said earlier. In practice, these things have to develop incrementally. You do not get to 2030 without building some steps along the way, and so the North Sea grid we talked about earlier is probably a much more credible development path, where you gradually start off with building a bigger integrated offshore network. You then start building some more interconnectors. Over time you then probably build some bigger things and gradually over time, it builds, and maybe in 20 or 30 years' time you get something that now looks like a super-grid.

I think the answer to what is a super-grid is probably depends on whatever you want it to be. It is a term that means different things to different people. Generically it means having a European grid with much interconnection and much more capacity to move power between countries.

Martin Crouch: I would agree, but, to offer a different vision, there are alternative views of the future in 2040 or 2050 and it is quite hard to predict. We did some work a few years ago: something that seems to have gone a little bit out of fashion, but there is a vision of the future that says we will have much more a system of micro-production, of domestic-level generation, of local systems. You may need much less of a super-grid and more micro-grids. That is also a compelling vision of the future and I think you will not hear it probably from the transmission companies, either from ENTSO-E or from others, but we should not get too sucked down the path that we know the future on these things.

The Earl of Caithness: That is an important point, because this is a European Committee. How strong is that voice in Europe and are the Commission likely to listen to it?

Martin Crouch: On the energy side of the Commission, the voice of ENTSO-E is pretty strong and the other large power generation companies are quite strong but there are plenty of other groups who are pushing the more responsive demand and local generation perspectives. Co-generation clearly is a much stronger feature of the European energy sector than it is in the UK.

Mike Calviou: We see that there is a need for lots of different technologies. No single technology, whether it is offshore wind or nuclear or big super-grids, will meet all of the challenges we need. The scale of the transformation of the energy system to meet the decarbonisation target is so big. So, I think there will be lots of stuff happening at a microgrid level. I think there will be solar PV, there will be microwind, there will be probably more CHP and heat grids but that can play a part in meeting the challenge, but I think there will need to be some big-scale stuff: offshore wind and nuclear. You need a balanced approach, and I absolutely agree: you should not back yourself too much into backing one particular vision and scenario future. There are a lot of different versions of what might happen.

The Chairman: Did you want to come in, Lord Lewis?

Q353 Lord Lewis of Newnham: Just on this question, yes. It does strike me, it worries me more than a little, that this seems to be happening by accident rather than by design. How far does this reflect that when one looks at energy problems and policies it seems to be left to individual Governments to make up their decisions? The recent situation we had in Germany where all of a sudden they changed from nuclear to renewables and in renewables for wind vis-à-vis solar, and things of this nature, which put a whole different pressure on to the systems in this particular way—how far are these things centrally being organised, or how far are they being left to local accident or prejudice? What word do I use to express it?

Martin Crouch: If you look at the European perspective, the treaty, as I understand it, says that the energy mix is a matter for national Governments, and that has underpinned a lot of the energy policy developments of the Commission trying to push as far as they can within that remit, but they find themselves limited by that. We may well have more European targets out to 2030, which should help ensure people are pointing in the right direction. We do need, I think, more mechanisms where before going ahead on a national basis at least there is a requirement to discuss with neighbouring countries and to try to ensure mechanisms that are introduced do not distort trade and create perverse incentives, but while the treaty says what it says I think there is a limit to that.

The role of ENTSO-E in providing a 10-year plan for the network development is something. What I think is now recognised is that 10 years is probably not enough, but that role of trying to bring everything together—what are the current Government policies, how do they fit together, what does that mean for the transmission grids—is helpful because I think pragmatically the first step forward, at least, is to shine a light on all of these things and that will reveal if there are inconsistencies where some of them are.

Lord Lewis of Newnham: So, this lacuna we have in planning between 2020 and 2030 is something that you say we ought to try to fill.

Martin Crouch: I think it is recognised that the 10-year plan needs to look beyond 10 years.

Mike Calviou: ENTSO-E are now planning to do some work with some 2030 visions to provide a bit more of that future look. I think there is a need for more co-ordination across Europe, particularly on things like network planning, and that is what ENTSO-E is all about and why we have taken forward the 10-year development plan. But there clearly are some aspects of energy policy that are down to national sovereignty.

Lord Lewis of Newnham: You are effectively that as the treaty currently is, that strategic vision cannot easily be delivered.

Martin Crouch: Visions can be delivered but I think that while—

Lord Lewis of Newnham: Visions can; sorry, yes. On the ground it cannot be delivered.

Martin Crouch: While the responsibility for their own energy mix is in the hands of national Governments, clearly they have a big say on how things develop.

Q354 Baroness Howarth of Breckland: One of the things you said when you talked about the North Sea programme was that you were not sure that it was economically viable at the end of the day, and I just wondered if there was a study being done to look at what more local development would be and whether that in fact would be better. One of the things that worries me about 10-year plans and vision is that sometimes you lose sight of the reality and the measurements that might go alongside the vision. I am pro-European usually, but is there something about maybe national Governments getting on and ensuring their security? The only other thing I would say about that is this. I was interested in you talking about there being too much capacity almost, I thought you were saying at one stage, in terms of capturing capacity. All those things put together make me think that we should not just have clearly one scenario in mind in thinking of a future strategic plan, but think very clearly about all the options. I am quite new to this, so I find it fascinating.

Martin Crouch: I completely agree we should focus on more than one scenario. National Grid have done some good work with four different scenarios. I think ENTSO-E's new plans look rather similar for some mysterious reason to what National Grid have been doing but there is a lot of value in that. I think there probably is value in a meshed system in the North

Sea. I am not trying to dispute that, but I think the full case for it has yet to be proven. I think more work is needed.

There is a need for people to be joined up and at least understand the interactions. Clearly still there is a strong role for national Governments in driving things forward.

Q355 Lord MacLennan of Rogart: In your written evidence to us, the National Grid made a great bullish, strong case for carbon capture and storage. You concluded that report with saying that it was disproportionately important compared with other sectors such as wind and nuclear in respect of decarbonisation. You said that costs meeting carbon targets could be as little as 0.6% of GDP but without carbon capture and storage the cost would be more than double. What we experienced in our discussions with others is that there is very little progress being made on this, and what I am not clear about is whether this submission of yours is purely hortatory or whether you can have a catalytic effect on the decisions that have to be made. The first question is this. How can we get into the demonstration scenario?

Mike Calviou: As you say, CCS has the potential to be a fundamental technology in terms of meeting the Government's decarbonisation targets. As you look further out there is a lot of uncertainty about different options but it is clear if the energy mix is primarily in terms of low carbon being made up of baseload nuclear and intermittent renewables there is then something that needs to be there—the thing that is going to generate when the wind is not blowing, and some fossil fuel-based generation would appear to be most obvious. So if you can get CCS to work that helps with that vision to decarbonisation. That is why we see CCS as such a fundamental technology.

As you know, there are a number of projects looking to work on proving and developing CCS and being conceptual, to demonstration plants, ultimately to commercialisation. The Government programme to effectively award support to a number of projects as part of the commercialisation of those CCS projects—we see that as key that that proceeds to the timetable. I understand a further decision should be made in a few months and that hopefully will lead to the successful project being able to proceed, ultimately to be able to be built within five years.

There are signs of progress but it does require some financial support so that some of these early demonstration projects can show that the whole end-to-end technology works. I think each bit of technology appears doable but it is just putting it all together and making it work.

We are very enthusiastic about CCS. We are involved in a number of the projects because of our expertise in pipelines and therefore we see ourselves having a role in being able to move carbon dioxide from where it is captured to ultimately where it would be stored. We are particularly excited about the Humber area because the Humber probably has the biggest concentration of CO₂ emissions anywhere in Europe and therefore it will be an obvious area where you can build some sort of carbon capture infrastructure and have some shared pipelines. So, one of the projects that is currently being considered, the Drax project, is in that area and we also have another project in the area that has some European funding. We are excited by it but in order to move it forward it does require decisions being made around the DECC commercialisation programme.

Lord MacLennan of Rogart: You have described very helpfully the general interest that you have and also how you might contribute to pipelines and development of carbon dioxide transportation grids. Can you say whether you put in to the calculations any financial cost figures, which would be something to be borne by your own organisation? In bringing the

thing forward, is the Government assisted by knowing what part of this burden you are going to bear?

Mike Calviou: Certainly we have spent millions so far that have been unrecovered on developing these projects to the point they are, and I think all the people involved in the projects are probably putting some of their money at risk. I think because the technology is at a phase where it needs to go from concept through demonstration into commercialisation we are looking for some Government funding and support. Ultimately then the contracts that would be struck for those deals would recognise the amount of Government money versus how much private money is going in.

It has been taken forward by National Grid Carbon, which is a separate subsidiary of National Grid, so I am not party to the detailed commercial negotiations but ultimately I will be confident that the Department of Energy and Climate Change will be looking to get a good deal for consumers while recognising the strategic benefits of developing CCS.

Q356 Lord Lewis of Newnham: Recognising that commercial negotiations are not secret or private, is there any way in which your subsidiary could give us any indication of what help, in financial terms and technical terms, you would be able to give to the project, which might help to accelerate it?

Mike Calviou: We can certainly look and see if there is a further submission that National Grid Carbon could make. I think the answer on the help is that we need a timely decision on which of the projects are going to receive support under the DECC commercialisation programme. As long as we can get the right contracts in place then the technical challenges should be achievable as all of the projects are backed by consortiums of companies with a great deal of relevant expertise in the various bits of the whole carbon capture and storage chain.

Lord Lewis of Newnham: Presumably this is going to increase the price of your energy at the end of the line, merely the introduction of this new technology in order to do this form of separation. Have you any idea at the moment of what sort of aims or factors you are looking at? Are you increasing by 40% or 100%? Are you viewing this primarily as a mechanism for acting as an intermediate source in your renewable picture when renewables are not available or are you viewing it as an alternative source of energy that could overcome the difficulties that we have with the gas or coal type of energy source?

Mike Calviou: To answer the second question first, I think both. There is a key role for a low-carbon generation option that could be the generation that runs when the wind is not blowing or to the extent that we are not trading efficiently over interconnectors with our neighbouring countries. There is clearly a big benefit from CCS in that role. But if the technology develops and becomes economical then ultimately I am sure the country wants to find the most effective way of decarbonising. There is a lot of debate about offshore wind and how can we reduce the cost of offshore wind—there is like a magic £100 per megawatt hour cost that everybody is trying to get to. I am sure CCS will be of the same view, saying, “Ultimately as we go through the commercialisation and turning it into a mature project it will be similar numbers that we would be heading towards in terms of making it a credible economic technology and meeting decarbonisation targets”. Ultimately the work at the moment is trying to position it so maybe in 10 years’ time CCS is one of a number of low-carbon technologies that are competing to meet the country’s requirements.

Q357 Lord Whitty: Looking ahead on this and looking at the pan-European basis, we know that the Germans and the Poles, who are shifting more to fossil fuels at the moment,

are not particularly keen on CCS because they, in effect, do not think they have anywhere to put it whereas we have the whole of the North Sea. Is it part of the ultimate economics of CCS that we or the North Sea powers provide the storage for the rest of Europe, in which case clearly more integration would be needed rather than less? Or is the economics dimension that you are talking about still seen on a national basis?

Mike Calviou: I think you are probably right that when you think about CCS there are certainly opportunities for it to become more than just “How do we meet our own national requirements economically?”, but more that this could be something that becomes a global industry and we might get first-move advantages if we make the right decisions and the right developments take place. There is certainly potential for CCS to be a very exciting industry that would be of benefit to the country in terms of industrial developments as well as just in terms of meeting our carbon targets.

Lord Whitty: Clearly technological lead is one prize to get but there is also the prize of having the facilities reasonably close to our coastline that could be used by the whole of Europe, which presumably would bring some economic benefit to the lateral countries around the North Sea.

Mike Calviou: There is clearly potential there, yes.

Lord MacLennan of Rogart: I would just like to re-emphasise that it would be immensely helpful if we could get more than the generality of your recognition that this is something that might be helpful in a national context. You have devoted a large part of your written submission to talking about this, but the facts and figures were not there in terms of what you are doing and what you think you can do in partnership with the commercialised project that the Government is working on. It does seem that if you want to have a strong catalytic effect that it would be helpful for us to know how. Can you give us more?

Mike Calviou: We will see if we can provide some more facts and figures to support our evidence on CCS.

Lord MacLennan of Rogart: Thank you very much.

The Chairman: Gentlemen, thank you very much. For us it has been a most interesting and informative session, and we are very grateful.

Professor David Newbery⁸⁵ Sc.D. (Cantab.) Ph.D. (Cantab.) M.A. (Cantab.)—Written evidence

- I. The dominant theme of the Commission's Energy 2050 Roadmap is decarbonisation, with a particular focus on renewables. How can energy policy make its contribution to both decarbonisation and to economic growth? In what specific ways can energy drive economic growth in the EU?

Answer

Energy policy can contribute to decarbonisation by giving suitable market signals and incentives to decarbonise generation and energy use (e.g. by switching from fossil heating to electric or renewable heating). It does so through a combination of **price signals** (e.g. the carbon price of the ETS), **taxes** (the carbon price floor, the climate change levy), **subsidies** (e.g. to renewables via ROCs, the subsidy to gas and electricity via the reduced rate of VAT – although these last are perverse they influence energy use and choices), **charges** (deemed in the UK as taxes, but not in other EU countries, e.g. on electricity consumers to support renewables, or energy efficiency), many of which are adopted to meet **targets** (such as the 20-20-20 Renewables Directive that mandates a 20% EU renewable energy target by 2020, or the Emissions Performance Standard in the EMR, or various targets for fuel efficiency in transport), **standards** (on energy efficiency of housing and equipment) and **prohibitions** (e.g. on filament light bulbs). The art of delivering good energy policy is to choose the least-cost combination of instruments to meet the various goals, which include delivering the necessary research, development, and learning needed to lower the costs of low-carbon technologies. Energy policy can contribute to growth by ensuring that the resulting energy mix is delivered efficiently, at least cost, sustainably, and securely. A failure in any of these will create future economic and social costs that would harm well-being, and so avoiding such failures can be said to contribute to economic growth (and more widely to improvements in well-being, which is why growth is desirable).

The most obvious way in which decarbonisation could stimulate economic growth is by increasing the total rate of investment above what it would be under “Business as usual”, particularly if, as in the next few years, the EU (and certainly the UK) is in a serious recession with under-investment. Of course, it is important to remember that public sector infrastructural investment and investment support (of the kind needed for decarbonisation) is in any case desirable to stimulate depressed economies. Once the government has recognised this, and agreed an accelerated rate of public sector investment, all investment should still be selected using best-practice social cost benefit analysis (SCBA). In that context, transport investment (roads, airports) almost certainly has higher returns than investment in some low-carbon options, and should not be displaced solely on the grounds of whether or not it lowers carbon emissions. Roads and airports may well relax constraints on transport that might lead to higher emissions, but if the SCBA properly includes their cost, as well as including a sensible estimate of the learning benefits of supporting immature renewables technologies and their environmental and social (visual dis-amenity) costs, then the correct choices should result.

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It is a serious but common error to consider that creating “green jobs” is a way to stimulate growth – many low-carbon technologies are considerable more capital-intensive and less labour-intensive than the fossil technologies they replace and to that extent the net impact of a switch of investment on employment can be negative. (The one obvious exception is the development and employment of a trusted sector of energy efficiency installers who could improve the insulation of buildings while avoiding the label of cowboys that double-glazing sales people attracted.) In any case it is the task of macro-management of the economy to maintain full employment, not the choice of individual sector-specific policies. Holding the total volume of investment constant and reallocating it from e.g. road building to off-shore wind farms would almost certainly have an adverse impact on employment and the balance of trade, but holding other investment constant and increasing energy investment by shifting to less carbon-intensive solutions should stimulate an under-employed economy and would be neutral or slightly negative in a fully employed economy (depending on how the extra finance for the investment were raised – distorting taxes on industry as under the present system of electricity charges for renewables would have adverse effects).

Nor should one automatically assume that energy policy requires industrial policy – it will almost certainly require considerable research and development (R&D) support that in many cases is best done in partnership with industry, and it is definitely the task of institutions that allocate public funds to R&D to pick winners and kill off unpromising lines of development. In some cases where it seems unlikely that the private sector will take on the political risk of developing very capital-intensive technologies (nuclear power and CCS are the leading examples), it may be necessary for a large element of state support, and that might be considered as industrial policy, but before deciding to invent everything here one hopes that the funding body will take a long hard look at the options that it makes sense to develop, and considers what capabilities and comparative advantage the UK might have or might develop and how best this might be done. Past UK nuclear policy (especially the AGRs) has been disastrously designed and delivered, and recent choices (not to support Sheffield Forgemasters, selling Westinghouse) have not been encouraging. In many cases (PV panels, wind turbines, nuclear components) we should recognise that it may be efficient to import these, and concentrate on developing a more capable construction industry and transport infrastructure (which is almost necessarily mostly domestic, not imported) to deliver the projects.

A common EU approach to transforming the energy system

2. To what extent will a common European approach help keep the costs of transforming the energy system down and assure security of EU energy supply? Where do you see economic growth and decarbonisation benefitting from a common approach to generation, transmission, distribution and storage? And what are the risks?

Answer

If the approach is well-designed it could meet these objectives, but past experience of joint-EU decision-making is not encouraging. The sub-questions can be taken in order.

Costs of energy supply

I suspect that the big question lurking behind the *2050 Roadmap* is what to do after 2020, given the long lead-times of energy infrastructure. Clearly the ETS is almost completely dysfunctional in its current state, as it signally fails to give an adequate, credible and sufficiently durable investment signal that would convince bankers to lend on 40-year

investments that take in many cases nearly a decade to construct (nuclear and off-shore wind, major transmission upgrades, etc.). The response of the CEC is to set targets rather than try to modify market price mechanisms like ETS that requires unanimity to change, while harmonising carbon taxes would always encounter entrenched Member State (MS) opposition. The ETS emerges from carbon targets but these are too short-term to deal with the objective, which is to manage to cumulative total carbon emissions, not the instantaneous rate of emission that is sensitive to macro-economics as well as other policies like the 20-20-20 Renewables Directive.

The Renewable targets are a more directed attempt to decarbonise energy while devolving to MSs the task of supporting Research, Development, Demonstration and Deployment (RDD&D), particularly deployment. The major achievement of the 20-20-20 Renewables Directive is to ensure that each MS provides massive financial support for deployment, which in turn creates a market that stimulates companies to do more of the R&D part. Its weaknesses are that it undermines the ETS (which should have been at the very least commensurately tightened to reflect the increased supply of low-carbon energy) and it also over-emphasises deployment at the expense of RD&D. It also has put in place a system that makes cross-border trading of green certificates very complex and difficult.

Clearly it would be most unwise to support a 2030 Renewables Directive, when the whole point of the 20-20-20 Directive was to bring the viable low-C energy options to commercial viability (at least, at a sensible carbon price). That carbon price has to be at least adequate to support the already near-mature options like on-shore wind and generation-3 nuclear power. Two problems arise: how to support immature technologies and what to do about the mature low-C technologies that need, but do not receive, an adequate carbon price.

As to supporting immature low-C options, the Government should press the CEC for a better way of collectively supporting RD&D for promising but still non-commercial options (CCS, off-shore wind, possibly next generation bio-fuels and cheaper PV). One possibility is to translate renewables targets into financial targets, where each MS is given a financial target (as a percentage of GDP) which can be spent on any low-C support at a rate benchmarked on the efficient solution, but also on RD&D. Thus the credit for PV would be benchmarked on best Spanish or Italian solar sites (e.g. the revenue needed to support PV generating 1600 hours per year compared to the average EU wholesale price, for on-shore wind possibly estimated as the support per MW installed capacity needed for a 25% capacity factor wind farm selling at the average EU wholesale price to be commercial, etc.). These credits should then be tradable in the sense that where governments choose to invest in other countries (including developing countries) they can be credited with these values. As the metric is already money it should be much simpler to address this tradability question that has undermined the efficiency of current renewables support.

As to supporting mature low-C technologies, on the plausible assumption that the ETS continues to fail to deliver bankable long-term investment signals, something will be needed to replace it. The logical and cost-effective solution is that all fossil fuel should require one EUA per tonne of embodied carbon dioxide (i.e. 3.67 EUAs per tonne of embodied carbon) to be transferred with each sale and relinquished at the final stage of combustion. The main problem with that solution is that it would have possibly adverse impacts on exposed traded carbon-intensive sectors and the income distribution. The current ETS fudges some of these problems (including the notion that it is a corrective tax) by expensively measuring emissions from a subset of the economy. If these constraints continue to prevent a rational solution,

then perhaps an emissions performance standard for all generation might be required. This would, however, necessarily be a rather complex solution, since it would have to respect differences in MS's starting positions and resource endowments. Ideally the solution would lead to the efficient replacement of obsolete carbon-intensive plant with low or zero-C plant, while ensuring that new investment in any base or mid-merit plant is zero-C, only allowing reserve/peaking capacity with low average capacity factors to burn fossil fuel. Ideally also the investments should hold and trade emission certificates like EUAs, but confined to electricity generation (CHP would present problems). This would be a kludge to ensure efficient investment decisions while avoiding the problems of setting technology-specific targets (e.g. renewables rather than low-C energy) and dealing with the political difficulties in agreeing an EU-wide and economy-wide carbon tax or price.

Security of energy supply

Renewable energy reduces import dependence but raises other security of supply issues, as renewable energy supply for electricity (RES-E) is mostly intermittent, and requires additional flexible reserves to prevent blackouts. Nuclear power avoids both problems, but is costly and slow to build. Gas is discussed further below, and with sufficiently diverse sources of supply emerging (pipelines, LNG terminals, even possibly shale gas at some future date), as well as storage, security issues can be managed without excessive cost, providing a rational and not emotive approach is taken and liquid markets allow gas to flow freely within the whole of the EU in the event of localised disruptions to pipelines.

Common approaches to generation, transmission, distribution and storage

There is an obvious logic in ensuring that energy transactions between MSs are facilitated and not made unnecessarily complicated, and to that extent grid codes and the terms for offering ancillary services offered to Transmission System Operators should be internationally harmonised. That may mean some harmonisation for connection and charging arrangements for generation and distribution at the entry and exit points of the grid (or high pressure pipeline system), but it is less clear that this is required for purely domestic arrangements such as distribution and storage, other than to ensure that the various unbundling and access requirements of past directives are enforced. It would certainly be silly to require each country to have a target share of PV or wind or gas or any specific technology. The main problem of harmonisation is to agree what and how low-C generation can be supported without running afoul of State Aids suits.

The Internal Market in Energy

3. The internal market in energy is focused on transmission. Should competition in the rest of the supply chain be given greater consideration? What economic opportunities might arise from such consideration? What risks arise?

Answer

The reason the internal market is currently focused on transmission is that the rest of the structure has already been dealt with in earlier directives; but efficient cross-border trading and investment remains problematic. As far as I can tell, the rest of the supply chain is required under EU law to be competitive (or at least its component parts are disbarred from exercising abusive market power), although the EU Sector Inquiry suggested that this was far from a reality in many cases. Clearly increasing competition is desirable where it can be done legally (i.e. by due process without violating property rights) and also clearly political lobbies, defences against transparency that appeal to commercial confidentiality, and the

asymmetry of information and understanding between large energy companies and bureaucracies make this a slow and incremental process. ACER is certainly handicapped by its inability to secure adequate market intelligence.

Reducing the costs of energy for business and consumers

4. Energy is a significant manufacturing input and household cost. Is it appropriate to seek to reduce the costs of energy in order to boost EU competitiveness and, if so, how can it be achieved in addition to energy efficiency? To what extent might price reductions jeopardise attempts to decarbonise? What implications, if any, do consumer preferences over the energy mix, such as onshore wind and nuclear power, have for price?

Answer

There is a simple principle of good public finance that was enunciated by Nobel laureates Diamond and Mirrlees in their 1971 paper.⁸⁶ That is that revenue-raising taxes should as far as possible fall on final consumers, not on producers (an outcome best achieved with a VAT that can be reclaimed by producers). Corrective taxes designed to reflect the cost of externalities (like CO₂ emissions charged through a carbon tax or price) should fall on all including producers. That means that all levies designed to cover the public cost of supporting renewables and energy efficiency should only fall on final consumers and that commerce and industry should be exempt (as is largely the case in many EU countries). Further developments of public economics suggest strongly that VAT at a *uniform rate* is the efficient way to raise revenue, and that redistribution is best and already largely conducted through transfers and expenditures (on health, education and welfare), not through discriminatory tax rates.⁸⁷

This gives simple prescriptions for almost all the various electricity levies, but there are several tricky issues remaining, of which carbon prices/taxes are the leading one, as they damage exporting industries in a world in which carbon pricing is partial and in any case too low. The preferred but politically problematic and administratively complex solution is border tax adjustment to bring the tax on embodied carbon up to the EU level, but unfortunately different MSs levy different rates of carbon tax, including *de facto* subsidies (e.g. by charging 5% VAT on gas and electricity in the UK rather than 20%). Second best solutions grant varying forms of exemption or compensation (e.g. free allowances) to carbon-intensive exposed sectors facing international competition, although these are prone to fraud, can be anti-competitive and are certainly administratively complex.

Road fuel excises pose another problem as these are very heavy compared to the environmental damage and are in part justifiable as a road user charge to pay for the road infrastructure. They are likely to require modification (road pricing) as fuel efficiency is driven up and electric vehicles and biofuels (if they remain untaxed) increase their penetration. It is not immediately clear that these need urgent reform as part of the low-C agenda, but will need forward planning for future reform.

In short, exempting all commercial and industrial companies from any renewables and efficiency charges is sound public finance and avoids harming competitiveness unnecessarily.

⁸⁶ Diamond, P.A. and J.A. Mirrlees (1971) 'Optimal taxes and public production I: production efficiency', *American Economic Review*, 61, 8-27

⁸⁷ The Mirrlees' Review on reforming the tax system for the 21st century was published in 2011 (see <http://www.ifs.org.uk/mirrleesReview>) and provides adequate guidance on these matters.

Gas

5. Do you agree with the Commission that “Gas will be critical for the transformation of the energy system”, until at least 2030 or 2035? What mechanisms are required to boost the role of gas, securing appropriate investments, but on the proposed interim basis? Does an active renewables policy require gas in support of it? Should the EU encourage the development of unconventional gas?

Answer

Gas is an obvious transition fuel in the sense that it can more than halve the emissions of coal-fired generation per kWh produced, and past dashes for gas in various countries (most recently from shale gas in the US) have demonstrated this admirably. It is far from clear that anything needs to be done to ensure this, as past experience if anything suggests an over-enthusiasm to invest in gas-fired plant, which is cheap, quick to build, raises few environmental or political objections, and, in a world in which gas sets the price of electricity, is also low-risk (although vulnerable to falling demand if there is adequate coal plant on the system, as was the case in the US, the UK and many parts of the Continent). As coal is retired, emissions performance standards agreed or as the carbon price is raised the ability to switch back into coal will be reduced, enhancing the attraction of gas, unless RES-E and or massive nuclear cause wholesale prices to collapse.

In any case flexible gas will continue to be needed to balance the electricity system as the share of intermittent RES-E rises, although that may require a shift to capacity and energy payment contracts to allay fears that current investments will be stranded by future low-C policy. Gas in domestic heating is likely to remain the preferred fuel at least until the 2030s.

As to encouraging unconventional gas, the main requirement is to ensure that any environmental and other restrictions are limited to those justified by the damage caused (including fully charging for any carbon or methane emissions) so that active inhibitions are not imposed. It is then reasonable to leave exploitation decisions to commercial operators, with some assurance that harm done by any future political changes to rules of operation will be adequately compensated.

Research and innovation

6. We would welcome views on how the EU can most effectively support research and innovation as catalysts for decarbonising energy and driving growth, and how EU energy policy can be sufficiently flexible to take into account emerging new technologies.

Answer

The Strategic Energy Technology (SET) Plan has mapped out a reasonably sensible path (perhaps overly influenced by powerful car lobbies and the remaining nuclear lobby). What is lacking is the mechanism to mobilise sufficient funding through collective action, and the institutions to ensure that any such money is well-spent. One such funding mechanism would be the transformation of the RES targets to financial targets as argued above. Ofgem's Low Carbon Network Fund⁸⁸ is a good example of stimulating competitively sourced near-market improvements towards smarter distribution networks. Ensuring that any research funds are awarded competitively by bodies that contain rotating groups of experts whose task is to

⁸⁸ <http://www.ofgem.gov.uk/Networks/ElecDist/Lcnf/Pages/Lcnf.aspx>

Professor David Newbery F F Sc.D. (Cantab.) Ph.D. (Cantab.) M.A. (Cantab.)—Written evidence

select wisely rather than build empires and circulate internal memoranda is also good practice. Leaving each MS to choose its own priorities makes sense (and the modified RES mechanism described above would allow this), with EU co-funding allocated to the extent that the research produces wider benefits.

If energy policy is evidence-based and if support interventions are market-friendly and meet good public finance criteria, it is not clear that anything further is needed to encourage emerging new technologies, other than support where these are both promising and immature.

27 September 2012

Ofgem and National Grid—Oral Evidence (QQ 325 – 343)

[Transcript to be found under National Grid and Ofgem](#)

Oil & Gas UK—Written evidence

Introduction

1. Oil & Gas UK, the leading trade association for the offshore oil and gas exploration and production industry in this country, is pleased to have an opportunity to respond to the House of Lords Committee's invitation to submit evidence to its inquiry into EU energy: de-carbonisation and economic competitiveness. In particular, we are responding with respect to gas and its contribution.
2. This industry has consistently been the largest investor among the UK's industrial sectors over the past 30-40 years, with some £8.5 billion of capital spent in 2011 and over £11 billion forecast to be spent in 2012. A further £7 billion was spent during 2011 on operations. The industry currently supports about 450,000 jobs across the economy through its activities on the UK's continental shelf (UKCS) and in the export of oil and gas goods and services to various parts of the world which are estimated to be worth more than £6 billion a year.
3. Government policy is that the industry should recover as much oil and gas from the UKCS as can be economically achieved. On current projections, we still expect to be producing oil and gas in 2050, although much less than currently. However, this will require further improvements in the fiscal regime for the UKCS, especially for gas, thereby reducing the need for imports and benefiting the balance of payments. Nonetheless, the industry will continue to help secure the nation's energy supplies, provide highly skilled, well paid jobs, pay significant amounts of Corporation Tax (over £11 billion in tax year 2011-12, more than any other sector), develop new technologies and export oil and gas goods and services.

General

4. Before addressing the specific questions posed by the Sub-Committee, we begin with some more general points regarding wider energy perspectives.
 5. In broad terms, the primary energy consumed by the UK's economy can be subdivided into three similarly sized uses: electricity, heat and transport. However, to date the debate has largely been focussed on electricity, although DECC published its consultation about the future of heating in the spring of 2012. Gas and oil remain by far the largest sources of primary energy, with gas dominating the supply of heat and making a major contribution to electricity generation (40 per cent in 2011), while oil is overwhelmingly the fuel for transport.
 6. Even if the desired changes in electricity generation are implemented within the planned timescale to a reasonable degree, wholesale transformation of heat and transport will be considerably more demanding, given the fundamental changes in technologies and societal behaviour that will be required.
- a. Electricity**
7. The Government's proposed reforms of the electricity market have been eagerly awaited. Without these reforms, there are unlikely to be any new nuclear power stations

8. Furthermore, the UK faces a large number of power plant retirements. The great coal fired stations, which were built between the mid-1960s and mid-1970s, have been the mainstay of the electricity system for several decades and now, as they reach the end of their working lives, are coming under increasingly stringent environmental requirements; the Large Combustion Plant Directive (LCPD) and the Industrial Emissions Directive (IED) come into full effect in 2015 and 2023 respectively. The IED is also expected to be too demanding for the early gas fired power stations to meet without significant new investment.
9. The total generating capacity affected comprises 12 GW (coal and oil) by the LCPD and 18.5 GW (coal) and up to 18 GW (gas) by the IED, as well as age considerations for the coal fired plant. While the exact consequences of IED are not yet clear, the UK is almost certainly facing power station closures amounting to 40-50 GW, perhaps as much as 50-60 GW, of capacity by the mid-2020s⁸⁹. This will be on an unprecedented scale in this country, matched possibly only in Japan, by the enforced closures of some of its nuclear power stations and the progressive suspension of generation by all others following the disaster at Fukushima in March 2011.
10. By the mid-2020s, the new nuclear power station at Hinkley Point (two reactors of 1.6 GW each) should have been built, but it is difficult to envisage more new nuclear capacity being completed within this critical timeframe. Even if 25-30GW of wind generating capacity has been installed by then, as intended, there will still be a substantial shortfall in power generation overall, particularly when wind power's highly variable load factor is taken into account (maximum winter demand is c. 60 GW currently, but this is forecast to rise as the economy becomes more electrified). Furthermore, National Grid is forecasting that the total generating capacity required by the mid-2020s will be in excess of 100GW⁹⁰.
11. It is therefore inevitable that new gas fired power stations (mainly CCGTs⁹¹) will have to be built at scale to cover both back-up for intermittent renewable power and the shortfall in base-load generating capacity. There is no other technology that can fulfil these needs on this scale and within this crucial timeframe.
12. DECC has also announced that it will undertake a review of the role of gas in power generation. This is a most welcome sign that the Government has now recognised how important gas will be in future in order to keep customers reliably supplied with electricity.

⁸⁹ total generating capacity is ~80 GW at present

⁹⁰ UK Future Energy Scenarios, September 2012

⁹¹ CCGT = Combined Cycle (gas + steam) Gas Turbine

b. Heat

13. Remarkably little of the debate about energy policy has been about heat and so the publication of DECC's consultation document *The Future of Heating: A Strategic Framework For Low Carbon Heat In the UK* in March 2012 represented a significant step towards rectifying this shortcoming. Nonetheless, it is evident from the document how difficult the desired transformation of heat supply will be. Not only is gas the largest source of heat – and the largest source of primary energy – in the economy, but the gas system and modern gas equipment are, by most standards, efficient, reliable and cost competitive. In almost all applications, gas remains the cheapest and most efficient means of providing heat.
14. There are many references in the consultation to the future use of biomass and biogas, but a lack of numbers with which to judge the potential scale of these sources of renewable heat. However, it is worth noting in this context that, according to Drax, if its four GW power station in Yorkshire were to be switched wholly from coal to biomass firing, it would consume three to four times the entire annual output of wood from the UK.
15. On page 12 of DECC's consultation, chart 2 compares heat and electricity demand. The variability for the year 2010 demonstrates starkly the importance of gas which dominates the supply of heat. Not only does demand for heat swing between peak and trough daily and weekly, as well as winter and summer, much more than demand for electricity does, but, in the winter peak, heat demand is four to five times the equivalent energy demand from electricity.
16. Furthermore, according to National Grid, during the heating season a one degree Celsius reduction in ambient temperature increases the load on Britain's electricity grid by 300-350MW, i.e. less than the size of a single, large CCGT generating unit. However in France, a much more electrified country, the equivalent figure is 2,300MW, i.e. similar to the combined output of the two Advanced Gas-Cooled Reactor (AGR) power stations at Heysham in Lancashire or the output of Longannet power station on the Firth of Forth in Scotland, the second largest in the country after Drax.
17. Clearly, it makes sense to extract economically justifiable energy efficiency improvements from existing systems, such as by switching to condensing boilers, before considering wholesale changes to systems. Modern, high efficiency gas boilers save more energy and reduce consumers' bills by more than any other readily available and affordable technology. They correspondingly reduce emissions of CO₂ by more.
18. Improving the thermal efficiency of buildings both by rebuild and retrofit will surely be of crucial importance, although the extent to which older buildings can be improved without excessive expense is likely to limit progress. In any event, gas heating is still likely to remain the economic solution for several decades to come. What is clear is that it will make no sense to switch from gas to electrical heating in buildings only to have much of the electricity providing the heat through the winter being generated by gas (although efficient, gas fired power plants convert less of the energy within gas into electricity than gas boilers convert into heat).
19. Lastly, it should be noted that the bulk conversion of primary energy into electricity and its subsequent transmission and distribution to users is considerably less efficient and

more expensive than moving gas to and using it as near the point of final consumption as is reasonably possible. Furthermore, transmission and distribution are more reliable for gas than electricity.

20. In our view, it is likely that effecting such major changes in the nation's heat supplies will happen only slowly and, therefore, gas will continue to play a substantial role in providing heat for decades to come. The scale, cost and time required for the transformation that is sought should not be underestimated.

c. Transport

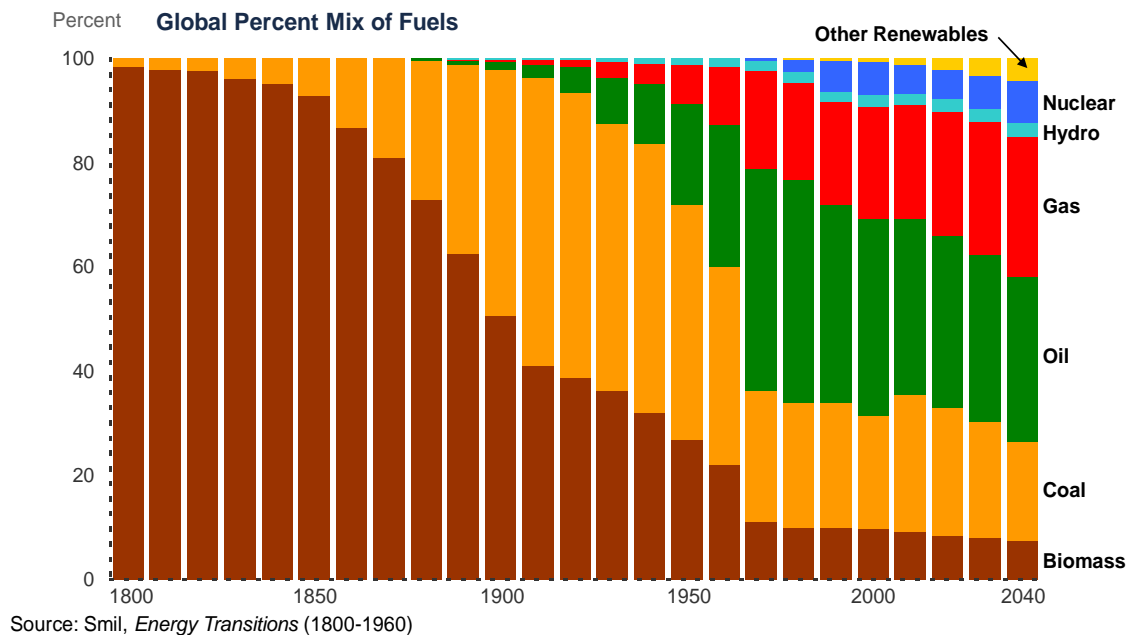
21. Oil products dominate fuel for transport throughout the world. Apart from the electrification of railway lines with high traffic densities, the inherent properties of oil products – availability, portability and energy density – make them uniquely suitable for land, sea and air transport, especially over long distances.
22. While some of the new technologies being developed demonstrate applicability for road transport over shorter distances, such as for cars, buses and vans in and around towns and cities, none so far shows signs of replacing oil products for longer distances on land, never mind at sea or in the air. There is, though, the possibility of using compressed natural gas or LNG for long distance road freight transport and ships' bunker fuel, but those are currently in their early stages.
23. However, there is the likely prospect that advances in technology will improve the fuel efficiency of vehicles markedly during the next 20 or so years. In its Energy Outlook 2030, published in January 2012, BP forecasts that vehicle numbers world-wide will rise by some 60 per cent, but that fuel consumption will only rise by 26 per cent. This efficiency gain is the equivalent of ~11 million barrels per day (mb/d) of oil demand which compares with current consumption of ~90 mb/d and forecast demand of 103 mb/d in 2030. Furthermore, according to the IEA, some 5 mb/d of excess demand for oil results from fuel subsidies in many developing economies which some of their governments are now trying to reduce or eliminate on account of the unsustainable cost.
24. Nonetheless, oil is still likely to be the dominant fuel for transport in 2030.
25. We now turn to some of the specific questions posed by the sub-committee.

Q. 1 Energy's Contribution to Economic Growth

26. Since the beginning of the industrial revolution, a good supply of affordable energy has been essential for economic growth and improving living standards. It began with the switch from wood to coal, then oil imparted a new impetus especially in transport and more recently gas has taken a powerful lead in heating and most recently power generation. The chart below demonstrates vividly this progressive change in the world's energy supplies over more than 200 years.
27. The crucial feature of coal, oil and gas is their energy density, the amount of energy per unit of volume. It was the energy released by burning coal relative to burning its predecessor, wood, that unleashed the industrial revolution through the development of

steam power. The energy density of these three fuels is only matched or surpassed by uranium.

Evolution of Energy Supplies since 1800



28. The most important way in which energy can help make its contribution to a lower carbon future and economic growth is through energy efficiency and the right choice of energy for the application in question. Thus, as mentioned above, gas is a very efficient means of heating. Gas also has a higher efficiency of conversion into electricity than other fuels and, when used in a combined heat and power plant (CHP), it is very efficient.
29. In their annual analyses of energy supplies looking ahead to the 2030s, both BP and ExxonMobil have concluded that energy efficiency measures and switching from coal fired to gas fired power will, in world-wide terms, reduce emissions of greenhouse gases by more than any other factors. Because such efficiency measures and fuel switching can be accomplished without subsidies, they will help promote economic growth.
30. Furthermore, a recent paper published by the Oxford Institute for Energy Studies⁹² indicates that electricity generated by gas fired plants fitted with carbon capture and storage (CCS) will be cheaper than offshore wind power and no more expensive than new nuclear power.

Qs. 2 and 3 The EU and its Internal Energy Market

31. An open, liberal and liquid market is necessary for ensuring competitive supplies. GB's gas market is a model that others in the EU, including the Commission, are increasingly following. It has demonstrated an ability to provide reliable supplies and to stimulate

⁹² "Gas with CCS in the UK – Waiting for Godot?", OIES, September 2012
<http://www.oxfordenergy.org/2012/09/gas-with-ccs-in-the-uk-waiting-for-godot/>

substantial new investment in new sources of supply, such that GB now has the most diverse gas supplies in the EU, as well as the most responsive market.

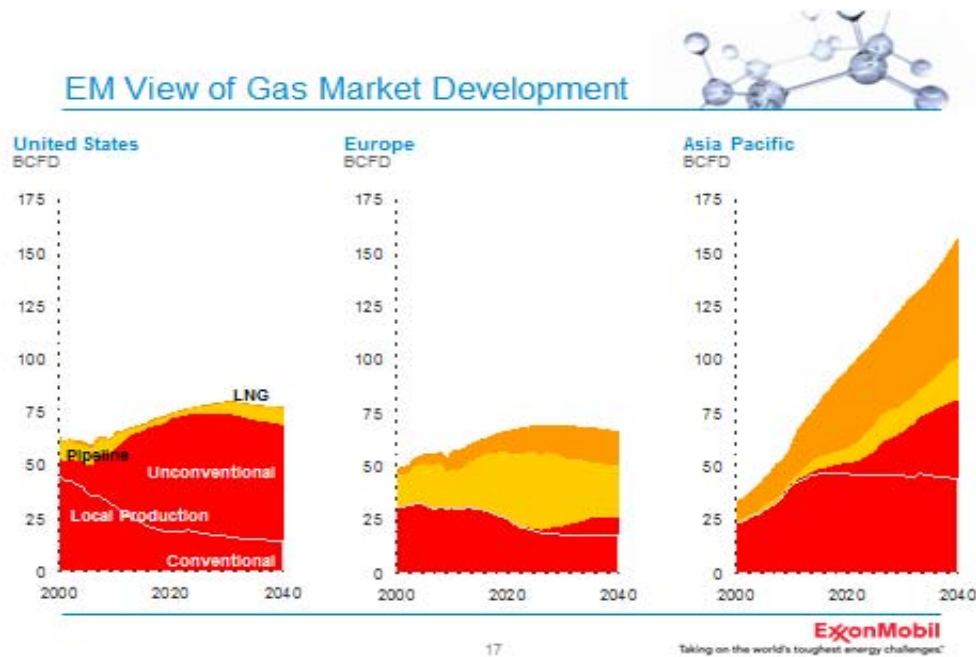
32. In recent winters, the gas system has been tested as never before: the dispute between Ukraine and Russia in early 2009, the long winter of 2009-10 which was the coldest for more than 30 years, the early weeks of winter 2010-11 comprising the coldest start to any winter for at least 100 years (nine of the ten days of highest demand for gas in GB occurred in 2010 with three in January and six in December, according to National Grid) and, more recently, the sudden cold snap during the first two weeks of February 2012 with severe weather spread across the whole of Europe and much of Siberia and widespread reports of reduced Russian exports. However, overall, our security of gas supply has been maintained with the only interruptions being in January 2010 as a result of congestion in some distribution networks, not through a shortage of gas. In contrast, several other EU countries with much less well developed markets than GB have not been so fortunate.
33. Therefore, we are convinced that competition in supply and open markets are beneficial to all parties and the economy as a whole. This is not to diminish the importance of transmission; competitive supplies depend of having good access to transmission systems. We would encourage the authorities to press on with achieving the goals of the Third Energy package.

Q.5 Gas

34. Overall, we believe that natural gas has a long term future as a fuel here in the UK and in Europe for several reasons: the abundance and diversity of accessible resources worldwide, the means of transporting it to market and the significantly lower carbon content of natural gas relative to other fossil fuels. The European Commission is therefore right that gas will be crucial in transforming our energy systems.
35. We also believe that investment in gas fired power generation will need to increase in the near and medium term to cover plant closures associated with the implementation of the Large Combustion Plant and Industrial Emission Directives and that the strengths of gas fired power generation are well known:
- The technology is proven, reliable and is the most flexible of thermal plants, combined with the lowest emissions of CO₂, oxides of sulphur and nitrogen, heavy metals and particle matter.
 - A new gas fired power station can be built in three years and, more often than not, can be built at a location that does not involve additional transmission investment.
 - Natural gas supply has continued to grow as unconventional resources are unlocked and the outlook is one of continued growth in supply potential with vigorous competition amongst producers to bring gas to international markets.
 - Natural gas import, transmission and distribution infrastructure is already available in the UK; its reliability is very good. Pipeline connectivity to and across Europe is continuing to improve.
 - The UK continues to benefit from a liquid, well-functioning wholesale market and is connected to similar markets in Europe that will continue to develop as the EU's Third Package is implemented.

36. Regarding questions of policy and their relationship to gas fired power generation, we would offer the following comments. At the simplest level, an investor has to assess how much generating capacity will be needed to be filled by gas fired power, at what times of the year and of the day that capacity will be required and what prices are achievable during such times over the life of the proposed investment. We believe that addressing these questions has been easier in the past and Government interventions affecting the power sector have created a significant range of new uncertainties affecting such an assessment. Resolving these uncertainties will be necessary in order to secure the required investment and maintain electricity supplies.
37. Some authors state that gas investments are “locking in” high carbon assets, but these studies tend to lack comparative costs and assessments of longer term timeframes for replacing assets. Other studies demonstrate that in the short to medium term gas represents a quick, lower cost route to carbon reductions and make the point that investment in more expensive renewable technologies today takes longer to implement, needs gas to support its intermittency and will have to be renewed in 20-25 years’ time. So, we are not convinced by the lock-in argument; it lacks credibility, especially if CCS comes to fruition at power station scale.
38. Then there is the potential for and benefits of combined heat and power. CHP plants are likely to be essential to the implementation of Government’s energy efficiency and decarbonisation agenda, especially at sites with large heat demands, such as oil refineries and chemical works and in district heating schemes in towns and cities. Gas CHP is highly efficient.
39. The UK’s gas market has evolved over the past 10 years towards a diversified range of sources of supply, balancing indigenous production and pipeline and LNG imports. The open and liberal approach that has characterised this market has created conditions of confidence for companies to invest in new infrastructure, such as pipelines from Norway and the Netherlands and the LNG terminals at Milford Haven and Isle of Grain. Retaining an open, competitive market will be necessary to ensure that this investment confidence is retained in the future, so that supply and related infrastructure can continue to meet evolving demand.
40. From a worldwide perspective, we believe that unconventional gas production will be essential to meeting the world’s future energy needs. Within Europe, exploration of unconventional gas is at a very early stage; the scale and commercial potential of the resources remain unknown, but this is normal in any potential new gas (or oil) basin. The chart below, taken from ExxonMobil’s annual Energy Outlook, shows its assessment of the potential for unconventional gas in the USA, Europe and the Asia Pacific region. If successful, we believe it constitutes a significant opportunity to enhance EU and UK supply security, but such projects and their associated technologies will have to secure public support to succeed.
41. In order to produce unconventional gas, a process called hydraulic fracturing is used to create small cracks in the shale rock that allow the gas to flow through a well to the surface. Hydraulic fracturing has been used since the 1940s in more than one million wells in the United States and in Europe since the 1950s. It is safe and effective provided that sound practices concerning well design and construction, water management, air

emissions and surface impacts are followed to ensure accidents do not occur and to mitigate other safety and environmental concerns.



Conclusions

42. We therefore believe that natural gas will continue to play a fundamental role in energy supplies in the UK, the EU and worldwide for several decades to come and, if CCS comes to fruition, potentially for much longer. The Commission is right to emphasise this role during the transition – in power generation it is becoming essential – and it is encouraging to see and hear similar signs from our own Department of Energy & Climate Change (e.g. its forthcoming gas generation strategy and the recent speech by the Secretary of State at Gastech 2012 in London: http://www.decc.gov.uk/en/content/cms/news/gastech_ed/gastech_ed.aspx).

10 October 2012

Oil & Gas UK—Oral evidence (QQ 71-80)

Evidence Session No. 3.

Heard in Public.

Questions 71 - 80

WEDNESDAY 21 NOVEMBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
The Earl of Courtown
Lord Giddens
Lord Lewis of Newnham
Baroness Parminter
Lord Plumb
Lord Whitty

Examination of Witness

David Odling, Energy Policy Manager, Oil and Gas UK

Q71 The Chairman: Mr Odling, thank you very much for coming to see us today. Following on from the last session, we are anxious to hear your evidence. I will go through the formal remarks again, if I may. You should have in front of you a list of interests of committee members that have been declared. This is a formal evidence-taking session of the Committee. We are taking full shorthand notes. They will go on the public record both in printed form and on the parliamentary website. We will send you a copy of the transcript for you to comment on in terms of minor errors, and the session is on record and being webcast. We have about an hour. I do not know whether you would like to make some opening remarks for one or two minutes, or would you like to go straight to questions?

David Odling: We did submit written evidence. We are very pleased to do that and to be here. Thank you for inviting us. One broad, general remark is that we would concur with a lot of what I heard the previous witness say, particularly on the question of the operation of markets and the need for competition, so if it is appropriate I would rather go straight to questions.

Q72 The Chairman: The first question is about gas and economic growth in the UK. Could you be specific about the contribution that you see gas making to this important issue and the whole question of the wider EU context? Can gas do the same thing? Can it generate growth? Perhaps you would make a couple of comments on combined heat and power and the recurring theme of today: CCS.

David Odling: As to gas and its economic contribution, in this country we start from the position in which over the last 40 years or so gas has made an enormous contribution to the economy, and it has had a very large and favourable environmental impact with improvements in air quality, energy efficiency and so on.

As to the future, there are two parts to the gas market. The larger part by far is heat in the domestic, commercial and industrial sectors, so it is throughout the economy. The second part is electricity, because that is a phenomenon really only of the 1990s and subsequently, with the infamous first dash for gas. As far as the heat sector is concerned, the chances are that the demand for gas is likely to drift downwards over the coming years. That is driven by two things: first, there is increased energy efficiency. Investment in any efficient technology relating to gas will be economically stimulating, for example if you put in a more efficient boiler or insulate your home. By the way, putting in a more efficient boiler is one of the most effective ways to cut consumption and emissions. Unfortunately, nothing like enough is said about that. I believe only about 22% or 23% of the stock of domestic boilers has been converted to modern high-efficiency ones. Bearing in mind that 80% of homes in this country are heated by gas, there is a big stock out there. There is a huge prize to be had by pushing through that programme.

Secondly, in industry people are forever investing in energy efficiency techniques, particularly where they reinvest in plant. Every time you scrap a piece of old plant and reinvest, you are putting in the latest technology, so in that sense there are opposing forces. On the one hand, you use less gas but become more efficient, but that is economically stimulating. On the other side of the equation is power generation, which at the moment is somewhat depressed because of the low price of coal relative to gas. In the last two years we have swung rapidly from gas being largest source of generation to coal now being the largest source of generation. It has happened in Germany as well. It is all a question of what happens with prices. We have the carbon floor price coming in next April; we have the large combustion plant directive coming in progressively to 2015, so a series of coal stations are going to be shut. Some have already been shut; others will close. The industrial emissions directive is on the horizon, and that will increasingly bite into the remaining coal-fired power stations.

I entirely agree with the noble Lord here that on this sector one of the most efficient things you can do is substitute coal for gas. The IEA in worldwide terms sees that as one of the big moves in the electrical sector in terms of both controlling emissions and stimulating new investment, because the one thing about gas-fired generating plant is that it is affordable; the technology exists; we know it works, so you can do it now and with relatively little trouble. In this country we have plenty of power station sites available, and the grid connections are there. Those two dynamics are at work, which potentially are very helpful to the economy.

Then there is our own investment, which I would like to touch on if I may. We are very busy at the moment. Last year our capital investment was £8.5 billion. This year it will probably go over £11 billion. That is a mixture of oil and gas, but it is more oil than gas. Your Lordships may be interested to know that the relative prices between the two, if you convert them energy to energy, show that, despite what people think about the price of gas, it has been sitting at roughly half the price of oil over the last year or 18 months. Traditionally, the gap has been two-thirds and one-third; now it is sitting at about 50%, so the investment case for gas has to be really robust. None the less, we are spending a lot of money, and that stimulates the economy as well.

Currently, we estimate that we support 450,000 jobs throughout the economy, and that is rising. A lot of these are highly skilled and high value-added jobs. It is said, although we have

no figures of our own to confirm it, that the average pay in the industry is roughly twice the national average. That is stimulating because that sort of pay stimulates further expenditure and also increases the Chancellor's tax revenues.

The Chairman: Before we move on to Lord Cameron's questions, do you want to say a word or two about combined heat and power and CCS?

David Odling: We are not experts on combined heat and power. Having said that, we do believe there is scope for it. Clearly, in industry if you have a big enough plant there is scope, and a lot of the major plants have it already: big refineries, chemical works and so on. Then there is the question of district heating. To come back to the question of the price of coal versus the price of gas, it is out of the money at the moment, even though it is very efficient.

The Chairman: It is out of the money.

David Odling: Yes; and I checked that with the Combined Heat and Power Association only yesterday just to be sure I had it right. What happens to the price of coal and gas, the tax regime and the LCPD over the next two or three years could be quite critical in how these things reset themselves in the immediate future.

The Chairman: What about CCS and gas?

David Odling: Oh dear—the first competition was unfortunate. One of the short-listed projects in the current competition is CCS in gas-fired power. That is at the Peterhead power station in north-east Scotland. Scottish and Southern are the owners of that power station, and they are working with a very well known member of ours, Shell, who are taking responsibility for the disposal and offshore storage of the ensuing CO₂. So you have two fairly powerful companies working together on CCS with gas.

The Government have been very good; they have said openly that they would like to see this happen, and so would we. We need to test these things and find out what is necessary to make them work, and get over all the theory, papers and what have you. Let us try to do it.

Q73 Lord Cameron of Dillington: I want to inquire further about what criteria you use to justify your investment. What sort of investment return are you looking for, what payback period would you expect, and are your decisions to invest motivated or affected by the possibility of changing renewable targets that might emerge from the EU?

David Odling: That is a very widely scoped question, if I might say so. In broad terms we can break it down into two categories, but we have to be careful because it is like a spectrum. There are phasings all the way down the spectrum. At the big end of the business, where capital expenditure is extremely high, you are looking at long payback periods. You are talking about spending £2 billion to £4 billion on a project complete with pipelines and all the connections required. Pipeline economics can be highly dependent on time, because pipelines pay for themselves by the volume going through them over time. Those big projects tend to be on a fairly long timescale.

Lord Cameron of Dillington: Can you put a number on that?

David Odling: It can be 10, 20 or even 25 years.

Lord Cameron of Dillington: It is not 50 to 70 years; you are talking about 10 to 20 years.

David Odling: Yes, but varies hugely. If I may cast a bit of history, I can think of one example where the operator took the decision to invest when the price of oil was \$32 a

barrel. When it came on stream, it was \$12 a barrel. The project had a nominal life of 12 years, and during that time the price of oil never rose above \$20 a barrel. They might have got back some of their cash, but in broad terms by the end of it they were out of the money. However, because they found more reserves and invested more and so on, that original project and all the kit is still out there servicing a much wider hinterland of production, which, at the time they originally invested, had not been conceived of because it simply had not been found, or the technology did not exist to develop it. The economics of the whole thing changed on account of the extra finds and rising prices. They may not have seen their money back for 25 to 30 years.

However, if you go to the other end of the scale and some of the very small projects we have got, the project will last for only two years so you have to get your money back in that time.

The Chairman: Whenever these decisions are made, what rate of return would bring capital into this market for these projects?

David Odling: You would have to ask the individual companies. Whether or not they would be prepared to declare them is another matter; they certainly do not tell us their hurdle rates. Clearly, they have investment criteria because they are looking at a worldwide portfolio of investments. They have investment criteria that are privy to themselves. We have to be very careful about competition law here as well. It is the kind of data that normally you cannot share, so I am sorry; I cannot tell you.

Lord Cameron of Dillington: Perhaps you could touch on the whole question of how closely you watch renewable targets with a view to moderating or encouraging your investment.

David Odling: Obviously, we are conscious of them. In the broadest terms we think there are now too many targets out there. It is getting a bit confusing, with a landscape of so many different targets for this, that and the next thing; they are all competing for space. But we are fully aware of them, and we obviously respect what is public policy. It is declared policy, so there it is, and we have to go along with the law.

Lord Cameron of Dillington: But do worries about future public policy restrict investment?

David Odling: Certainly, in the upstream oil and gas sector—I am talking here about the exploration and production side, not the downstream end—at the moment it is not restricting investment. What is restricting investment for smaller companies is the ability to raise finance. The big boys can raise finance because, first, they have the balance sheets and, secondly, they have the cash flow from existing operations, so they can put together big projects and they are doing so. When you get to the other end of the scale, smaller operators are struggling because they have to go to finance houses, raise equity or whatever, and that is much harder for them in current circumstances.

Q74 Lord Plumb: Widening the investment questions yet further, research is obviously behind all this. I suppose that the amount of investment in research will depend on the perception at least of the end product. At the moment a lot of people must be wondering where it is leading with so much diversification in the way it is going and how it develops. Do you consider that public policy intervention is required to boost investment in the sector, as well as the opportunity for private investment? What can private sector investment do in terms of leverage by public finance? That is an extremely important question facing all of us. What experience do you have working with the commercial

banking sector to secure that finance, and are its objectives sufficiently aligned with public policy decarbonisation objectives in your view?

David Odling: The industry does a considerable amount of R and D, but that tends to be internationally based, because clearly technologies get transferred around the world as they are developed, but in this country we do a lot particularly on sub-sea oil and gas production technologies, in which we are world leaders. In the pure research sense, we would like to see more going into that from the public side. If we are going to go for some of these new technologies, something has to stimulate the research and get it to a stage where it is ready for commercial development. We believe that sometimes there has been too much emphasis on paying to get on with some of the plans now being implemented, whereas perhaps there should have been more emphasis on researching new technologies that will get us to the longer term goals. We sense there has been too much emphasis on 2020 and not enough thought on the actual steps to take to 2050. The existence of the plethora of targets in relatively short-term energy concepts has diverted people's attention. There are things we could do, like getting out of coal and into gas in power generation and energy efficiency in homes, which are get-on-with-it-now and eminently doable technologies that require no further R and D—it is all there—versus what will be the solution in the much longer term. There has been a lot of talk about the longer term, but it would be good to see more money going into the research side of that. I have touched on raising finance. Before the financial crisis, banks almost fell over themselves to provide project finance.

Lord Plumb: As they did with so many other things.

David Odling: At least in most cases we paid them back. Moreover, we were able to pay our shareholders a dividend.

Q75 The Earl of Caithness: To follow up Lord Plumb's question and your comment about 2050, when should we start looking beyond 2050? If you are taking long-term decisions on 25-year payback, in 10 years' time we have to be looking beyond 2050.

David Odling: Yes. If I may say so, that depends on how quickly we manage to progress. The previous witness rightly said, with respect to the emissions trading scheme, that it is time to address post-2020, and that is something we as an industry have put to the Commission. We have said, "You are talking about messing around with phase III. Phase III is on us, and you can do very little about it unless you tear up the directive and rewrite it, but, for goodness' sake, please give us an outline of what you think phase IV is going to be like. Will there be a phase IV?" Nobody has actually said there will be a phase IV and that it will run from 2020 until whenever. We need to keep an eye on the long term, but we also need to take manageable steps along the way.

Q76 Lord Lewis of Newnham: In your report, which we found very useful, you turn to the point of unconventional gas and emphasise that, as far as you are concerned, this is an important development for the future. We have heard quite a bit about unconventional gas, but it seems to have a very mixed reception at large in the community. Could you expand on the level of potential that you see for unconventional gas, particularly from the point of view of the European Union? How far do you see potential research developments in the extraction of this as being important to development?

David Odling: There are several factors here. First, I do not think anybody, including us, expects it to be the kind of game-changer it has been in the United States; it will not be on that scale. The potential in Asia is probably considerably greater than in Europe, but that is not to say there is no potential in Europe. The difficulty we find ourselves in now is that we

have got only very broad geological data. Few wells have been drilled. Until you start drilling and testing, you do not really know what might happen, and that is true of all oil and gas developments. To give a simple example, when I came into the industry in the mid-1970s, oil production had just started and gas had been going for seven or eight years. The official view in the Department of Energy was that oil was about a 20-year project and by the year 2000 we would have packed up and gone home. How wrong we were. Oil production in this country peaked in 1999 and gas production in 2000, at the very time when all those years ago it was said we would have packed up and gone home. If you go back even further, there was a famous comment by one geologist in a well-known company to another geologist in the well-known company in the early 1960s when gas had just been found in the Netherlands and they were discussing the geology of the North Sea. It was concluded there was gas under the North Sea. One said he believed there was possibly oil under the North Sea as well, and that argument raged. The other one said to him, "I will be able to drink every drop of oil that you ever produce from under the North Sea." That is an extreme illustration, but, to come back to shale, we simply do not know. We need to drill more wells, but we do know from the evidence that has appeared so far that there is potential. These are all fairly big depths; they are 7,000 ft, 9,000 ft and up to 10,000 ft. The depth of what is known as the pay zone—in other words, the zone in which the gas exists—in north-west England is extreme; it is deeper than you would normally expect. In a sense, it suggests that the potential may be quite good. The counter is that because it is so deep it may be more dispersed and therefore more difficult to get at, whereas if it is in a narrower pay zone, once you are in it you know where you are, but, frankly, we simply do not know. There are not enough data available just yet, but the potential appears to be there. Our other advantage is that we have the infrastructure. The gas transmission system is there. It is an extremely well developed, run and efficient gas transmission system, so absorbing anything like this into the gas system will be relatively easy. You just have to make sure that the quality is within the specification.

Lord Lewis of Newnham: How uniform is the gas stream? One of the interesting features that I discovered is that America has a certain amount of C2 and C3 carbon in its gas streams, which it is using from a pharmaceutical and not energy point of view.

David Odling: We do the same thing. Quite often, we are producing a rich gas that has within it fractions of other hydrocarbons. This is particularly prevalent the further north you go. We have got oil, so we get both out of the ground, and quite often you will get some of the higher fractions of gas, like butane, propane, LPG and what are called condensates, which sit on the borderline between gas and oil. It is a bit like a spectrum through the system. We have got all that experience already. We have to separate those. We do not put them into the national transmission system; it would be dangerous to do so, and they are too valuable. They need to be stripped out, sold separately and used for things like industrial purposes. It is quite normal to have to do something like that. Certainly, the specification of the gas in the national transmission system, which is laid down in regulation, is very tight. You have to meet that specification.

Q77 The Chairman: Can you deal with Lord Lewis's point about fracking technology?

David Odling: Hydraulic fracturing by the industry worldwide has been going on since the late 1940s. Well over 1 million wells have been drilled and hydraulically fractured. The difference, to the extent there is one, in the case of shale gas is that what the entrepreneurial companies in the States did was to bring together more than one technology: they brought hydraulic fracturing, horizontal drilling and a few other bits and pieces together and said, "Why do we not try this?" and it worked. They are not doing

things that have not been done before, but they do them in a way that has not been done before. To the extent there have been problems—some may well have happened; as to others, who knows—one thing I am confident about is that the system of regulation in this country for drilling wells is extremely rigorous; it is probably one of the most rigorous systems in the world. That evolved out of the disaster on the Piper platform in the late 1980s and the complete rewriting of the way safety is managed.

The Government have been very rational in the way they have tackled the whole business. They are probably going to make a statement on this in the not too distant future, and it may well be there will be some slight enhancements of the regulations regarding hydraulic fracturing on land, maybe on water use and one or two other bits and pieces, but we do not think there will be anything that means it stops the whole show. In any event, if there are such problems, they are exactly the sorts of things the industry is good at resolving given a bit of time, and has done so on many occasions before.

Q78 Lord Whitty: You heard the exchange with Philip Lowe in relation to the internal market. First, would you agree from your industry's point of view that there are benefits from developing a more integrated market? On the other hand, what is your take on national capacity payments, which he seemed to think were an inhibition to growing the internal market? What is your take on the propositions on that on the generation side?

David Odling: First, we like markets. You can hardly be in the oil industry and not work with markets. Secondly, we are all for the liberalising agenda in Europe. We would rather see it go faster than it has. In this country we have opened our markets. To go back five or six years, it was almost to our disadvantage in that we had a liberal arrangement and were tied to a much less liberal one and sometimes it produced a few undesirable effects, but those are disappearing as the markets open. Therefore, we are pro-market; we want to see Europe open up its markets and more trading of gas, which is happening. If you look at the reports, the Dutch trading point is growing rapidly; the Germans at last have consolidated some of their zones and now have only two trading points; and even France is starting to make a move, although it has huge infrastructure restraints. Philip rightly talked about getting some of the interconnections improved to get over some of those restraints. We are fully supportive.

To come to the second part of your question, it is more of a power generation point. Our belief is that if what you do uniquely imposes cost on a system, you should be responsible for picking up that cost, in the same way that we are required to deliver gas to a defined specification when we put it in the system. Mother nature very rarely delivers it at that specification, and we have to build and operate plant to make sure it meets that spec. In the same way, that is what ought to be done in the generation sector. Our view is that, given the drive towards renewables and the inevitable intermittency of such generation, whether it is wind, solar and so on, there is bound to be a requirement for more and more flexible power in support. That is absolutely inevitable. In this country we also think there is quite a gap in baseload power that will have to be plugged on a 10- to 15-year view, given the extent of closures. Frankly, most of that will have to be gas, because there is not another technology available in the time frame of 10 to 15 years, is affordable or gives you the continuity of supply. Crucially, it is also one of the most flexible forms of generation, so in terms of load following with wind, thermal and solar, it is probably as good as you are going to get.

Lord Whitty: Can I also ask about your expectations? We always talk about gas as a transitional fuel, but the transition seems to be getting longer, particularly as relative prices

change. If we had a cheaper supply of shale gas essentially, would that speed up the replacement of heavier hydrocarbons or coal, or would it also delay the take-up of generation from nuclear and renewable plants?

David Odling: That is peering into the future, is it not?

Lord Whitty: It is relevant in terms of a 30-year market.

David Odling: I do not think the volumes of shale gas will be sufficient to have a material impact on prices. However, inevitably any increase in supply provides a check or downward pressure on prices. Clearly, that would be the case. The great trick is: can we make CCS, or something equivalent, work? To digress slightly, bearing in mind that coal dominates power generation worldwide, CCS or something equivalent is going to be necessary. To give you a simple example, according to the IEA, China already has more coal-fired generating capacity than the USA, the 27 members of the EU and Japan combined, and it is building them steadily. India, while not on the same scale, is doing similarly. We need a solution to coal-fired power. If we have a solution to that, we have a solution to gas-fired power, and it is probably cheaper per megawatt-hour of electricity generated.

Q79 The Chairman: Do you have a sense of the economics of shale gas? If shale gas did come to pass in Europe and we saw \$3 gas, as we have seen in North America, what will be the impact? For example, what price does Gazprom need to wheel that gas out of Siberia into Europe and be able to do it? I am sure that commercially it is highly sensitive, but somebody must have a sense of these things.

David Odling: First, \$3 gas in the US is clearly below cost. What is the marginal cost of new supplies? It is probably in the range of \$5 to \$6 per million BTU. If you were to liquefy that and ship it across the Atlantic, we would be adding another \$3 or \$4, so it would be up to \$8, \$9 or possibly \$10 per million BTUs by the time you got that gas into Europe.

The Chairman: What does Gazprom charge now for it coming the other way?

David Odling: That is a good question. If you really want to go into the detail of that, I recommend that you talk to the Oxford Institute for Energy Studies.

The Chairman: We are going to. I just seek a bit of guidance. Having given us the prospect of \$10 gas transported one way, I seek guidance on the price the other way.

David Odling: What is the equivalent figure in this country right now at the NBP? It is slightly above \$10. Can Russia get it to Germany for less than that? My guess is that undoubtedly it could. It is clearly under a lot of pressure with its long-term contracts. It has to renegotiate at least round the edges, if not the middle. The Norwegians have publicly stated that they are heading towards hub pricing as they renegotiate a lot of their long-term contracts; and there is Algeria in the south, where most production is still on oil-indexed contracts, which probably accounts for why gas in Italy is among the most expensive in western Europe.

Q80 The Earl of Courtown: I do not think you referred in your submission to the emissions trading system, but it has been raised by Lord Caithness's questions to the director-general in the previous session. It would be quite interesting to hear what experience your members have of this system, what impact it has had on their operations, and what changes they might like to see in the future.

David Odling: First, we are subject to it. We are one of those sectors that is under the ETS, and clearly it is an extra cost to the operation. It is understandable, but none the less it

is a cost. Philip Lowe perhaps did not put enough emphasis on the consequences of the recession for the current price. Looking back to the beginning of phase II in 2008, in the early months right up to about August the price of an allowance was €25 to €27 per tonne. It looked as though what had been planned for phase II was coming to pass, and people were starting to say, “Hey, fellas. This is serious stuff.” Now we all know what has happened. The recession has cut emissions. The shift to gas in power generation in 2009, 2010 and 2011 also cut emissions dramatically. It is now swinging back again because of the point made by Philip Lowe. Our plea, as I think I mentioned in an earlier answer, is: what happens next with the ETS? Can we have some visibility about what is going to happen post 2020, the direction it might take and so on? It is very unfortunate that people have labelled it a failure. That is extremely unfortunate terminology. It may not have delivered the investments people imagined, but, frankly, even if it had been €30 per tonne, that would have been a very hard sell, because if you jump to things like CCS, which we have talked about, even ballpark figures for the price you would need to kick-start it are upwards of €60 per tonne, and probably more like €90 or €100 per tonne, which, with time, as you go from first of a kind to nth of a kind, might drift down, but would it drift down to €50 per tonne all in today’s money? I think that would be unlikely. Maybe in a very long time it will do so. I have never understood the notion that €25 to €30 per tonne would stimulate major investment in plant, particularly when you consider that the industries in the ETS are by their nature long-term capital investments so you do not replace the plant. You might do a mid-life revamp and chuck out some bits and upgrade them, but otherwise it is a 25-, 30- or 40-year investment. When you build the next one, it is totally different.

To complete that story, perversely our most efficient offshore installations are all electric. You convert raw energy into electricity and run the whole of the installation on electricity, but electricity is not eligible for any allowances at all under the ETS, whereas a lot of our older installations are part-electric and part what we call direct drive; in other words, you use something like a gas turbine to power a pump directly by mechanical connection, perhaps via a gearbox. Those are eligible for emissions under the current arrangement, so our most efficient installations are being hit harder than our less efficient ones. Having said that, the less efficient installations will be retired first. It is a quirk and twist that I am sure was an unintended consequence. I see the good professor making a quick note of that.

The Chairman: That is tremendous, Mr Odling. On behalf of the whole Committee, we are very grateful for your time and very helpful evidence.

Peter Vis—Oral Evidence (QQ 216 – 236)

Evidence Session No. 11 Heard in Public Questions 216 - 236

WEDNESDAY 23 JANUARY 2013

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
Lord MacLennan of Rogart
Baroness Parminter
Lord Renton of Mount Harry
Lord Whitty

Examination of Witness

Peter Vis, Chef de Cabinet to Connie Hedegaard, EU Commissioner for Climate Action

Q216 The Chairman: Thank you for coming to see us, Mr Vis. We are looking forward to what you have to tell us. There are some formalities that I would like to go through. We will have sent you a list of the interests that have been declared by the Committee. This is a formal evidence-taking session and we are keeping a shorthand note. It will go on the public record in printed form and we will send you a copy of the printed transcript. You will be able to revise that for any minor errors. I do not know whether you would like to start with a general overview or go straight to the questions. Which would you prefer?

Peter Vis: A brief general overview might be appropriate. Last week there was a debate among the Commissioners on global competitiveness. There are many dimensions to that, many of which, such as free trade, the UK is very much in support of. In this discussion there was, as there is in discussion more generally, an increasing concern or interest in energy pricing as one of the levers of competitiveness. People are looking over their shoulder at what is going on in the US and thinking that a cheap energy era is emerging and that in Europe somehow we are stuck with higher energy prices. Indeed, last year the Commission adopted a report on the internal energy market to try to make it more complete, very much with a view to making it perform more efficiently.

What is happening is that climate legislation and, specifically, the Emissions Trading Scheme are often being very simplistically portrayed as the cause of higher energy prices. That story is being massively overplayed. There are all sorts of things that the energy market might do better, but the Emissions Trading Scheme is a mechanism of achieving environmental targets

at a lower cost. That cost-effectiveness is something that we should really hold on to. The carbon price is a pan-European price; it is the same in the UK as it would be in Portugal or Germany, or wherever else. At the moment, the price is rather low due to the economic recession, but the story of the competitiveness burden that we might be imposing with climate change is getting quite out of proportion. You cannot have, on the one hand, a low carbon price as it is today, significantly lower than was anticipated, and somehow maintain that it is the cause of the competitiveness burden on European industry. It is one of the factors; we have to accept that climate change will require measures and that those measures will not be at no cost. There will be costs involved.

However, I would want to put this in the general framework, because that is the debate that took place on Friday and the debate that the Commission continues to have—but it is also one that is going on in the wider world. It can also be applied to the car industry, and CO₂ car standards that we are setting at the moment. Legislation is going through the institutions. The auto industry is in difficult circumstances and no one would pretend otherwise, although it is a patchy picture and some are doing better than others. But once again, it is not the fact that European cars are performing better from an energy efficiency point of view that is causing there to be such grief in the sector. There is overcapacity in that sector, as there is in the steel sector. Those overcapacities are not caused by climate legislation, but somehow we have been used as the excuse that people are invoking, not entirely but disproportionately, and the danger is that we lose the appreciation of a pan-European instrument in the Emissions Trading Scheme. The CO₂ standards are pan-European standards.

David Cameron has just been expounding the merits of the single market in his Europe speech, and these are mechanisms that absolutely fit with that sort of discourse. The UK has a lot to offer in helping us to convey the message of there needing to be ambitious climate action, as we have been portraying for some time. We can discuss, as we will in more specific terms, what that would mean in a number of respects, most notably with the Emissions Trading Scheme. I shall stop there, if I may, but thank you for giving me the opportunity.

Q217 The Chairman: You have in many ways dealt with the first question. I do not think that we have heard a lot of criticism of the concept of the scheme, but we have heard criticism of how it works. We have not heard on economic grounds a huge argument for trying to chuck it out—so maybe that is more encouraging. Many witnesses have told us that the price is too low and that it does not work properly, et cetera. Now that the Commission is trying to bring reforms forward on this, could we have some guidance on where you think that is going to go, in as much as you can share it with us, what those ideas might be, and how they might ideally evolve?

Peter Vis: One situation that we might be in is that no legislative proposals would be made by Commissioner Hedegaard and the European Commission. We might be facing the situation that we are in today with a very low carbon price and nothing on the table to address that. On the contrary, Connie Hedegaard has persuaded the Commission to make a proposal on backloading, which is only a temporary measure. What is taken out is put back in; it is a short-term measure. It was one that we were close to proposing through what we call comitology, through regulatory committee procedure. Indeed, that was what we thought we could do, but then the legal advice that we had was that there would in all likelihood be a legal challenge to that, if we did it, and that legal challenge would take time to resolve. In the mean-time, the doubt would hang over the market. So the advice given to us was that we would have that doubt one way or the other and that it was better to deal with it head on,

that we should make a legal proposal but make it incontestable that the Commission had the right to make such a decision in comitology. That co-decision proposal is clarifying the Commission's right to work in committee. Of course, the Commission does not work alone in committee; it is the Member States that vote in committee, but the role of the Parliament is different. So the backloading co-decision was made last July, and it will be voted on in the industry committee tomorrow morning and then in the environment committee later this month. The discussion is extremely difficult in the Parliament, because of course the industry people are lobbying the Parliament very actively. I regret the fact that there has not been a clear signal from some of the biggest Member States, including the UK, that they support backloading.

Q218 Lord Cameron of Dillington: I am sorry, but I am very thick. Could you just explain exactly what backloading is?

Peter Vis: I may have assumed too great a degree of knowledge. Backloading entails that every year from now to 2020 a certain number of allowances are auctioned by Governments to the power sector, primarily. We have proposed that that amount, which is actually a flat rate—every year the same amount—would be slightly skewed so that less would be issued for auctioning in the forthcoming three years and more issued in the later period towards 2020. Specifically, €900 million allowances would be withheld from the market from 2013 to 2015, and those €900 million would be put back in, in 2019 and 2020. That is the concept. The proposal is at the Committee, on the table, but it is not being actioned because we are seeking a separate clarification that the Commission has the right to make such a proposal in the committee. That clarification proposal is all that is being discussed in the European Parliament and the Council, but if we do not have clarification on the legal right there would be a problem with the Commission just going ahead anyway. It would be rather unwise.

Q219 Lord Renton of Mount Harry: Is there among some of the countries a strong feeling that you do not have the right to do it?

Peter Vis: One particular country in the EU, Poland, has opposed and contested the right of the Commission to do this. We think that it has actually been done before, but it was to do with what we call frontloading. It was to auction a few allowances before 2013. WE are in a new phase of the ETD now, and you cannot use phase 2 allowances, which were issued last year, to comply with this year's obligations. For various reasons of futures trading by the energy companies, they like to sell their electricity early, so they wanted to know what the carbon price would be. They got some frontloading so that they could buy allowances and know where they were. We did that because they asked for it; so that was done, and no one contested the Commission's right through the regulatory committee to frontload.

Since then, the crisis has evolved in such a way that there is a big surplus of allowances. Everyone has enough of these allowances—at least the industry sectors do. The generators have to buy, but the industry sectors are allocated for free, and we are not proposing to change their allocations at all. They are given them for free, and they will continue to be given them for free. All we are proposing to do is to withhold those €900 million in the early years of the period and put them back in in the later years. There is a lot of suspicion that something will happen between now and then that would mean that we would not put them back in. Indeed, it is one of the structural options raised in our carbon market report that we might permanently set aside a number of allowances; in other words, they would never be auctioned. That permanent set-aside is different from backloading.

The suspicion is that what we take out of the market in the earlier part of phase 3 would somehow never be put back in, but that is clearly not what we are proposing now, and if ever such a proposal were to be made, we would make a new co-decision, which would be with full Parliament and Council deliberation and not through regulatory committee—and, of course, it would have to have an impact assessment. The permanent set-aside is not what we are proposing, but everybody thinks we are, or at least it is often believed that we are, so that people say—I am paraphrasing—“We don’t want backloading”.

The fact that the UK has not made its position clear is a pity. The UK Government tells us that they would like there to be structural measures to address the oversupply of allowances in the carbon market; they would like there to be something bigger and more permanent. They therefore think that backloading is just gesture politics. I do not think that it is just gesture politics. We need the UK’s explicit support and Germany’s explicit support, because without those two countries others are sitting on the fence. The UK has always been in a privileged position with the Emissions Trading Scheme, because it had one first, and everyone knows the UK’s affinity to market-based solutions. There is an issue of trust and if the UK sits on the fence other people wonder why. So we have tried to talk to Mr Davey—indeed, my Commissioner has done so on several occasions. But it is all about government positions and the coalition, and so on. Because this has not been put for a vote, the option of sitting on the fence is there. In the mean-time, there is an increasing scepticism that backloading will happen, and the carbon price seems to fall every day. It has gone below €5 in recent days.

Q220 The Earl of Caithness: Which countries are leading the cohort against you on this?

Peter Vis: Poland is explicitly doing so.

Lord Renton of Mount Harry: Why is Poland so against it?

Peter Vis: Poland sees it as an affront to its coal-based generating capacity. I would say that, as far as I am aware, only Poland has said that it would vote against, but of course Poland is talking to others. It is primarily in Parliament that the action is happening right now. The Member State delegates are very good at sitting on their hands and asking the right questions but not telling us what they think. That is fair enough; they are keeping their powder dry. But in Parliament there are votes coming close, and the lobbying is very intense.

Let me be clear that, if we do not get backloading through, the price that we anticipate will fall further and there will be nothing at hand to change that. Many people would see that as an invalidation of an instrument that we have successfully deployed in the EU, and where the EU had some credibility until the point of being ineffective. Some will cling on to the fact that it will still obtain the environmental outcome that it was designed to do, but it will incentivise very little different investment than would otherwise be the case. Indeed, more coal plants might be built in the EU, as is indeed happening.

The Chairman: I am conscious that we have you only for an hour and we still have four more questions.

Q221 Lord Cameron of Dillington: I was going to ask about a floor price on the ETS. I would not be quite clear on the question of backloading—whether it is an either/or, or whether they could both operate together. If backloading is becoming politically difficult, what are the political possibilities of a floor price? Perhaps you could talk us through how you see the whole thing operating politically.

Peter Vis: Backloading is compatible with all of what we call the structural or permanent solutions to the Emissions Trading Scheme. The permanent solutions were outlined very briefly in a carbon market report on the operation of the ETS published last year in September or October, and the floor price was mentioned.

Lord Cameron of Dillington: But not as being a very realistic option.

Peter Vis: No, indeed it was not, and it is not one that we favour, although I say that subject to the fact that none of those options was preferred and all were on the table. Of course, the UK has introduced its own floor price, and we have talked to the UK about it, but it does not make much difference for the EU for the UK to have a floor price; as long as UK generators can buy in auctions of other countries, they can bypass it. I am sure that the UK would welcome there being a floor price across the EU.

Let us be realistic, and look at the problem that we are having with the backloading. There would have to be a long negotiation on what level would be appropriate for the floor price, just as we are talking now in the backloading context about what would be appropriate level for temporary withdrawal of allowances. The UK might think that €5 a tonne was a reasonable floor price, but it is more likely to think that it was €20. But the Poles would be very much of the view that it should be a lower figure. So that would be a very difficult discussion.

The further reserve that we have about that is that, whenever we have discussed floor prices—and they have been discussed periodically since the inception of emissions trading—a ceiling is also discussed. Invariably, energy-intensive industry comes in and says, “Yes, a case can be made for a floor price, but there should also be a maximum”. Supposing the economies all pick up, which is a very benign scenario, the carbon price might be €25, €30 or €40. Two negotiations will come into play, on the maximum and the minimum, and by the time you have a floor and a cap, you are no longer talking about a market-based mechanism without constraints. There would be an administrative sleeve within which the carbon price would fluctuate, so there would not be as much of a market signal as there would otherwise be—and we have so far very much defended the market forces as being the forces that determine the price. But I would not wish to exclude the idea, by any means. It is one that is there on the table, and there are some very eloquent advocates of it. As Treasury departments realise the revenue-generating capacity of an emissions trading scheme, they might come to love a floor price, which would be a little bit of underpinning. Of course, it would be a floor price that could be implemented only through auctioned amounts, and auctions would not issue allowances if the price was not sufficient. But the secondary market would be without constraint, so if industry had some in its pocket it could sell at whatever price, however low it might go. So I have no ideological objections, but practical reservations about floor prices. The ideological reservation could only be in so far as it would constrain the market mechanism.

Q222 Lord Renton of Mount Harry: If I remember right, you have been through this all before with copper. There was a great worry that there would be a shortage of copper, and people wondered what that would do to electricity. So in a way you are quite used to having these difficulties. They get done up in the end, but it takes time.

Peter Vis: I would not like to say that we have had experience, because I personally, in the climate field, have not had that, even if in copper there has been. You quote an example, but I am not aware of it; forgive me if I lack knowledge on that. But if you had a mechanism that tries to determine the floor prices, presumably it would have to be updated every 10 years, as excise duty minimum rates, or things like that, are updated. So you are building into the

system a continual negotiation process, which will be difficult every time. Also, we would argue that you are having a negotiation around something that you do not need to negotiate much. If you can determine the right quantities of allowances, you can enable the market to get on with it. But we have not succeeded so far in determining the right quantities, because we did not foresee the recession, as many others did not.

Lord Cameron of Dillington: Your point about a secondary market would make a floor price slightly unreal, as well, because a secondary market is bound to develop.

Peter Vis: Yes, once they are issued, there would be that.

Q223 The Earl of Caithness: Can I ask your thoughts about looking at the carbon price another way—having a tax on goods imported into the EU and establishing a global carbon price that way?

Peter Vis: Yes, it has been long discussed and chewed over in the EU, and is an idea that is often advocated by France. It tends to be discussed as a border tax adjustment, and that might be misrepresenting it in all sorts of different ways. But I think that we know what we mean. It is the idea that steel produced in Europe somehow has to integrate the cost of carbon embodied in it; it is covered by the ETS scheme, whereas steel imported from China is coming without that constraint.

In the Commission, we have never been enthusiastic about the idea of a border adjustment, if I may call it that for simplicity's sake, although there are advocates in the UK, including Dieter Helm and Michael Grubb, another climate thinker. It will be difficult to implement without it being distorting. In the end, if you have Chinese steel, you have to decide whether or not you are going to use an average of how much carbon is produced in China per tonne of steel, even if that particular plant might be state of the art and next to the big hydro-dam and it could be claimed that it is carbon free. Then there are the intricacies of saying that you will apply it because it is an average, but it might not be quite suitable for another consignment. An average will always be approximate. Then you would need an awful lot of data to be able to establish, without necessarily the collaboration of the Chinese, what the carbon content of the fuel might be. So there are administrative complexities, and a risk of overtaxing the import, or indeed undertaxing. It would have to be very carefully crafted. Then there would be retaliation and trade measures. You can imagine Camembert cheese and wine and things all being taxed in other jurisdictions—and presumably we would have to do it to the Americans as well. It would get awfully close to home, in that it would be applied not just to south-east Asian imports but to all.

Then of course it would presuppose that we could get all the datasets from every country that we import from, and our consideration would somehow have to take into account whatever action they were taking and whether or not they were in the Kyoto Protocol, which is almost immaterial. We would have to take into account whether they were taking action that would impose a carbon charge on the goods that have been produced. Many jurisdictions are doing measures of some sort that might be described as having an implicit carbon price, and the Chinese are doing pilot schemes for emissions trading. Even if they are energy efficiency standards and regulatory measures, there are always implicit carbon prices. We have to remember that, because they are often very much higher implicit carbon prices. You would have to take account of the measures that other third countries may be applying themselves, which again is an administrative complexity.

There is some logic—there is an intellectual logic in it, and I would not dare say anything else with Michael Grubb now in the room. But it sounds protectionist. The Commission's

thinking is rather that it is more by free trade agreements that we will generate more growth and jobs, not by more protectionist measures. So it goes a little bit against the current of the thinking of the Commission at the moment, and I have described some of the complexities that we have turned around. I finish on this note. A few years ago, we wrote a report about the extent of carbon leakage and found evidence to substantiate that it was very thin on the ground. Very few sectors could be described as suffering from that offshoring due to the carbon price.

Q224 Lord Cameron of Dillington: What about the cement industry?

Peter Vis: That is closer to home. It is run on the edges of Europe—and there might be some of it in Turkey and north Africa. But I am not sure that we want to put up barriers to applicant countries to joining the EU, or to our southern Mediterranean partners going through the Arab spring. It would be a very odd signal to send to some of those countries, that we were going to start imposing the carbon charge on their exports to the European Union. There is a lot going on there that we would want to be more constructive on, and we are trying to engage with them, but I am not sure that that would be quite the mood of the moment, if I may say. But ask Michael—he knows so much more about this.

Q225 Baroness Parminter: Throughout the inquiry, we have had lots of people saying that CCS is absolutely critical in delivering the roadmap, but we have also heard about the problems in getting it off the ground in terms of German reticence and a lack of response to the projects, as well as some question marks, but only some, over the technology. Does the Commission still believe that CCS is critical? If so, how does it foresee these barriers being overcome in the short to medium term?

Peter Vis: CCS is absolutely on our agenda, and we are trying to enable demonstration projects in the European Union, as opposed to on the edges of it, in Norway. So we are very keen, and have been for some time, to have CCS projects in Europe. We have made the legislation compatible first of all, because storing waste products underground has been phased out and all of a sudden we want to store waste gas underground. So the legislation had to be changed, and that has been done.

Then there was the European economic recovery programme. At the end of the last mandate, about 2008, we put €4 billion of European money that was unspent in other envelopes of the European Union budget that was deployed. Some of that went to CCS projects, but probably at the feasibility stages. More recently, the Emissions Trading Scheme had designed into it a new entrants reserve, which would basically enable there to be money reserved for new entrants, which could be monetised by the Commission. Indeed, we have made out of it a fund, which we have called the New Entrants Reserve 300, because there were 300 million of these allowances—the NER300. It is very geekish to call it that.

We wished to deploy the fund in two respects. One was on innovative renewable energy technologies and the other was on CCS. The first phase of that fund has been committed to projects; there was about €1.8 billion to be deployed. Basically, no CCS projects made it to the very end. Some came quite close but, for various reasons, none of them came about. The French one was the last to fall, in that the funding from the private investor, ArcelorMittal, was withdrawn at the very last stage. The UK had shortlisted four projects but, again, the Government were not prepared to commit to funding those projects at this stage.

I would make the point that we are looking at an expensive technology, as everybody realises, and only by demonstrating commercial scale plans will we bring down the costs and

make this a less expensive technology. It worries the Commission that the Member States themselves are not able or perhaps not willing to fund this. If they are not prepared to pay for it, one could ask why the European Union budget should be deployed for it. We are now picking up the tab when no one else wants to pay, and that is not our purpose. After all, it is European Union money that you contribute. We are going to try once more; there is one more phase of the NER300 to be funded. Of course, the low carbon price means that we are getting less money for the fund, which is regrettable, but we expect there to be CCS projects that can pass the qualifying criteria.

Q226 Lord Cameron of Dillington: Why did they fall? Was it for technical reasons or political reasons? There is an anti-CCS move in Germany.

Peter Vis: There is, and that may have meant that projects were more difficult to deploy in Germany, but they could have been deployed in other countries. But they have not been, and I do not think that it was the environmental concern about storing CO₂ that was the reason for those failures. It was really the willingness to commit. I think that in every project's case there was a private investor who did not commit the money, or the Member State in question. In the UK's case, it was about process; they were not ready. They submitted four projects, because they could not decide which of the four they preferred. We pressed them to make a choice but they said that they had a process. We would hope to have started the second phase within a matter of weeks—at least, that is when we would have the call for tenders. Then the tenders are submitted, and evaluated by the EIB. It might be the end of this year or at the latest spring next year. We are trying to work towards having that second phase wrapped up by the end of this year.

Lord Cameron of Dillington: I thought that the Peterhead project or pilot scheme was going to go ahead, but I may have got that wrong.

Peter Vis: We need funding from the Treasury; it has to put some money on the line, and it is deciding between projects. I am not in a position to say what the state of play is with regards to the UK, but they have let it be known to us that they would like a bit more time. We have urged them to hurry up, but we must proceed. The point is that these funds are also being deployed in such a way that we want the projects on the ground to start as soon as possible, because only that will create jobs and develop the technologies. Too long a phase of consideration and reflection will lose time.

Q227 Lord Whitty: This is crucial from another point of view. If we are moving to use gas as the transitional fuel for the next 20 or 30 years, gas without CCS will probably mean that we will not meet the climate targets. In a sense, the political will to get CCS up there ought to be deliverable, because otherwise everything else falls.

Peter Vis: But you know that in the last discussion one point being raised to me was about longer-term targets for 2030 and 2050. In our 2050 scenario, we are assuming that CCS is becoming deployed as of 2035 on a fairly wide scale and that from that moment on it is deployed as a matter of routine in the power sector. If there was no CCS, we would have to go back and redo those assumptions, and there would have to be some other means of obtaining those longer-term climate targets, which for now are our reference points. I think that the scientists are going to publish new reports as of the end of this year and next year, but I do not think that the science will have got any less severe in terms of the warnings that it is giving, and the likelihood is that we are increasingly going to find those targets very hard to meet. So without CCS, we are going to be in a difficult situation.

At the same time, the Member States must act collectively. It is easy to blame the EU institutions, because we tend to be the personification of the European Union's action on all fronts, but in the end the Member States have to be ready with us. Our money that we would put into these CCS projects is very small. Per project, we are not talking about big amounts of money. In the French case, which nearly qualified and would have done if ArcelorMittal had signed off, it was €250 million. I do not think that that is a game-changing amount of money. That is why others have to step up to the plate, or whatever the expression is. We cannot do it alone, and the UK is particularly well placed for geographic reasons. It has those offshore storage sites very close. Some countries do not have that opportunity. So if it cannot work in the sites most suited to it, everyone wonders whether it has any future. There is CCS going on in a number of other countries, including in North America. I saw the Alberta Minister of Environment. There is CCS in the context of oil sands being developed, she told me, and there are pilot projects in the US as well. We can talk about being ambitious in terms of climate change, but the action on the ground could be seen as happening elsewhere, certainly in technological terms. Meanwhile, we are struggling with an ETS that is apparently not providing an incentive to make those right technology choices. I had better stop on that, if I may.

Q228 The Chairman: It is pretty depressing, is it not? Would you say that it was a depressing scene?

Peter Vis: I have been engaged in climate change in the Commission for 15 years, and CCS has been talked about in all of that time. It is becoming like nuclear fusion; it is always so many years away.

Lord Whitty: Fusion is a technology problem, whereas this is a resources problem.

Peter Vis: Yes, I think you are right there. That is a good point. The technology has been proven at a reduced scale, and now it is scaling up that we are trying to do.

The Chairman: How much would it cost to build a big demonstration project that would move this on, because we seem to be stalled?

Peter Vis: I do not know, I am afraid. I could not give you a very exact answer.

The Chairman: Where could we get an answer?

Peter Vis: I will try to get you that information, at least for those projects that were shortlisted in the context of the NER300, which in European terms you can say are the most ready to go. I will get that information and transmit it.

Q229 Lord Renton of Mount Harry: You talked about China. Do you regard China as being inevitably very involved, because they will have a great many things that they want to bring into Europe?

Peter Vis: They are involved, from all sorts of perspectives. They are already now the biggest global emitter, and their emissions per capita are getting very close to the European Union's emissions per capita. The forecast demand for energy is scary, if you look at the emissions effects of it. At the same time, they are now the biggest producer of solar panels. Indeed, they are developing solar technology faster and cheaper than we can do. Some people say that that is good, because we are buying some of those solar capacities, and they are deploying them themselves as well. It makes it cheaper that they are doing it on such a scale. Also in the next few years, coming on to 2030 and 2050, there has to be a step change of the sort in which the US and Chinese are involved in the next phase, or this will never be solved.

Lord Renton of Mount Harry: That will be terribly difficult.

Peter Vis: It is going to be terribly difficult, but those two big players play together in that the US will not engage unless China is part of it, and China argues repeatedly that this is a developed world problem that has been caused by the US and now ourselves, and that they are latecomers to the club of big emitters. But we are working very hard on how to progress that—and the discussion is perhaps not about international process. It seems like 2015 will be the year of a very big climate conference, to be held in Paris.

Lord Renton of Mount Harry: This is the French.

Peter Vis: Well, it is the normal annual conference of parties, the UNFCCC annual conference, of which there was one in Copenhagen in 2009. They take place every year, but every five or six years, or at least in 2015, there is expected to be a big one, for which Ban Ki-Moon, the Secretary-General of the UN, has said there needs to be a high-level summit this year or next. I think that it is next year. He is trying to orchestrate it so that there is a big deal to be had there. It is a long and tortuous road to get ourselves in a position whereby we would close a deal, but we are working at it hard.

Q230 Lord Renton of Mount Harry: You have really answered just now one of my questions, which was about the UNFCCC conference in 2015. Going back to greenhouse gas reduction targets, what are your plans for the development of a greenhouse gas reduction policy post-2020?

Peter Vis: It is all tied up. When we go in 2015 to the conference, the European Union goes with a number in its pocket. We did that with Kyoto and we had one in our pocket at Copenhagen.

Lord Renton of Mount Harry: You say that in a not particularly cheerful way.

Peter Vis: I mean to be cheerful about it, but of course it depends what the number is. In the case of Kyoto, we went with 15% reduction for the European Union in our pockets and came back with an 8% reduction commitment. Our offers are made with a view to others matching them. In the Copenhagen conference, we put a 30% target on the table if others were prepared to come on board to a significant degree, but a 20% target would do in any case. That 20% target is what we have done, or what we intend to do and have legislated for, in any case. You cannot go to a big conference like the one in Paris without a target, and it has to be one beyond 2020, because the treaty will take effect from 2020.

All I can say is that the Commission work programme is this year working on a framework for 2030, but a lot of analytical work has to be done. Just to give you a precursor of what that analytical work might say, our 2050 roadmap identified that by 2030 we should be reducing our emissions by 40%, compared to 1990. That was a number that was on the cost-effective trajectory from where we are now to where we want to be in 2050. We must not wait too long, because a lot of the wrong infrastructure has been built in the meantime. Conversely, you could do it all now, when there is a recession, because we could say that we will inflict so much effort and make it so that we reach the targets early. Of course, we are all seeking a cost-effective trajectory, which shows that slow and steady is essentially the answer. With that, we have taken a 40% reduction by 2030 and a 60% reduction by 2040. Those are just studies and analytical models; there is no political endorsement of those targets, but that gives you the range.

Again, I would say that in the context of international negotiations, there are likely to be more ambitious levels if others match—then there might be an attitude of, “We’ll do it anyway”. I do not know. We have not got to that stage; we are doing the analytical work.

Having done that in the roadmap to 2050, we are now looking at 2030 and using it as the benchmark, without really knowing what the international treaty will commit us to, in what year. We are using 2030 for our own exercise. The debate to be had within the EU will not be easy, but there needs to be a discussion of what targets we will have, and at what level. Both those questions will be very difficult, because we have a diverse European Union and Member States have different views. But if you talk about there being more than just a climate target or a renewables or energy savings target, those are things that my Commissioner likes the sound of, but it is not yet agreed that there should be such sets of targets. You will, I think, be deliberating on those sets of issues—cost-effectiveness and technology.

Q231 Lord Renton of Mount Harry: What do the newcomers to the EU think about it?

Peter Vis: They are not a homogeneous group, if you are counting the 12 Member States that have joined since 2004, and I believe that another one, Croatia, will join later this year. Slovenia is quite a wealthy country in GDP per capita, and several of the newer countries—Estonia, Malta and Cyprus—are euro members. So there are different speeds within that group, and they are not homogeneous. However, it is a fact that Poland and the Czech Republic have very heavy industry, as do Hungary and the Slovak Republic—these are countries with sizeable industry sector.

Lord Renton of Mount Harry: Cyprus does not.

Peter Vis: Indeed. But you cannot easily categorise them, just as the old EU 15, as we were, could not be said to be a homogenous group. It was Rumsfeld who put us all in the same basket, calling us “Old Europe”, but we think of ourselves as quite a diverse group and not old, except historically. In the past 10 years the EU has been fusing in such a way that there are newer Member States that are members of the eurozone and there are older Member States such as the UK and Denmark that are not. “New” and “old” do not fit the circumstances. However, those countries could be ambitious too if we can make a good case, and it is the economic case that we must make above all.

Q232 Lord Whitty: Can I ask a question on that, although the action on it is probably for other Commissioners? You have talked about the diversity of the EU, which includes the diversity of its energy structures, but you also talk about cost-efficiency. Part of the argument must be that if we had a more complete internal market, we could attain these targets more cost-effectively. However, that would mean, first, paying for physical interconnection and, secondly, more integration of the regulatory regimes. What weight do you give to that part of the agenda for delivering the climate targets?

Peter Vis: Huge importance. Efficiencies could be gained by there being a network that was robust enough to take off the renewable energy that is coming on. It is a variable source of energy, in the main. There has to be a grid that can take it, and indeed the grid has to be built offshore where it does not already exist. Then, with regard to the energy market, the more efficiencies that we can get, the fewer power stations we will need. The more robust the network, the less capacity you need. Optimising, smart metering, all the things that could save energy at some times of the day and use it at other times when it is flowing but no one is there to use it—those things have enormous potential for climate change. It is very much a feature of my Commissioner’s approach to climate change that it is not about having climate directives; we have rather few directives under our own direct responsibility, although obviously the ETS is one and we are in charge of things like CO₂ standards and fluorinated gases.

However, we are what we call mainstreaming into the other portfolios, which sometimes makes me a bit unpopular. “Mainstreaming” is our jargon word for saying that we want them to think about climate considerations, because in many cases, by strengthening the internal energy market or strengthening energy security, you can at the same time obtain climate benefits. There is a separate Environment Commissioner; if he tightens air quality standards, we can bank on there being some co-benefits in terms of carbon. Similarly, we are engaging actively with agriculture policy and regional policy to make these policies climate-relevant—that is, not contributing more than necessary to emissions and indeed reducing them where possible.

Q233 The Chairman: Do you have the metrics for the impact of all these? Do we know what smart metering would deliver across Europe towards the climate change agenda?

Peter Vis: It is not easy to estimate, measure by measure.

The Chairman: So it is quite hard to make a case economically, then, is it?

Peter Vis: I think that we will find that every measure we propose is impact-assessed. Indeed, environmental impacts are among the impacts that are thought of. It is possible that a smart metering provision would save tonnes of CO₂ and the impact assessment might estimate how many. The reality is that the impact assessments are done; for example, it was the third or fourth energy market liberalisation package that was adopted in the last mandate. The directive talked about unbundling and regulators, and established the European energy regulator. It also made sure that there was a target for the rolling out of smart meters by 2020. All I would say is that when the impact assessment work is done, it looks at the whole thing. The degree of smart meters might have grown or shrunk during the negotiation process, so what you get in the end of it is not always what you started with and have impact-assessed. Our impact assessment work tends to look at the big picture of all the changes that a particular piece of legislation is bringing in; it does not try to break it down. We would like to if we could, but I am not sure that I could give you the measures of the different components of smart meters and so on.

The Chairman: We could go back to the impact assessment.

Peter Vis: You can always do that, yes.

Q234 The Earl of Caithness: Given what you have said, given how little the Commission has in this area because so much is held back for the Member States, and given the assertiveness of countries such as Poland, the whole EU scenario has changed in the past five years, as has the whole energy market. CCS is unlikely to become a major player and, when we are looking at the dilemmas between security, growth, price and climate change, it is climate change that is going to suffer. The rest of the world goes on to do growth and security and we will try to do climate change but not be very successful at it.

Peter Vis: I hear what you say. I could not refute the claim that climate is suffering from the economic crisis, among other things. There are many who are saying that the first job is to get out of the crisis and the second is to solve the climate challenge. My Commissioner is very much of the view that we can and should be trying to get out of the crisis in ways that are climate-compatible. She believes that it is by, for instance, the setting of environmental standards for cars or the fluorinated gases that are used in air-conditioning systems that our inventiveness can be stimulated. Necessity is the mother of invention, and therefore we can stimulate our industry to perform better and develop better products with which they can compete globally. You might say that they would do that anyway if left to their own devices;

I do not know. However, she is convinced that being demanding of industry is a recipe for their success, not their demise.

Capitalist systems are in constant evolution; there are always declining sectors and some that are growing. She believes profoundly that the growing sectors of the future will be those that can be resource-efficient. The competitive advantage vis-à-vis other trading partners of ours will not be low wage costs, because we are never going to have low enough wage costs vis-à-vis South-Eastern Asia, and it is unlikely to be low energy costs because we do not have the energy; the US has it in its own territory to an extent that we do not have, so it is unlikely that we are going to make energy the competitive advantage. But we could make resource productivity one of our competitive advantages; indeed, the EU as a union has managed to decouple its emissions growth from its manufacturing products growth. Manufacturing products—our global exports—continue to grow significantly, and there is a bit of an idea that we are de-industrialising. Well, some of the data suggest that we are manufacturing more and more and exporting these products globally. We must not talk ourselves into the idea that we are losers. We have some state-of-the-art industries that we are very expert in, whether that is gas turbines, industrial products or machine tools. The more that we can add value and make products that everyone wants to buy and that pay for themselves over time through energy savings or whatever, the better.

Q235 Lord MacLennan of Rogart: You have laid out very clearly the rational way to proceed, but you have not indicated that the Commission is prepared to employ sticks or carrots with national Governments, and I do not quite understand why because this is a competence of the European Union.

Peter Vis: Not everything is a competence of the European Union. The energy mix is something for Member States to decide themselves.

Lord MacLennan of Rogart: Energy is a competence. There are qualifications but it is a competence.

Peter Vis: It is true that energy has been at the heart of the EC project since its inception; people will quickly quote to you the Coal and Steel Community. Most of legislation that we are adopting has a legal base that is based on the environment or the internal market. It is only recently that there has been an energy legal basis specifically, thanks to the Lisbon treaty. The extent of the powers of the Commission to use a legal carrot for Member States is limited, much more so than people imagine, because all our legislation has to be adopted by Member States and the Parliament. In the case of non-compliance with the legislation, of course we would go to the European Court of Justice, which can levy penalties on a Member State.

Q236 Lord MacLennan of Rogart: But the area in which we do not seem to be using sticks and carrots is exactly the area that you ranked highest—the growth and recovery area.

Peter Vis: To digress a little about the eurozone crisis, the economic governance of the European Union is becoming more intrusive, due to the need to make sure that there is better economic governance. A few years ago the European semester was started, where every year the Commission starts with what we call the annual growth survey, and we say in general global terms what priorities we would like Member States to focus on in their economic and fiscal policy. Then we discuss that with the Member States and, come the spring, the Commission adopts country-specific recommendations: the UK gets six

recommendations about problems that it should try to address in its annual budgetary process.

The problems that we have addressed in the past two years have included energy efficiency—although not necessarily the UK; every country is different. In a number of cases, we have looked specifically at completing the energy market or improving energy efficiency. I recall that last year we sent energy efficiency explicitly to the Baltic states, for example. At the moment, there is not a very good enforcement mechanism of those country-specific recommendations, but there is going to be stronger enforcement mechanisms in future. However, it is not with my Commissioner that you should talk.

All I want to signal is that we are part of the process and are trying to make sure that energy and climate concerns are looked at, and that recommendations are made to Member States on those subjects. Ultimately, there is what they call macroeconomic conditionality: if a Member State is not doing what it should in terms of its budgetary conduct, it can start losing access to EU funds, which is a powerful tool that no one wants the EU to use, but for a country that is a net contributor it is perhaps less of a stick than it is to those that are net recipients. We are doing what we can, but we are also mindful of subsidiarity.

The Chairman: That is a very good point to stop. Lord MacLennan has made a very good point. Thank you very much; that has been really helpful.

Peter Vis: I thank you for your time. I wish your Committee much success in its deliberations and a satisfactory series of meetings here in Brussels.

RenewableUK—Written evidence

Main points

- The Committee on Climate Change has modelled decarbonisation of the whole UK economy and the lowest cost path to 2050 is to decarbonise electricity by 2030. We concur with this analysis and wish to see Government being clearer that this is the policy intent.
- This decarbonisation of the electricity system can be achieved with a combination of renewables and energy efficiency, implemented at both the UK and EU levels. We would contend that this path has the best ratio of economic benefits to costs of the alternatives available.
- The forthcoming Energy Bill creates an opportunity to set binding commitments to decarbonise the power sector by 2030.
- Clarity on Government energy policy post-2020 is needed. Without added certainty investors will be unable to make the investments needed to meet 2050 obligations.
- UK and EU investment in decarbonisation through renewables will create economic activity and jobs in the short term to boost the economy and in the longer term will reduce balance of payments deficits. As a result, money which would have been spent on importing fossil fuel will be spent within this country, boosting our economy.

Main findings of the energy 2050 roadmap

The European Commission's energy 2050 roadmap looks at various decarbonisation pathways to achieve an 85% GHG reduction by 2050. 'No regrets options' have been identified, which should be taken whatever pathway is chosen. In other words, taking these actions will not be regretted regardless of the decarbonisation pathway:

- Increasing energy efficiency and conservation;
- Investing in a more flexible and smarter infrastructure; and
- Substantially increasing the share of renewables.

Renewables will provide between 55-75% of EU energy consumption in 2050 in all decarbonisation scenarios. In 2030, renewables' share will be around 30% in all scenarios – this share is relatively low because the roadmap delays energy efficiency and renewables investments to the last decade and has very low shares of renewable heating and cooling penetration. The European Renewable Energy Council has modelled a 45% share in 2030.⁹³ In order to ensure that this level of deployment can be attained, and at the lowest cost, the EU should agree to renewable energy targets for 2030, continuing the successful EU policy framework for the sector established and functioning since 2001.

Wind energy is the key generating technology in all of the Commission's scenarios, including diversified technology, high nuclear, and high CCS, and in 2050 provides between 31.6% and

⁹³ 45% by 2030: Towards a truly sustainable energy system in the EU, European Renewable Energy Council, Available at: <http://www.erec.org/media/publications/45-by-2030.html>

48.7% of electricity production. The roadmap shows that decarbonisation is not only possible, while still achieving the same levels of system security, but is also no more costly than business as usual. Only one decarbonisation scenario (the high energy efficiency one) has slightly higher overall system costs than the 'current policy initiative scenario'.

Economic need to decarbonise energy sector

1. The types of renewable energy and infrastructure projects required to meet 2020 targets require years of planning and preparation before they can reach realisation. This means that projects that are not scheduled to come online until sometime after 2017 are already being planned. Complicating this fundamental process has been the uncertainty of Electricity Market Reform (EMR) and other market reforms, which include the new support mechanism in the form of Feed-in Tariffs with Contracts for Difference (FiT CfD). While RenewableUK supports reform of the electricity market, this policy uncertainty is having an effect on investor confidence and may slow down the renewable energy implementation needed by 2020 to meet statutory targets. Swift Royal Assent of the Energy Bill and early provision of details surrounding the CfD, the allocation process for these contracts and the capacity mechanism, would help alleviate concerns. Such reassurance would allow developers and investors to begin actively preparing on an informed basis rather than waiting.
2. In addition to the uncertainty related to EMR and the Energy Bill currently being worked on, there is a serious lack of direction coming from Government as to what the renewable energy policy will be post 2020. It is understood Government envisions all technologies competing with one another in the 2020s, but it is still unclear what is exactly meant by this and when this would go into effect. In the meantime there have been mixed messages coming out of Government surrounding renewable energy trading and post 2020 targets, with language being used around 2030 decarbonisation that leaves a lot of 'wriggle room' for Government. It is critical that Government gives more insight into its energy strategy post-2020 as soon as possible. If 2030 objectives are clear and ambitious we will get more short-term benefit to the UK economy in terms of manufacturing investments as well as delivering 2030 decarbonisation more cost effectively. In particular, specific renewable energy targets for 2030 can help achieve economic growth and technological leadership, as well as energy security, which general decarbonisation objectives cannot do alone as they only promote the cheapest technologies, rather than options which have more innovation and technology export potential. Due to the uneasiness surrounding EMR and uncertainty concerning post-2020 targets there is a real sense of concern amongst investors. Critical investments needed to secure our energy future will not happen until investor confidence is restored.
3. The Committee on Climate Change (CCC) says it is 'crucial in the context of economy-wide decarbonisation that the power sector is almost fully decarbonised by 2030'.⁹⁴ The CCC has modelled decarbonisation of the entire UK economy and the lowest cost path to 2050 is to decarbonise electricity by 2030. We concur with this analysis. The CCC has also outlined the need for early investment to avoid build rate constraints preventing attainment of 2050 objectives. The Committee believes it

⁹⁴ The Renewable Energy Review, Committee on Climate Change, page 40, Available at: http://hmccc.s3.amazonaws.com/Renewables%20Review/The%20renewable%20energy%20review_Interactive.pdf

is not feasible to add sufficient low-carbon capacity to meet the 2050 target without meeting the 2030 decarbonisation goal. Instead, investment is required earlier to achieve the long-term objectives.⁹⁵ In 2010 investments in the wind, wave and tidal industries directly employed 10,800 within the United Kingdom, but they have the potential to employ many thousands more by 2020 and beyond.⁹⁶ In addition to the operation and maintenance of wind farms and marine arrays there is the potential for additional manufacturing plants being commissioned here in the UK. In order to make these kinds of investments the private sector must have a strong understanding of where Government policy is heading in the near future. For offshore wind, this is a once-in-a-technology opportunity to secure an industry for the UK; without early clarity, these investments will be made in other countries.

4. The March 2012 announcement indicating an Emissions Performance Standard (EPS) would allow continued operation of unabated gas-fired plant until 2045 leads to further uncertainty. In its recent open letter to the Secretary of State for Energy and Climate Change, the CCC said a move toward gas is not only dangerous for the investment community but could be illegal. The Committee and others have called for a 2030 decarbonisation target of 50gCO₂/kWh to be included in EMR secondary legislation. While RenewableUK believes that the inclusion of a carbon emission intensity target on the face of the Energy Bill would further strengthen the signal to investors, we are willing to work with a target in secondary legislation if it can be shown to have a significant effect. We believe that a decarbonisation target should be a stepping stone to a 2030 UK renewables target in line with what is being called for in Europe, since this would be the most direct message to the industry, which can then invest confidently in projects and technologies, thus minimising the cost. The two targets would have a hugely positive impact in garnering the estimated £110 billion energy investment needed in the UK alone.⁹⁷
5. Major investment in energy infrastructure will be required with or without an emphasis on decarbonisation and renewable technology. It is most practical to invest in the technologies adding to a country's competitive advantage. The UK is well placed to reap the rewards of wind, wave and tidal stream technologies. Not acting now has a number of consequences, including the opportunity cost of not being the first mover and thus missing out on industrial development. It makes most sense to make these critical investments now to get the maximum benefit. As pointed out in the Energy Roadmap 2050, if investments are postponed they will cost more and create more disruption in the longer term.⁹⁸
6. The UK has made a tremendous amount of progress within the renewable energy sector. It has led to a record amount of electricity produced by wind and the resulting jobs. Continued investment has the potential to cement the UK as a world leader within the wind and marine energy sectors by taking advantage of its natural

⁹⁵ The need for early power sector decarbonisation to meet carbon budgets and the 2050 target (attachment), Committee on Climate Change, 13 September 2012, Available at: <http://hmccc.s3.amazonaws.com/EMR%20letter%20-%20September%2012.pdf>

⁹⁶ Working for a Green Britain, RenewableUK, February 2011, page 7, Available at: http://www.bwea.com/pdf/publications/Working_for_Green_Britain.pdf

⁹⁷ Letter to Rt Hon Edward Davey MP, Committee on Climate Change, 13 September 2012, Available at: <http://hmccc.s3.amazonaws.com/EMR%20letter%20-%20September%2012.pdf>

⁹⁸ Energy Roadmap 2050, European Commission, page 2, Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011PC0885:EN:NOT>

resources. This momentum must be sustained. The European Commission has made it clear that there is a real need to have a post-2020 strategy considered as soon as possible citing the fragile economic environment and the threat of slowing renewable energy momentum. It appears the Commission favours setting national and/or EU-wide targets for 2030, which is supported by its Impact Assessment assessing a range of options.

7. RenewableUK urges UK Government to seriously consider the economic merits of a more explicit post-2020 strategy, including a carbon emissions intensity target for 2030 in the Energy Bill and, ideally, a specific renewable energy target for that date. A comprehensive strategy has the potential to strengthen the UK economy, stabilise prices for consumers and meet legally binding emissions targets.

Energy's contribution to economic growth

8. Decarbonisation, particularly if based on renewables, opens up significant opportunities to expand economic growth. One major reason decarbonisation can spur economic growth is that renewable sources of energy are found locally and require local expertise, equipment and technology to bring them to realisation. Operation and maintenance of wind farms alone result in a number of local jobs. It is estimated that 88,000 direct and indirect full time jobs will be created between 2010 and 2021 within the onshore and offshore wind, and marine industries if a scenario with 41.5GW of these technologies is realised.⁹⁹ In addition to operation and maintenance, turbines and other components need to be manufactured. Companies have determined that it benefits their bottom line by using skilled labour in as close proximity to the project as possible. There is steady employment throughout the life of a wind turbine.
9. At the EU level, the wind energy industry is already a driver for economic growth: in 2010 the wind energy sector – both directly and indirectly – contributed €32.43bn to the EU's GDP, 0.26% of the EU's total GDP for that year. This contribution could increase to 1% by 2030 if European Wind Energy Association scenarios are met. The European wind energy sector has also created jobs in Europe, with direct and indirect employment increasing by 30% between 2007 and 2010, to 238,154, whilst EU unemployment rose by 9.6%. The EU wind industry is projected to employ up to 800,000 people in 2030. Finally, the European wind energy industry is a major industrial exporter: €8.8bn of products and services were exported by the European wind industry in 2010. In contrast, the sector imported €3.2bn of products and services in 2010, making it a net exporter of €5.7bn of products and services.¹⁰⁰
10. Renewable energy trading between other Member States and the UK has the potential to deliver major economic benefits to the development of renewable energy here in the UK as well as the strengthening of the domestic supply chain, as long as the UK becomes a net energy exporting country post 2020, as it has the potential to be at scale. Steps taken to strengthen the renewable industry, such as renewable energy trading, can facilitate the creation of thousands of high quality jobs

⁹⁹ Working for a Green Britain: Vol 2, RenewableUK, July 2011, page 2, Available at: http://www.bwea.com/pdf/publications/Working_for_Green_Britain_V2.pdf

¹⁰⁰ Green Growth: The impact of wind energy on jobs and the economy, European Wind Energy Association, April 2012, page 5, Available at: http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/Green_Growth.pdf

here in the UK in addition to keeping energy costs to a minimum.

11. The Coalition Government has said it remains focused on increasing manufacturing exports to create much-needed jobs here in the UK, and we believe the same should be said for renewable energy. The UK should aim to harness its abundant renewable resources including wind, wave and tidal, and maximise their value as opportunities present themselves. The scope for using the flexibility mechanisms available under the Renewable Energy Directive is limited within the 2020 timeframe – certainly there is not much prospect of net export of renewable power before then. Without the need to comply with a strong renewable target, there is little drive to trade.
12. Europe, through exploitation of its natural resources such as wind, wave and tidal, has the ability to be the world leading generator of renewable energy. Europe's hydro and solar photovoltaic (PV) power has the potential to reduce or eliminate the variability of renewable energy. Already others around the world look to Europe for leadership. This also means they look to the UK and Europe for the expertise and knowledge needed to develop their own renewable sources of energy. Further developing that reputation will continue opening doors of employment, manufacturing and investment all while decarbonising the energy sector.
13. In addition to these direct economic benefits are those arising from addressing climate change and investing in more stable energy sources. Fossil fuels often come from dangerous parts of the world as well as emitting dangerous pollutants into the air. Furthermore, these polluting sources we have become dependent on also add great instability to prices. As energy prices continue to rise it becomes more important than ever to do more to stabilise prices. Renewables such as wind and marine technologies have the ability to stabilise prices as already demonstrated in countries with high wind penetration. RenewableUK has begun investigating the possible existence in the UK of the Merit Order Effect (MOE), where high levels of wind generation result in lower wholesale market prices for electricity, which can partially offset the cost of supporting renewable technologies through policies such as feed-in tariffs. The MOE exists because wind generation displaces power from generators with high marginal costs, resulting in lower prices being set for the market overall. The MOE has been identified in countries such as Germany and Denmark (areas of high wind penetration) where it has often reduced the wholesale price of energy for consumers.
14. Just as businesses strategically place themselves to take advantage of skilled workforces or less expensive labour costs they are beginning to determine their location based on the costs of energy. Analysis has shown that investment in renewables will stabilise prices and prevent them from increasing further than they would without investment in renewables. If Europe is able to successfully keep energy prices down compared to other places around the world then it will put it at a competitive advantage. Business will want to be based within Europe leading to economic growth.

A common EU approach to transforming the energy system

15. The Energy Roadmap 2050 correctly points out that as global energy markets become more interdependent, the EU will become directly influenced by its neighbours.¹⁰¹ With a coordinated European approach to transform the energy system, costs can be kept down by ensuring that systems and resources are not duplicated. Those countries best suited for different types of energy generation, whether that be wind, wave, tidal or some other source such as solar PV, should specialise in whichever technology best suits their resources and characteristics. This is a fundamental economic principle. With a single integrated European electricity market, prices would be driven down. Few other places around the world would be able to compete with this European competitive advantage.
16. The UK offers some of the best conditions for onshore and offshore wind, and wave and tidal energy. With certainty of support would come additional deployment of these technologies in addition to the manufacturing plants that would create thousands of jobs here in the UK. The UK is the world leader in offshore wind and marine technology. It makes economic sense to maintain this position to capture all of the benefits that accompany it. Furthermore, given the UK's natural resources it is well positioned to export renewable energy to the rest of Europe. For this to become a reality further work toward European integration and harmonisation is necessary. Trading amongst European Member States makes both practical sense and will act as a barrier to unstable energy prices.
17. A common European approach of transforming the power system will help keep costs down by:
- Increasing competition: opening all national electricity markets to EU competition will give consumers freedom to choose suppliers, especially in markets dominated by a limited number of players. Suppliers would not be able to pass on price increases to consumers anymore without suffering market penalties.
 - Creating a larger market for businesses, meaning more trading and investment opportunities
 - A common set of market rules giving certainty to investors, securing competitiveness and growth
 - Better and more efficient use of assets and resources e.g. improved congestion management across borders, reserves sharing, trading closer to real-time delivery across borders
 - Aggregation of control zones into larger geographical areas for trading
 - Increased convergence of electricity prices between regions
 - Increased system adequacy by accessing resources from neighbour systems
 - Increased security of supply

The internal energy market

18. Creating functioning markets covering larger geographical regions within Europe, also on the intra-day and balancing level, will reduce the need to balance variable

¹⁰¹ Energy Roadmap 2050, European Commission, page 3, Available at: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011PC0885:EN:NOT>

renewables like wind and solar, and therefore the cost of integrating renewables. Competition should not only focus on transmission, but also on the rest of the supply chain, e.g. on generation and demand side response. Special attention should be given to structural market distortions:

- Regulated prices: regulated consumer prices still prevail in the EU and are a significant obstacle to efficient and fair competition and hinder market entry, infrastructure development and demand response. They do not allow a transparent comparison between generating technologies and they distort markets.
- Market concentration: Energy markets in the EU continue to be highly concentrated. It is important for small and medium-sized (including wind energy) companies to be able to enter the market and compete on a level playing field.
- Market rules designed without renewables in mind: Market rules have been developed with little reference to the increasing amount of renewables foreseen and limited recognition of their technical nature.

Reducing the costs of energy for business and consumers

19. It is not realistic for energy prices to decrease. Independent experts agree electricity prices will continue to rise as the world population does so and more people begin relying on modern technology. There have been advances in energy efficiency and these must continue. However, it is disingenuous for some to insist lower energy prices can be achieved. With investment in new technologies we can hope to stabilise prices for consumers and businesses. Currently an over-reliance on expensive and volatile fossil fuels leaves the UK and other Member States in a dangerous predicament. Home-grown energy such as wind, wave and tidal allows the UK to meet its decarbonisation targets and be less dependent on costly sources of energy.
20. Reducing costs of energy for businesses and consumers can be achieved by increased competition in the market. Removing market concentration and other structural distortions such as historical subsidies for fossil fuels and nuclear energy are imperative for functional, transparent and liquid markets. Regulated prices are a significant obstacle to an efficient and fair competition, as they complicate market entry. They affect consumer preferences over the energy mix by not allowing a transparent comparison between generating technologies and hinder infrastructure development and demand side response.

Gas

21. The Commission's Communication states that 'gas will be critical for the transformation of the energy system' in slight contradiction with the results of its own modelling. Indeed in all decarbonisation scenarios the share of gas as a percentage of gross inland consumption is stable and even slightly decreases from around 25% today to around 23% in 2030, even in the 'low nuclear scenario' which is more reliant on CCS. This is mostly due to electrification, which prevails in all scenarios. Rather than focussing on gas, the Committee should focus on flexibility, including all ways to increase system flexibility.

Research and innovation

22. Investments in research and innovation within the renewable energy sector will not only enable the best renewable technologies to be developed in Europe, but will also translate to other related innovations that can be used in other sectors. For instance, tools and techniques first used for oil exploration in the North Sea have had a beneficial impact on progressing offshore wind development.
23. European-based companies are already making huge advances in research and technology, maintaining European leadership in renewable technology, in particular wind. With these advances will come decarbonisation and growth. In addition to support, companies react to signals from Government. CCC has recommended minimum deployment levels for less mature technologies.¹⁰² A clear steer from the EU and Member States is necessary to induce confidence within the industry. This applies not only to public finance for R&D for renewables, but also to renewable policy. EU wind turbine manufacturers are investing more than 10% of their annual income in R&D because the EU has set ambitious renewable energy targets assuring companies there will be a growing market for renewable energy at least up to 2020. When there is confidence, companies are more likely to be able to invest the time and resources to further advancements in research and technology. Additional research funding from Government can also be helpful in ramping up private investment in research and technology.
24. Due to the European Atomic Energy Community (EURATOM), nuclear energy has had a ring-fenced EU energy research budget, which has secured half of the EU's energy research funds to date for that specific technology. This will continue with 'horizon 2020' the proposed research budget for the 2014-2020 period. Strategic Energy Technology (SET) Plan technologies, which have been identified as the key technologies to 2020 and beyond should be given certainty of funding and be financed in dedicated budget lines. Combining this with an earmarking of 2/3 of the remaining 'non-nuclear energy' budget to renewable energy and energy efficiency technologies would create enough flexibility in the system.
25. Marine technology research and development is currently being led from Britain and it is possible to continue this trend with the right investment and commitment from Government. The UK is incredibly well suited for these technologies given its geography, manufacturing capabilities and know-how. It is important that the already existing expertise in this industry is taken advantage of and that the UK remains the world leader in marine power. The potential of energy generation is huge as well as the job opportunities that come with it.

Conclusion

26. Investment in renewable energy technologies, combined with focus on other decarbonisation initiatives such as energy efficiency, transport technology and refurbishment can have a dramatic effect on the UK and European economies. More certainty from leaders on the direction of UK Government energy policy is needed

¹⁰² Meeting Carbon Budgets – 2012 Progress Report to Parliament, Committee on Climate Change, June 2012, page 112, Available at: http://hmccc.s3.amazonaws.com/2012%20Progress/CCC_Progress%20Rep%202012-bookmarked_singles_1.pdf

so that investors can begin to more comfortably make the huge investments needed to create a future stable energy market. There is no time for delay. Decisions for 2030 and 2050 are needed today as the consequences of not doing so pose major challenges to overcome. The forthcoming Energy Bill creates a critical opportunity to establish a 2030 decarbonisation target for the power sector which would help create certainty for such investments to proceed.

3 October 2012

RenewableUK and Dr Robert Gross—Oral evidence (QQ 93-103)

RenewableUK and Dr Robert Gross—Oral evidence (QQ 93-103)

[Transcript to be found under Dr Robert Gross and RenewableUK](#)

Scientific Alliance—Written evidence

Energy's contribution to economic growth

How can energy policy make its contribution to both decarbonisation and to economic growth? In what specific ways can energy drive economic growth in the EU?

1. A rational and well-considered energy policy is vital for any developed society, but the need for a secure and affordable supply is incompatible with the present decarbonisation agenda, which has arisen from international agreements and, in the particular case of the UK, the Climate Change Act. The only low carbon renewable generating technologies currently capable of deployment on a large enough scale to make a significant impact on carbon dioxide emissions are the horizontal axis wind turbine, photovoltaic panels and solar thermal systems. These requires both subsidy for the operators (currently provided by means of feed-in tariffs, paid via energy bills by consumers and business) and a matching reserve of conventional generating capacity to maintain a balanced grid and continuity of supply. True costs are difficult to estimate except by analysing the total generating and supply network with and without renewables, but there seems little prospect of wind or solar being a significant part of the generating mix without continuing public subsidy unless real progress is made in the development of economic, efficient, large-scale energy storage technologies.
2. If decarbonisation is the objective, this can be achieved most effectively using a combination of gas and nuclear generating capacity. Although arguments continue to rage over the true cost of nuclear power, the best estimates put it below the price of even on-shore wind (and well below that of off-shore wind or solar)¹⁰³. It remains the only proven way of reliably delivering low-carbon base load electricity.
3. If economic growth is to come from industry, it requires a secure energy supply at a cost broadly similar to that of competitive economies. The danger is that EU countries will continue to export jobs to lower-cost economies, particularly where energy is a significant part of their overall cost base. Using public subsidy to expand otherwise non-viable generating options will hold back the economy rather than contribute to its growth. Germany has a large installed renewable energy generating capacity in the form of both wind and solar systems, and its domestic electricity prices are the among the highest in Europe (second only to those in Denmark)¹⁰⁴. However, Germany puts more of the burden on domestic consumers, with industrial competitiveness being protected to some degree via lower energy prices.
4. Claims of 'green' job creation appear to be overstated¹⁰⁵. Many of the jobs come at the expense of existing ones and may be relatively short-term in nature (eg, erection of turbines or installation of insulation). Even plans for developing facilities in Hull and elsewhere to service the off-shore wind farms – promoted as analogous to the growth of Aberdeen as the hub for the North Sea oil and gas industry – are highly dependent on government policy and public subsidy.
5. Some countries – notably Denmark – have enjoyed the growth of industries which make generating equipment sold both domestically and round the world. Vestas, a

¹⁰³ Ruth Lea; [Electricity Costs: The folly of wind power](#); Civitas; 2012

¹⁰⁴ http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Energy_price_statistics#Household_consumers

¹⁰⁵ [Worth the Candle? The economic impact of renewable energy policy in Scotland and the UK](#); Verso Economics; March 2011

Danish company, is a leading manufacturer of wind turbines, but manufactures in a number of other countries and has recently also suffered a severe drop in profitability as demand for its products has fallen¹⁰⁶. There is little chance of the UK or other EU member states not yet directly involved developing a competitive manufacturing base in the wind sector; no European country has any real comparative advantage or novel technologies to challenge the dominance of Vestas and others. The best that could be hoped for is the supply of components and development of an installation and maintenance capability. In the meantime, wind turbines and solar panels are increasingly being sourced from China.

A common EU approach to transforming the energy system

To what extent will a common European approach help keep the costs of transforming the energy system down and assure security of EU energy supply? Where do you see economic growth and decarbonisation benefitting from a common approach to generation, transmission, distribution and storage? And what are the risks?

6. Those in favour of a large expansion of renewable energy generating capacity often argue for the development of a Europe-wide 'supergrid' to balance supply and demand on a regional basis. This is in effect a massive expansion of the situation in Denmark, where the large percentage of capacity provided by wind is balanced by integration into a wider Scandinavian and Germany grid, providing a mix of hydro, coal, nuclear, gas, wind and solar power.
7. Over a wider scale, the argument is that, if wind speeds are low (or too high) in one area, they will be balanced by moderate winds elsewhere thus to some extent smoothing the pattern of generation over time. Similarly, electricity generated from solar panels in favoured areas can be distributed more widely if local demand is insufficient. However, it is not acceptable for this situation to pertain 75% or even 95% of the time; unless the installed renewables can provide a guaranteed minimum output at all times, conventional generating capacity must be held on standby to avoid voltage drops and power cuts. It is not uncommon for large stationary areas of high pressure to sit across most of the continent at times. Under these circumstances, which occur both in high summer, leading to heat waves, and winter, where very cold, clear weather becomes established, the output from wind farms is minimal.
8. Reductions are made in carbon dioxide emissions as wind and solar generating capacity increases, but experience in Ireland and Denmark shows that this relationship is not a linear one. Above a certain percentage of total generating capacity coming from wind or other renewables, no further emissions reduction can be expected¹⁰⁷. This figure, which is in the region of 10-20%, could be higher if a supergrid was in place, but we are never likely (with current technology) to approach a situation where the majority of consumption is from renewables.
9. The costs of achieving these emissions reductions would also be rather high, taking account of the public subsidies needed plus the vast expenditure necessary to construct the Europe-wide grid, using high voltage DC transmission lines. A far more cost-effective approach would be to build new nuclear and gas-fired stations to replace ageing coal-fired capacity. Concerns about reliance on imported gas and price volatility can be addressed most effectively by facilitating exploitation of known shale gas reserves. A common EU policy would be less necessary for this approach.

¹⁰⁶ [Vestas cuts a third of its workforce](#); Financial Times; November 9 2012

¹⁰⁷ For more detailed analysis see, for example, [Wind energy in the Irish power system](#); Fred Udo and [Facts about the saving of fossil fuels by wind turbines in the Netherlands](#); Kees le Pair

Reducing the costs of energy for business and consumers

Is it appropriate to seek to reduce the costs of energy in order to boost EU competitiveness and, if so, how can it be achieved in addition to energy efficiency? To what extent might price reductions jeopardise attempts to decarbonise? What implications, if any, do consumer preferences over the energy mix, such as onshore wind and nuclear power, have for price?

10. Large swathes of European industry, including steelmaking, coal mining and shipbuilding, have been lost to more competitive Asian economies. The centre of gravity of consumer product manufacturing also lies in China. None of these rapidly growing countries is burdened with the decarbonisation plans the EU is committed to. If the dash for wind continues, then so will the export of jobs. Europeans enjoy high rates of pay and can compete globally only in areas where they can add real value, but high and increasing energy costs jeopardise even these parts of the economy.
11. The fact is that ‘decarbonisation’ in one country makes no difference to global carbon dioxide emissions unless it is matched in all significant economies. All the efforts made in the EU simply push the emissions offshore. Suggestions of imposing tariff barriers based on ‘carbon content’ of manufactured goods would simply start a trade war and depress the entire world economy. The recent decision to delay the inclusion of the global airline industry into the European carbon trading system via levies on all flights within or through Europe is a good illustration of the global reality. If Chinese and American companies refuse to pay, the EU has no option but to back down.
12. In these circumstances, the target of decarbonisation at any cost is deeply misguided. It is in everyone’s interest to be energy efficient. Companies and individuals are very happy to save money, even if they care little about reducing emissions. Encouraging further savings makes sense, but this should not be by continuing to raise prices and forcing more people into fuel poverty. With current technology, a move towards a reliance mainly on nuclear and gas generation would reduce emissions from their current levels while providing secure and affordable electricity to industry and consumers.

Gas

Do you agree with the Commission that “Gas will be critical for the transformation of the energy system”, until at least 2030 or 2035? What mechanisms are required to boost the role of gas, securing appropriate investments, but on the proposed interim basis? Does an active renewables policy require gas in support of it? Should the EU encourage the development of unconventional gas?

13. We agree that gas will be critical over this time period and, frankly, it is difficult to look with any degree of certainty any further ahead than that. Gas stations are relatively quick to build and represent a modest investment compared with some alternatives. However, at present coal is the most economic fuel to burn in Europe, which accounts for the apparently bizarre situation in Germany where the recent decision to run down nuclear stations means they will be replaced by coal-fired stations, in many cases burning (highly polluting) lignite.
14. We are not in favour of markets being rigged unnecessarily to achieve an apparently desirable aim, so artificially favouring gas over coal does not seem a sensible step. However, facilitating exploration and extraction of shale gas deposits in countries which wish to do so would be a very sensible move which could deliver an assured supply of domestic gas and, based on experience in America, bring energy prices

down significantly. Equally, there is every reason to begin to look at how offshore methane clathrates could be exploited economically.

Research and innovation

15. Research and innovation on novel or improved energy generation and storage technologies should certainly be facilitated and incentivised (eg via tax credits and grants), but in a competitive way rather than by backing 'winners'. Likely research areas would include:
- Options for large-scale, economic means of storing energy over extended periods. The availability of such technology would potentially transform the contribution which renewable energy could make to a secure supply.
 - Alternative, potentially more efficient and less intrusive wind technologies, including vertical-axis turbines which can be grouped much closer together without reducing output.
 - Realistic options for large-scale wave and tidal power generation, with the proviso that these would be no more useful than wind farms until effective energy storage is available.
 - Novel ways of harvesting solar power, the ultimate source of all our energy. These could include cheaper, higher-efficiency photovoltaic cells and 'artificial leaves' which use the principles of photosynthesis to produce liquid fuel.
 - Advanced nuclear reactors capable of extracting the 99% of energy currently left unused in uranium fuel, and burning highly radioactive actinide by-products to eliminate high-level nuclear waste.
 - Ways to extract gas from offshore methane clathrates economically and safely.
 - Continued improvement in design and construction of new homes and commercial buildings to make them as energy efficient as possible at minimum cost.

23 November 2012

Scottish Power, EDF Energy and SSE—Oral evidence (QQ 186-202)

Scottish Power, EDF Energy and SSE—Oral evidence (QQ 186-202)

[Transcript to be found under EDF Energy, Scottish Power and SSE](#)

ScottishPower—Supplementary Written Evidence

Summary

1. ScottishPower and its parent company Iberdrola support the EU and UK policy objective to decarbonise the energy sector and the broader economy, in a manner which guarantees our energy security and delivers affordable energy for homes and businesses.
2. Efficient investment in energy infrastructure can play a positive role as a catalyst for growth, boosting employment and creating new industries. By efficient, we mean investment that is needed, efficiently delivered and sustainable in the context of affordability for consumers. In the UK the need for investment is intensified as a result of the expected closure of a significant amount of existing power generation capacity, due to the impact of EU environmental legislation on coal and oil plants, and as the existing fleet of nuclear power stations approach the end of their lives.
3. Both in the UK and across Europe, the scale of the decarbonisation challenge dictates that governments and policymakers will play a vital role in establishing the future energy market frameworks and removing barriers to investment. However it is important that the benefits of competition are retained and, where possible, solutions should be pursued which can be delivered within a broad market framework.
4. Getting the timing and pace of the transition to a decarbonised energy sector right will be important. In balancing the overlapping policy ambitions of decarbonisation, security and cost to consumers, it is likely that a diversified mix of generation technologies will be required, with unabated flexible gas generation and some coal plant existing as part of a balanced portfolio alongside renewables and nuclear.
5. In maximising the UK's decarbonisation potential it will be important to assess the potential of all viable low carbon power sources including, for example, emerging technologies such as marine and Carbon Capture and Storage (CCS). This will include providing sufficient support to gain proper visibility of the long term costs of the technologies concerned. In the interests of affordability and sustainability of the policy regime, it will however make sense to prioritise lowest cost, more mature technologies such as onshore wind to maximise deployment potential at least cost.
6. Irrespective of the technology choices, we believe that the decarbonisation ambition will only be successful if consumers understand the true cost of energy policy options. It is therefore of vital importance that all stakeholders communicate and engage fully with final energy consumers on the costs of delivering the chosen policies.
7. Similarly, any future commitment to a legally binding decarbonisation target for 2030 must also include a commitment to the costs involved. We believe that this is a decision for Government and policymakers at a national and European level, not the power sector, although we look forward to engaging in the further policy work in this area in due course.
8. Continued weakness in the price of carbon under the EU Emissions Trading Scheme (ETS) has led individual Member States to promote their own solutions to incentivising new

low carbon power generation. In the medium to long term it will however be important to implement measures to ensure a carbon price trajectory via the ETS which provides an investment signal for low carbon generation across Europe.

9. Unilateral policy interventions by Member States in this area, such as the introduction of a carbon price floor in the UK, are unlikely to play any meaningful role in decarbonisation or delivering new investment but are likely to drive up the cost of energy in the UK, particularly for energy intensive industries.

10. Above all, a stable regulatory framework is an essential component in providing investors with the confidence to invest many billions of pounds in the energy sector to deliver a new energy system. In that regard we welcome the UK Government's commitment to the Electricity Market Reform (EMR) programme to deliver investment in the low carbon generation needed over the next decades and in their commitment to stick to the agreed delivery timetable.

11. Where there is a clear and bankable long term commercial and regulatory framework, Iberdrola and ScottishPower have demonstrated their willingness to invest. As one example, Iberdrola have committed to centre investment efforts in the UK with £3.5 billion of investment allocated (42% of total global investment) in the period from 2012-2014.

Answers to the Committee's questions in the Call for Evidence.

Energy's contribution to economic growth

The dominant theme of the Commission's energy 2050 roadmap is decarbonisation, with a particular focus on renewables. How can energy policy make its contribution to both decarbonisation and to economic growth? In what specific ways can energy drive economic growth in the UK?

12. Energy policy can contribute to both decarbonisation and economic growth through supporting efficient investment in large scale low carbon power generation and energy infrastructure. Efficient investment is investment that is needed, efficiently delivered and sustainable in the context of affordability for consumers. It can boost net employment and create new opportunities. Such benefits will accrue from investment in the power generation and networks sectors and include direct employment during construction and continued operation, as well as the growth in supply chain and other services to support these new or revitalised industries.

13. The push for decarbonisation and associated policies to incentivise energy efficiency will offer further benefits to EU and UK competitiveness through delivering improved industrial productivity, more efficient business processes and cost reduction (assuming that these initiatives focus on cost-effective energy efficient opportunities). In the domestic sector, Government and energy supplier sponsored initiatives to increase energy efficiency in the home are contributing to economic activity through growth in, for example, home insulation and energy services.

14. Similarly, electrification of the heat and transport sectors with appropriate technologies offers the potential for the UK to meet an ambitious long term trajectory for decarbonisation of the sector.

A common EU approach to transforming the energy system

To what extent will a common European approach help keep the costs of transforming the energy system down and assure security of EU energy supply? Where do you see economic growth and decarbonisation benefitting from a common approach to generation, transmission, distribution and storage? And what are the risks?

15. In general terms the development of an integrated energy market across the EU will improve the overall functioning of energy markets and remove current inefficiencies which result from incompatible market design or, in certain Member States, a lack of competitive markets. In theory, European decarbonisation can be achieved at the lowest cost by providing a strong policy framework which provides the appropriate price signals for investment in low carbon generation, interconnection and demand side response.

16. However, many of the policy competencies remain at national level, as do responsibilities such as security of supply. Experience with the EUETS has indicated that while total emissions have remained within the envelope laid down, it has not played a material role in the enhancements to energy efficiency or the growth in low carbon generation. While this may change in the longer term, this would depend on international agreement and cannot at this stage be relied upon. Clearer signals are therefore needed to drive investments to enable the UK to prepare for tougher emissions limits in later years and meet specific renewables targets. For this reason, national programmes such as EMR are indispensable in the short to medium term.

17. For the UK, there may be benefits of a stronger European energy market over the medium term through the ability of a larger EU market being able to accommodate increased volumes of intermittent renewable generation and from increased availability of interconnection with neighbouring markets. There may also be benefits in terms of increased liquidity in GB electricity and gas markets.

The Internal Market in Energy

The internal market in energy is focused on transmission. Should competition in the rest of the supply chain be given greater consideration? What economic opportunities may arise from such consideration? What risks arise?

18. Coordination of the general market arrangements has already commenced in order to deliver the initial objectives of a single energy market by a hoped-for target of the end of 2014. Development of common network codes for electricity and gas, followed in due course by the progressive harmonisation of market arrangements, will aid the development of competition across the energy value chain and remove some of the remaining barriers to investment, for example in new interconnection. We believe that liberalised, competitive energy markets will deliver the optimal economic, environmental and social outcomes for Europe and for final energy consumers.

19. Whilst it will be important for the internal market to develop across all parts of the value chain, we believe it is pragmatic that the Commission has focused initially on the transmission and trading arrangements, as these elements will form the building blocks of the liberalised EU energy market. It is however important that the requirements of the 2nd and 3rd Energy Packages are enforced in full to ensure the full benefits of competitive markets can be enjoyed in due course.

20. ScottishPower believes that as the liberalisation of the EU energy sector develops in the coming years, including fully competitive markets in generation and energy retailing, this will deliver economic opportunities for efficient operators to compete at a Pan European scale. This, coupled with appropriate market oversight from ACER and National Regulatory Authorities, will ensure wholesale and retail markets are priced efficiently and all EU customers can enjoy the full benefits of competition.

21. From a UK perspective, the key risks arising from further activity on completing the EU internal market on energy are likely to relate to the ensuing regulatory framework. Delivering the single EU energy market is a significant undertaking, and operating within a set of overarching competitive market principles is likely to lead to changes in the existing market arrangements in each Member State (as witnessed by the ongoing network code developments being pursued by ENTSO-E and ENTSO-G). The challenge will be to ensure that moving to new market arrangements does not dilute the benefits of competition currently enjoyed in the UK or lead to high transitional costs.

Reducing the costs of energy for businesses and consumers

Energy is a significant manufacturing input and household cost. Is it appropriate to seek to reduce the costs of energy in order to boost competitiveness and, if so, how can it be achieved in addition to energy efficiency? To what extent might price reductions jeopardise attempts to decarbonise? What implications, if any, do consumer preferences over the energy mix, such as onshore wind and nuclear, have for price?

22. It is important for all stakeholders to recognise that the transition to a decarbonised electricity system is likely to lead to higher unit energy costs than experienced today, in particular from the higher cost of low carbon generation and network investment. Cost-effective policies on energy efficiency can be expected to mitigate the impact of decarbonisation to some extent, and will be a key priority. Ultimately, there is a trade-off between the pace of decarbonisation and the near/medium term bill impacts; it is for policy makers to judge that trade-off and justify the outcome.

23. This is a particularly thorny question in relation to energy intensive industries as the UK and Eurozone economies seek to remain competitive within the global context. In several Member States it has become necessary to provide direct support to energy intensive industries to reduce the cost impacts of decarbonisation policies or exempt them from some of the costs. These measures are of course subject to State Aid guidelines.

24. Indeed, it is clear that having investment in energy intensive industries occur overseas where it may otherwise have taken place in the UK is not only damaging to the UK economy but (in the absence of a global agreement on reducing carbon emissions) can lead to 'carbon leakage' impacting negatively on efforts to reduce global warming.

25. Of course, steps taken to protect particular sectors from energy policy costs are likely to lead to higher costs for other sectors. Accordingly, these steps cannot be seen as a magic bullet solution that will resolve these difficulties by themselves. It will remain important for policymakers to seek cost effective solutions and weigh affordability carefully in their calculations.

26. In terms of investment in new power generation, customer preferences for particular technologies (e.g. onshore wind, nuclear) may be impacted by factors other than the cost of generating from that technology. To help achieve affordability it will be important to prioritise investment in more mature low carbon technologies such as onshore wind so as to maximise deployment at lowest cost.

27. One area that has little impact on affordability is energy supplier profit margins. The segmental accounts produced by integrated suppliers show that these are already very thin, leaving no scope to offset the policy costs that are now in bills.

Gas

Do you agree with the Commission that “Gas will be critical for the transformation of the energy system” until at least 2030 or 2035? What mechanisms are required to boost the role of gas, securing appropriate investments, but on the proposed interim basis? Does an active renewables policy require gas in support of it? Should the EU encourage the development of unconventional gas?

28. We agree that gas has an important role in the EU energy mix for the foreseeable future. It is a reliable and flexible source of generation which is relatively inexpensive and quick to build. Gas can provide flexibility to the grid through its ability to operate either at baseload, or in a more flexible regime to support intermittent and other, less flexible sources of generation.

29. In the UK, the Government has recently published a Gas Generation Strategy which envisages a significant role for unabated gas, including significant investment in new gas fired generation in the period to 2030 to replace older coal, gas and nuclear plant as it retires from the system. As the Gas Strategy document suggests, if the UK continues to operate within the legally binding Carbon Budgets, then it is to be expected that load factors for the new gas plant would be lower than has traditionally been the case. This would have a clear impact on the revenue stream for such plant, which would need to be replaced to ensure that the necessary investments come forward.

30. In markets where the “energy only” market cannot deliver a sufficient price signal for new investment to come forward, the Government has identified that a capacity mechanism will be required and ScottishPower agrees with this assessment. A market-wide Capacity Mechanism will be crucial to incentivise cost-effective investment in existing and new thermal plant to maintain security of supply over the next decades. The need for its introduction in the UK is increasingly urgent as highlighted by Ofgem’s recent assessment of capacity in 2015/16. We therefore welcome the UK Government’s commitment to legislating for the introduction of a Capacity Mechanism.

31. We consider that early introduction of a Capacity Mechanism is important given the future economics of thermal generation in light of the UK carbon price floor and of increasing wind and nuclear generation on the system. We therefore welcome the fact that the Government is minded to introduce a first Capacity Mechanism auction in 2014.

32. We believe the development of new gas generation can be complementary with an active renewables policy and the broader ambition of decarbonising the energy sector. In particular, we do not see the building of gas generation as locking in carbon. The short run marginal cost of wind and nuclear plant will be below that of a CCGT and so these low

carbon plants will normally run ahead of gas whether or not the gas station has capital which needs to be remunerated.

33. We are not experts on the potential for unconventional gas in the UK. However, we would support the development of reserves that do exist providing that it is economic and environmentally acceptable to do so.

Research and innovation

We would welcome views on how the EU can most effectively support research and innovation as catalysts for decarbonising energy and driving growth, and how EU energy policy can be sufficiently flexible to take account emerging new technologies.

34. Well funded public / private research, and general EU research funding (for example through the EU Commission Framework Programme process) are both likely to play an important role in ensuring innovation benefits are enjoyed by the energy sector, however it is likely that direct financial support for pilot and demonstration projects across a wide range of technologies will deliver the greatest benefit towards decarbonisation.

35. The Scottish Government's proactive support for emerging low carbon technologies such as marine energy offers a good example of what can be achieved in this area. Strong and stable direct financial support via the Renewables Obligation is ensuring multiple solutions are currently under development in an attempt to demonstrate commercial viability of this potentially valuable technology.

36. In general terms, European and Member State sponsored research and development programmes will need to cover a wide range of technology solutions including low carbon generation technologies, energy storage, energy efficiency, smart grid and electrification of transport as just a few examples. Ensuring funding can flow to "real world" demonstration projects in each of these areas will be important.

37. National Regulatory Authorities can increasingly play a role in this area, and UK regulator Ofgem's awarding of funding for research and innovation projects via the Low Carbon Networks Fund represents a good example of best practice in this area.

38. Availability of finance for emerging technologies, for example through the UK's Green Investment Bank or from the European Investment Bank, offer further potential solutions in this area, as do increased international collaboration from within the energy industry and across academia.

14 February 2013

SmartestEnergy Ltd—Written evidence

Energy's contribution to economic growth

1. The dominant theme of the Commission's Energy 2050 Roadmap is decarbonisation, with a particular focus on renewables. How can energy policy make its contribution to both decarbonisation and to economic growth? In what specific ways can energy drive economic growth in the EU?

(1) We note that energy policy in the UK has been successful in encouraging an increasing proportion of renewable generation. Due to the Renewables Obligation and Feed-in Tariff schemes, investment in renewable generation has become much more attractive. The FIT incentive scheme was arguably too successful as the take-up (particularly of solar PV) was much higher than anticipated and led to early cuts. Now a degression mechanism is in place and we hope that future schemes are designed with predictability in mind so that investors can have the confidence to invest in projects with longer lead times.

(2) Investment in renewable technology requires innovation. If Europe achieves a leading role in the renewables industry this can contribute to economic growth as the products can be manufactured and exported.

A common EU approach to transforming the energy system

2. To what extent will a common European approach help keep the costs of transforming the energy system down and assure security of EU energy supply? Where do you see economic growth and decarbonisation benefitting from a common approach to generation, transmission, distribution and storage? And what are the risks?

(3) A common European approach could help ease the pressure of capacity margins as there are different peak electricity periods in each country during the day and throughout the year. Electricity can be transported to balance the variations across the continent. It would help facilitate the incorporation of renewable generation as the larger the geographical region co-operating the more likely that renewable generation will be used to its full potential.

(4) A common European approach would also allow generation to be located where it is most economically viable with competition continuing to drive costs down. Costs should converge and consumers should not be disadvantaged by electricity crossing borders but instead benefit from the cheapest electricity at any point in time.

(5) There is a risk that not enough is done to make all the different systems compatible and create a fully-functioning pan-European market. There is also the risk of over-reliance on other countries. Lastly, there is the risk that due to the easing of pressure on capacity margins too many countries might reduce investment in their energy networks which could hinder internal transfer of electricity or (depending on location of the network) could hinder other countries if energy is unable to pass through effectively.

The Internal Market in Energy

3. The internal market in energy is focused on transmission. Should competition in the rest of the supply chain be given greater consideration? What economic opportunities might arise from such consideration? What risks arise?

(6) Clearly there should be free competition in the retail markets so that generators have a choice to get their power to market; either through the wholesale market or direct to customers.

Reducing the costs of energy for business and consumers

4. Energy is a significant manufacturing input and household cost. Is it appropriate to seek to reduce the costs of energy in order to boost EU competitiveness and, if so, how can it be achieved in addition to energy efficiency? To what extent might price reductions jeopardise attempts to decarbonise? What implications, if any, do consumer preferences over the energy mix, such as onshore wind and nuclear power, have for price?

(7) Reducing the cost of electricity reduces the incentive for energy efficiency and hence should be designed so as not to hide the true cost of electricity.

(8) The EU operates in global markets. It would be inappropriate to seek to reduce the costs of energy in order to boost EU competitiveness. If total manufacturing costs are cheaper elsewhere so be it. Subsidy merely moves cost of products to other areas of the economy. Global solutions are required to tackle emissions so that everyone is on a level playing field.

(9) Subsidy levels within countries such as the UK could make UK businesses uncompetitive compared to other European countries (due to the taxes collected to fund them), therefore there would need to be some harmonisation to enable a fairer competitive pan-European market.

(10) The impacts of consumer preferences are hard to predict. Offshore wind seems more popular than onshore wind but as it is more costly a greater proportion of this type of generation would raise energy bills. However, regardless of consumer preference, the most ideal sites for onshore wind will eventually be saturated and force development to the more expensive offshore versions anyway.

(11) Also local opposition to wind farms, pylons etc. often requires some sort of 'compensation' which is another element contributing in some way to raising its cost. Consumers have the option of 'green tariffs' from a number of suppliers which suggests that some are willing to pay a premium for renewables or low carbon in general.

Gas

5. Do you agree with the Commission that "Gas will be critical for the transformation of the energy system", until at least 2030 or 2035? What mechanisms are required to boost the role of gas, securing appropriate investments, but on the proposed interim basis? Does an active renewables policy require gas in support of it? Should the EU encourage the development of unconventional gas?

(12) We do not see competition between renewables and gas as a 'one or the other' situation. A diverse energy mix is important for security and not one type of fuel/technology

can be relied upon due to the scale of demand and uncertainty. Greater interconnection, as already mentioned, can help reduce the capacity margin needed and can enable renewables to provide back-up for other renewables across the continent.

(13) We need to be wary of being in a situation where gas needs to be actively subsidised. As it is an established technology with short lead and pay back times this should not be the case.

(14) As a substitute for coal, gas is a sensible choice due to its lower carbon emissions. In the UK there are tax breaks already to incentivise gas, such as the Brown Field Allowance announced this year. Discussion of further incentives can delay investment as some developers wait for the chance of a more profitable option.

(15) Unconventional gas is a bit controversial and there have already been reports calling for greater safety and environmental regulation to enable this source of energy to become more acceptable. It must be remembered that areas around the world are different. The impacts of shale gas in the U.S. should not be expected to be fully replicated in the EU.

Research and innovation

6. We would welcome views on how the EU can most effectively support research and innovation as catalysts for decarbonising energy and driving growth, and how EU energy policy can be sufficiently flexible to take into account emerging new technologies.

(16) A clear, legally-binding target for beyond 2020 would give investors a clear signal of political commitment and greater confidence to invest in low carbon electricity. Transparency and predictability are good policy traits for which to strive.

3 October 2012

SSE—Written evidence

0.1 SSE is a UK owned and based company operating in the UK and Ireland. It has interests in the generation, transmission, distribution and supply of electricity and gas. SSE is currently the UK's second largest generator of electricity and the second largest supplier of gas and electricity.

1) Energy's contribution to economic growth

The dominant theme of the Commission's Energy 2050 Roadmap is decarbonisation, with a particular focus on renewables. How can energy policy make its contribution to both decarbonisation and to economic growth? In what specific ways can energy drive economic growth in the EU?

1.1 SSE believes that the energy sector as a whole has a crucial role to play in boosting economic growth and the decarbonisation of the UK and EU. In the UK the electricity and gas sectors bucked the economic trend, investing more than £11 billion in 2011. Since 2008, the number of people directly employed in the sector has grown from 83,000 to 136,500 to 2011, in addition to the 518,000 that are indirectly employed by the industry, through supply chains¹⁰⁸. These jobs are regionally distributed across each of the regions of the UK.

1.2 In regard to decarbonisation, the electricity sector will have a vital role in decarbonisation, as the heat and transport demand becomes increasingly electrified. Therefore decarbonisation of the electricity system is crucial to meeting 2030 and 2050 decarbonisation targets, and renewables have a key role to play in decarbonisation and security of supply policy objectives.

1.3 To decarbonise the electricity system there needs to be significant private investment in low carbon generation and the infrastructure that supports it. UK and EU energy policy needs to provide energy investors with a stable long term investment climate to secure investment in the sector.

1.4 Key to providing stable investment framework delivering low carbon investment and jobs is the development of a robust long term carbon price. The EU Emissions Trading Scheme needs to be strengthened to provide low carbon investors with a long term trajectory for low carbon investments and the UK should be at the forefront of driving this work

1.5 Additionally, SSE would support the introduction of binding targets for carbon reduction, renewables and energy efficiency to provide industry certainty over the UK's long term commitment to each thus enabling greater economic growth.

2) A common EU approach to transforming the energy system

To what extent will a common European approach help keep the costs of transforming the energy system down and assure security of EU energy supply? Where do you see economic growth and decarbonisation benefiting from a common approach to generation, transmission, distribution and storage? And what are the risks?

2.1 SSE believes that a common European approach is essential with regards to UK and EU

¹⁰⁸ Ernst and Young (2012) - Powering the UK

decarbonisation objectives, whilst maintaining security of supply at the lowest cost to the consumer. SSE would encourage further cooperation on EU level and integration of national markets, whilst leaving the Member States responsible for how to support specific technologies and to take measures to maintain security of supply. Furthermore SSE believes that investment in the generation, distribution and supply of energy will significantly contribute to economic growth, if the right policy measures at EU level will be taken:

- 2.2 The EU should **introduce a ‘2030 Climate and Energy Package’**, including binding targets for carbon reduction, renewables and energy efficiency to set a longer term perspective, to create a stable investment climate.
- 2.3 The **EU ETS should be strengthened** to provide a robust carbon price to support investments in low carbon technologies.
- 2.4 **Support schemes for renewables should remain the responsibility of Member States.** Although they should be compatible, they shouldn’t be harmonised at EU level, to enable Member States to adapt support to national circumstances.
- 2.5 Member States should be allowed to introduce a **capacity mechanism of its preference**, to maintain security of supply.
- 2.6 **Incentives for interconnection of national markets should be developed**, including financial support, smoothening permitting procedures and addressing cross boundary regulatory issues.
- 2.7 The EU should acknowledge the **significant potential of electric storage heating** and its ability to smooth peak demand, by stimulating the deployment of these technologies.

3) The Internal Market in Energy

The internal market in energy is focused on transmission. Should competition in the rest of the supply chain be given greater consideration? What economic opportunities might arise from such consideration? What risks arise?

3.1 SSE believes that competition has provided significant downward pressure on prices and additional service benefits for customers. Therefore, SSE supports increasing competition within the EU by the creation of a European internal energy market, which should primarily focus on the integration of energy wholesale markets.

3.2 Although as generation markets differ significantly across the EU, for example in the way low carbon generation and capacity availability is supported, further harmonising these national schemes could have a negative impact on both security of supply and reaching decarbonisation targets.

4) Reducing the costs of energy for business and consumers

Energy is a significant manufacturing input and household cost. Is it appropriate to seek to reduce the costs of energy in order to boost EU competitiveness and, if so, how can it be achieved in addition to energy efficiency? To what extent might price reductions jeopardise attempts to decarbonise? What implications, if any, do consumer preferences over the energy mix, such as onshore wind and nuclear power, have for price?

4.1 There is a short term temptation, particularly in the current economic situation, to invest in fossil fuels to drive down costs for consumers and industry. This strategy would adversely impact medium to long term costs to consumer, as the long term trajectory for energy prices is upward and this is driven by finite fossil fuels. In this regard, driving energy efficiency uptake is key to both reducing consumer energy bills and ensuring the long term competitiveness of industry in the UK.

4.2 Although, it must be remembered that the UK has some of the lowest energy prices in Europe. In 2011, the UK had 3rd lowest domestic electricity prices including taxes in EU15 and the 2nd lowest domestic gas prices including taxes in the EU15¹⁰⁹.

4.3 Currently support for renewables in form of the Renewables Obligation (RO) and the Feed-in-Tariff (FiT) adds in the region of £25 on the average domestic dual fuel bill. This investment in renewables will help to bring down costs in the long term and insulate the UK from volatile international energy markets. The UK Government is replacing the renewables support mechanism under the RO in favour of a low carbon support mechanism to include nuclear and CCS, the Contracts for Difference (CfD) to be legislated for upcoming Energy Bill.

5) Gas

Do you agree with the Commission that “Gas will be critical for the transformation of the energy system”, until at least 2030 or 2035? What mechanisms are required to boost the role of gas, securing appropriate investments, but on the proposed interim basis? Does an active renewables policy require gas in support of it? Should the EU encourage the development of unconventional gas?

5.1 SSE agrees that gas will play a critical role in the near term decarbonisation and security supply and objectives and in the long term as flexible backup plant as there is greater penetration of intermittent renewables. To ensure that flexible gas plant can balance the system at times of supply shortage post 2030, it is important that gas CCS is available so that gas plant are able to be retrofitted with carbon abatement technology. This alone makes developing CCS on gas vital for meeting the UK’s legally binding carbon targets.

5.2 SSE does not view that there is significant volumes of cheap unconventional gas extractable in the UK and Western Europe that occurred in the US. If shale gas extraction is cheaper elsewhere in the world and exerts a downward pressure on the UK gas market indirectly, as happened with shale gas extraction in the US, this could deter investment in low-carbon electricity and energy efficiency uptake in the UK, leaving the UK overexposed to gas price volatility in the medium to long term. Therefore it is imperative that the UK

¹⁰⁹ DECC (2012) - Energy price statistics - http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/prices/prices.aspx

leads Europe in attempts to strengthen the EU ETS and to encourage low-carbon generation and energy efficiency to insulate the UK from potential price volatility.

6) Research and innovation

We would welcome views on how the EU can most effectively support research and innovation as catalysts for decarbonising energy and driving growth, and how EU energy policy can be sufficiently flexible to take into account emerging new technologies.

6.1 SSE believes that EU support for energy research, development and demonstration (RD&D) could be improved, focussing on the following elements:

- **6.2 A major increase in RD&D** is needed in order to realise the EU's energy and climate objectives and to ensure its future competitiveness.
- **6.3 Risk sharing is the key element in financing energy RDD developments** that aim to bring strategically important technologies to the commercial stage. SSE is concerned that Member States and the European Commission are not taking an appropriate share of risk on energy technology development where they are best placed to manage them.
- **6.4** Energy has to become a central part of the European funding for research and innovation within the new budgetary proposal 2014 - 2020. **The Strategic Energy Technology (SET) Plan should have an independent budgetary line** within that proposal in order to deliver the expectations.
- **6.5** In order to have the best results, **technology-tailored support should cover the whole innovation cycle**. Particular attention should be given to enhancing market deployment of the new energy technologies as they determine success towards the ambitious energy and climate targets.
- **6.6** In order to enhance industrial participation in the EU funded programmes and to allow more innovative projects to be delivered, it is key to **remove generally administrative hurdles related to the EU RD&D programmes**. Flexibility should be considered to provide room for bottom-up initiatives. In this regard, the Commission should create information and support platform for all interested parties.
- **6.7 Better presentation and coordination of the EU research and innovation related programmes and actions** (i.e. past / on-going and planned) are essential.

9 October 2012

SSE, EDF Energy and Scottish Power—Oral evidence (QQ 186-202)

SSE, EDF Energy and Scottish Power—Oral evidence (QQ 186-202)

[Transcript to be found under EDF Energy, Scottish Power and SSE](#)

SSE—Supplementary Written Evidence

1) Energy Sector investment - The most recent study on macroeconomic benefits of jobs and growth from energy sector investment has been by Ernst and Young, on behalf of EnergyUK. The headline stats for 2011 are:

- Capital investment in the electricity and gas sectors is over £10billion or 12% of total turnover.
- There are 137,000 people directly employed in the electricity and gas sector, up 6% from 2010. Indirectly the industry employs 655,000. These jobs are regionally distributed away from the traditional economic centres, with Scotland, Wales, the North East, the North West and Yorkshire and the Humber seeing compound annual growth rates between 2008 and 2011 of between 11 and 46% at a time when the overall workforce in these regions shrunk by between 0.6% and 1.9%.

The majority of these jobs will be secure for the long term, as they are involved in the generation, transmission, distribution and supply of electricity and gas. The report in full can be found here –

<http://www.energy-uk.org.uk/publication/finish/5-research-and-reports/298-powering-the-uk-ernst-a-young-report-on-the-role-of-the-power-and-gas-sector-in-the-wider-economy.html>

The job estimates that are less certain are from the low carbon sector, particularly renewables, as these are susceptible to a number external factors, most notably around the weakening political support around decarbonisation and the cliff edges that renewables face in 2017 when the Renewables Obligation (RO) closes and 2020 when the UK's renewable targets expire. Having a 2030 renewables target will provide the supply chain certainty to invest in the UK for the long term bringing both economic and job benefits as well as allow the supply chain to invest R&D and innovation to bring the costs down.

The most accurate study of potential jobs in the renewables sector have been undertaken by RenewableUK. Their latest estimate put the number of people directly employed in the renewables sector at over 12,000 people as of April 2012, and predict that on a medium deployment scenario, there could be over 55,000 jobs in the sector by 2021, with a further 30,000 jobs created indirectly.

The report in full can be found here -

<http://www.renewableuk.com/en/publications/reports.cfm/Working-for-a-Green-Britain-Volume-2>

2) Marine renewables - On wave and tidal we see that the UK has a significant potential in marine renewables, and it has a role to play in the UK's energy mix. As such we are developing early stage projects in collaboration with a number of technology partners in for both near shore and deep water wave and tidal in Orkney:

- Brough Head - up to 200MW near shore wave joint venture with Aquamarine Power
- Cantick Head - up to 200MW tidal joint venture with Open Hydro
- Costa Head - up to 200MW wave project
- Westray South - up to 200MW tidal project

We also are looking at prospective developments across the UK, and view that the current

level of support from the ROC regime is the appropriate "pull" mechanism to bring these developing technologies to market and achieve real cost reductions over time. But it must be remembered that for emerging technologies at the early stage of development, they need the "push" mechanisms, such as appropriate support frameworks and upfront capital support to assist in bringing them to commercial viability in the future. An excellent case study in this regard is the development of the Danish wind industry and how it developed.

This can be found in the following report from Aquamarine Power –
<http://www.aquamarinepower.com/sites/resources/Reports/2654/The%20Danish%20wind%20industry%201980%20-%202010%20-%20Lessons%20for%20the%20British%20marine%20energy%20industry.pdf>

As with the renewables industry as a whole, RenewableUK have the most accurate study of employment in marine renewables industry, and in 2021 RenewableUK report that with deployment on a medium scenario trajectory, there could be over 10,000 people directly employed in the industry, with an additional 6000 indirect jobs.

The report in full can be found here –
<http://www.renewableuk.com/en/publications/reports.cfm/Marine-SOI-2012>

3) Electricity storage - Electricity storage has huge potential to help balance the grid as a greater penetration of intermittent generation comes onto the system. Coupled with flexibility options through demand side response (demand aggregation, EVs, time of use tariffs etc), interconnectors and smart meters, electricity storage has the ability to facilitate the distribution networks to operate more intelligently to allow the UK to become more efficient with the electricity it produces.

Currently pumped storage is currently the cheapest form of electricity storage, and as part of SSE's generation portfolio has pumped storage sites in operation (Foyers - 300MW), in construction (Sloy - converting existing 152MW plant for 2014) and development (Coire Gals and Balmacaan in Great Glens - 300MW to 600MW each) in Scotland.

But electricity storage as part of our networks business is particularly exciting. A project that we are undertaking as the grid operator in Shetland, is the NINES (Northern Isles New Energy Solutions) project, which will use new technologies to help operate the grid in more intelligently to maximise resource efficiency. The project involves:

- Replacing old inefficient storage and water heaters in 1,000 homes with modern 'smart' storage heaters which help to balance the electricity network;
- Adding a new electric boiler to the existing district heating system.
- Deploying new technology on the network that will allow more small scale renewable generators to connect to the network;
- Introducing new commercial arrangements to encourage businesses to change the times at which they use most energy; and
- Installing a 1MW battery, part-funded by DECC, at Lerwick Power Station.

More information can be found at - <http://www.ssepd.co.uk/News/NINES/>

25 January 2013

Professor Jonathan Stern—Oral evidence (QQ 141-156)

Evidence Session No. 7

Heard in Public

Questions 141 - 156

WEDNESDAY 12 DECEMBER 2012

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Giddens
Lord MacLennan of Rogart
Lord Renton of Mount Harry

Examination of Witness

Professor Jonathan Stern, Chairman and Senior Research Fellow, Natural Gas Research Programme, Oxford Institute for Energy Studies

Q141 The Chairman: Professor Stern, welcome. Thank you very much for coming to see us today. We are sadly depleted by weather and illness but we are fortunately quorate and we have been very much looking forward to seeing you, so thank you for getting here today. If I may, I will just deal with the formalities we have to go through before we start. You should have in front of you a list of the interests that have been declared by this Committee's members. This is a formal evidence-taking session of the Committee. A full shorthand note will be taken. This will go on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript and you will be able to revise it in terms of minor errors. This session is on the record. It is being webcast live and subsequently will be available on the parliamentary website.

I do not know how you would like to do this, Professor. Would you like to have a scene-setting or go straight into the questions that we have shared with you and are keen to get your views on?

Q142 Professor Stern: I am happy to go straight into the questions.

Q143 The Chairman: Thank you. If I may then, I will start with the question of gas price setting in the internal market and globalisation. As you can see, the main theme of this is the move away from the gas price being tied to the oil price. In the book *The Pricing of Internationally Traded Gas*, which I have read, there is a very interesting insight into this.

Q144 The interesting thing for us is that the domestic gas price reforms will be increasingly driven by international gas prices, and I think there are three questions. Could you explain to us how the setting of EU gas pricing is evolving and what the key variables are? I suppose the key question is the interplay between the long-term contracts, those fixed contracts, and the spot market prices and how those two things work together. The other question concerns those outside the EU, particularly Norway, Russia and Algeria probably, and Qatar to some degree, but Algeria because of its proximity, and the longer-term question of how you see this gas market evolving and particularly the impact of things like North American shale gas on prices, the knock-through effect of that, and how that may play out in the short and long term. Rather a lot of questions, I am afraid.

Professor Stern: Let me make a start. I think the key thing to say is that, since 2008, European wholesale gas prices are being increasingly influenced by hub pricing and that is pricing at hubs like the NBP in the UK but also TTF in the Netherlands, the German hubs NCG and Gaspool, and Zeebrugge in Belgium. It is our calculation and indeed others' that, either this year or at the latest next year, the majority of gas sold in Europe will be based on hub prices and not on oil-linked prices. This is a transition that is about half over. To some extent it is being held up by the fact that the two non-European major suppliers—that is, particularly Gazprom of Russia and Sonatrach of Algeria—are opposing this move. They want to retain oil-linked pricing for long-term contract gas, but I would say that they are basically losing this battle. It is a bit of a generalisation but a reasonable one to say that virtually all Norwegian and Dutch gas is now sold at hub-based prices.

Q145 The Chairman: Could you just stop and explain hub-based pricing to us?

Professor Stern: In competitive markets, the way that prices tend to be formed is at hubs. The UK was the first country to do this in Europe; the US did it before the UK. But in the UK we have a virtual hub called the National Balancing Point, or NBP. This is not a physical location, as the Henry Hub is in the US, it is a virtual location. With our tariffication system, which is an entry-exit system, all gas that is delivered into the UK network is deemed to be at the National Balancing Point and so all gas is priced at the National Balancing Point. You do not sell any gas in the UK except at NBP prices. Increasingly, partly through EU reforms and partly through national reforms, other EU countries are moving in that direction. It is the aim of the EU's Third Energy Package that all gas in the EU will be priced at hubs, so hub pricing is gradually taking over.

Q146 Lord MacLennan of Rogart: Who determines the hub price?

Professor Stern: The idea is the hub price is determined by the interplay of supply and demand, so it is truly a market price. As a market price, of course, it varies from day to day and from hour to hour, if it is allowed to do that, but the notion is that we move from a relatively rigid system such as the previous oil-linked price. In the UK we had a different system that was not based on oil but was equally rigid. Hub-based pricing is a system where supply and demand on a continuing real-time basis sets prices.

Q147 Lord MacLennan of Rogart: Who are doing these measurements, these calculations about supply and demand?

Professor Stern: What happens is on a particular day, for example we have a very cold day today, there will be a lot more demand from all kinds of customers: residential customers, industrial customers and power generators, and those customers will have their demand aggregated, to some extent, by the big supply companies. That demand will be balanced by supplies from a variety of sources: the UK continental shelf and a variety of imports and also

gas coming from storage. It is the National Balancing Point price that will move up and down in response to supply and demand. Next week, when we understand the weather will be warmer, we would expect the price to be lower because the demand will be less. But that would not be the case if we had a problem with any of our supplies. It is an ongoing market price on a day-to-day basis.

Q148 Lord Renton of Mount Harry: How does it work? I used to be in the London Metal Exchange and we had, in a forum, bidders and sellers. How does it work, the actual, “I want this today. What’s it going to cost me”? Do they go to an individual, British Gas, or what?

Professor Stern: No, it is an exchange-based price mechanism. There is a market operator and an exchange operator. You can buy gas either from brokers or directly from sellers, depending on exactly who you are and how big a demand you have, but the price is set by an exchange operator. It is completely removed from the actual commerce of those who are buying and those who are selling. This system has been operating in the UK now for a very long time. We are well ahead of the continental Europeans who are, at this present point, still setting up the details of many of these hubs.

Q149 Lord Renton of Mount Harry: Sorry to go on, but who is the exchange operator?

Professor Stern: I am sorry, I have lost the name of it for the moment but essentially they are an independent exchange operator. It is not involved in buying or selling gas. They are simply operating an exchange. I can give you the name. I have just blanked on it at the moment.

The Chairman: It is like the Stock Exchange. It is somebody who just makes the market.

Professor Stern: That is right. They are market makers.

Lord Renton of Mount Harry: Presumably at the Stock Exchange you have different people going up and down all the time.

Professor Stern: No. For example, the IPE, the International Petroleum Exchange, is a major exchange that provides a price, but they are not the people who operate the NBP market. I can supply you with that name.

Q150 The Chairman: We are pressed for time and I think this is quite an important question. How do we know which gas comes into the hub? Gazprom is shoving gas into its lines and the Norwegians are putting the gas in.

Professor Stern: We do not know. For an undifferentiated product, we have no idea where any gas that we use comes from. The only way in which you can absolutely say, “This is gas from a certain country”, if, for example, the Norwegian gas lines come into particular locations in the UK. That is Norwegian gas. If you get a tanker of LNG coming into Milford Haven from Qatar or from Algeria, that is Qatari or Algerian gas. But we do not know whose gas we are using when we start up our central heating.

Q151 The Chairman: Right, yes. I guess it is the pricing point then; perhaps if we go back to that.

Professor Stern: Yes. Perhaps I can just carry on with trying to address your questions. We still have long-term contracts in continental Europe. In the UK we do not have what are traditionally referred to as long-term contracts. We have contracts of between three and 10 years. The long-term contracts in continental Europe are more like 15 to 30 years. What is

happening is a progressive changeover of the prices on those long-term contracts from oil linked to hubs.

As I think I said previously, both Gazprom and Sonatrach of Algeria are resisting this. Particularly with Gazprom, they have reached a rather strange hybrid arrangement whereby the base prices in the contracts are relatively close to market prices, but the indexation—that is, the way the price changes over time—is still largely indexed to oil. This is a messy arrangement which means that, at the end of the price period, the buyer gets a rebate from Gazprom if they have paid too much for the gas in relation to the market (hub) price. But my contention is that we are in the middle of a transition and, within three or four more years, virtually all gas sold into Europe will be sold at hub-based prices.

The key issue to understand is that the determinants of hub-based prices are very complicated to list. As I mentioned before, on one level it is a reflection of supply and demand for gas at any particular time, at any particular location. But if we look at the supply of gas, that supply is influenced not just by European supply and demand; it is influenced by global supply and demand. This is a phenomenon of the last three or four years. If we had been talking five years ago, this would not have been apparent.

If you have a phenomenon like the US shale gas revolution, which has turned the US from being a potentially large-scale importer to being self-sufficient and possibly an exporter in the future, or if you have an incident like the Fukushima nuclear accident in Japan, which has shut down all the nuclear stations and greatly increased the need for more LNG imports, this has a knock-on effect in Europe. The key thing to understand is that the market is evolving in the direction of a joined-up regionalisation. It is quite difficult to put it more definitely than that. Some people refer to it as a global gas market but that is, in a sense, confusing because you have in your mind the global oil market and it is not and will never be as fungible as the global oil market. Oil is a truly global market. Gas, at the moment, and I think for a long time, will be regional markets that have price linkages between them.

You asked a question about the extent to which the wholesale price is set by exporters. Again, the price is a function of supply and demand. It does not seem to be well known in the UK that European gas demand over the last few years has been in free fall. In 2012, European gas demand will be down to the levels of the 1990s. We have lost over 10 years of growth of European gas demand. This is confusing because of the International Energy Agency referring to a “golden age of gas”. We appear to have entered a dark age of gas in Europe. This tremendous decrease in demand, including incidentally in the UK, is leading to some difficulties in saying what is setting the price. What I think you are interested in is that the big suppliers, Norway and especially Russia, have a big say in price levels because they are able to increase or decrease their volumes in order to influence the price level, but that influence is limited because of demand reduction and also because of the progressive globalisation of the market.

How I try to explain this in the book is that at certain times of the commodity cycle—gas is a commodity and, like all other commodities, it moves in cycles of surplus and shortage—particularly shortage times, these countries will have very great influence on the price. At other times, they will not.

Q152 Lord Giddens: Forgive me for being late. In relation to what you said—a downward fall in European demand for gas—is that the result of recession, in your view, primarily? Second, do you think Gazprom is going to turn towards China more in the future? That has been discussed for ages and we know they would have to build new facilities and so on, but

do you think, if Europe becomes a kind of iffy market for them, they would turn more towards China?

Professor Stern: The reduction in European gas demand is definitely partly a function of recession, but it is a function of a lot of other things as well. It is a function of the great increase in renewables in a number of other countries. It is a function of low coal prices and also a function of the fact that gas has been maintained at artificially high oil-linked prices for far too long. It is simply out of kilter in the pecking order of energy prices. The combination of those impacts has seen declines in gas demand to levels that we never expected to see.

In terms of the Russians and China, as you say this is a very long-running story. Of course, it would make absolute sense for the Russians to export more gas to Asia and they have long had plans to do so, but they have thus far been relatively unsuccessful. They still have not managed to sign a deal with the Chinese. Every few months they say they are on the point of doing so, but then they do not. Their new plan that was announced a couple of months ago, which is to take gas from the Yakutia region to the coast and liquefy it and export it, is very sensible in strategic market terms but extremely expensive and will, anyway, not happen until the latter part of this decade and that is if they go ahead pretty much immediately.

There is no sense in which, if Europe does not play ball, Russia will export gas to China or Asia instead. In any case, the gas that it will be exporting to Asia comes from the eastern part of Russia rather than the part of Russia from which Europe gets its gas.

Q153 The Chairman: Just before going to Lord Renton's question, what does Gazprom need as a price to get that stuff out of Siberia into the European market? Clearly, as you said, in terms of where there is high demand, they will have great pricing power, but when there is low demand, like now, and their pricing power is weak, what does it cost to wheel that gas into Europe? Where does it cease to be economical for them? Say, they are the equivalent of the Saudis in the oil business, they are the balancing power, and there is a moment when they keep pumping but it is not economic.

Lord Giddens: Half of it leaks away anyway.

Professor Stern: Again, these are complicated questions, but perhaps I could put it to you like this. Gazprom would like to see a price of around \$10 per million Btu.

The Chairman: \$10, right.

Professor Stern: Now, they could probably make money at a price below that, but they would like to see about that price. Of course, they would like to see a higher price, which is what they have at the moment on oil-linked prices, but something to keep in the back of your mind is that Gazprom is no longer the only gas producer in Russia. There are other gas producers with much lower costs than Gazprom and those companies are beginning to take over the domestic market from Gazprom. The monolithic face of Russian gas is changing very rapidly. What is very interesting is that, for all other companies, the cost base is lower and for some it is significantly lower.

Q154 Lord MacLennan of Rogart: I want to go back to this question of the hubs where the prices are determined. Can you give an indication of what the percentage variation between the hubs in western Europe might be day-to-day or month-by-month?

Professor Stern: We have done quite a major study of this that shows that if you look across north-west Europe—so if you are looking from the UK to the Netherlands, to Belgium to Germany to Austria—you see relatively little variation over a long period of time. You might see the odd daily variation because of something particular that happens in a

country, but the hub prices are becoming more and more co-integrated across north-west Europe.

In the east, there are no significant hubs, so they are in a different situation. The east is dominated by Russian gas at the moment without hubs, although they plan to develop some. The south is, again, a different story. Spain is dominated by LNG. Italy, although more diverse, has been somewhat set apart from northwest Europe, but it is interesting that in the last six months the Italian hub price is coming more into line with north-west Europe. It has some way to go. We are still talking about a price that, on many days, is 20% above north-west Europe. But what you see, which is what you would expect given the way that liberalisation and competition is rolling out, is a trend towards increasing price co-integration across Europe; that is, prices that can be explained by transportation distances between hubs.

Q155 Lord Renton of Mount Harry: I still find myself puzzled by the hub price because in one way you are saying there is one international petroleum unit that sets the price almost minute by minute, but then, equally, there are obviously other big sellers who do not use that unit. Is that correct?

Professor Stern: No. The UK is a good example. In the UK, it is virtually impossible for anyone buying or selling gas not to use the NBP price. That is the market price in the UK. In other countries, where hubs are developing but not as well developed, you may well find big players still buying at oil-linked prices under their long-term contracts will be losing a lot of money and that is part of the problem and why this process is rolling out so quickly.

Q156 Lord Renton of Mount Harry: Yes. That leads on to what I wanted to ask you. We are a body that looks at the European Union all the time. How much do you see there is room for the exploitation of unconventional gas? Obviously one thinks immediately and particularly about shale gas, but how much difference is there going to be because of unconventional gas?

Professor Stern: I have, shall we say, unfashionable and unpopular views on this. We have done a lot of work on European shale gas and we published a big study two years ago where we said we doubted very much whether European unconventional gas would yield any significant production this decade. People said we were very pessimistic, overly pessimistic. I have to tell you that in the two years since that report, the results have been much more disappointing than even I believed. I doubt very much whether, in any European country, we will see more than a couple of billion cubic metres a year of shale gas, or indeed any other unconventional gas, being produced this decade.

Post 2020 we could see a different story, but the key thing here is whether we are going to drill very large numbers of wells, because that is the only way we are going to know what our real potential is. All of these potential recoverable estimates are interesting geologically, but they do not mean anything in terms of produceability and commercial viability. I draw your attention to the fact that two years ago there was a huge amount of hype about Polish unconventional gas. Once they started to drill wells, they found that the resource base was not that promising. We have seen quite big companies pulling out. I believe that unconventional gas is a real prospect in maybe three or four countries in Europe.

Lord Renton of Mount Harry: Which ones?

Professor Stern: Probably Poland, Romania, Bulgaria and, under certain circumstances, the UK, but that is going to require public tolerance of drilling and fracking large numbers of wells. I do not see that public tolerance around at the moment. Just to give you an idea of

the scale of this, I spent last week in Houston at a big meeting at the University of Texas because I wanted to see the results of their major survey, the first survey that has ever been done of the drilling in the Barnett Shale. They have results— not models, real data—for 16,000 wells that have been drilled in the Barnett Shale in order to produce this unconventional gas. They have done it—

Lord Renton of Mount Harry: 16,000?

Professor Stern: 16,000 wells, yes. The US drills 45,000 wells every year of which 80% are fracked. This technology is on a scale that we cannot imagine. In this country I cannot remember whether we have drilled two wells or four wells, but the key thing is that people in Europe just do not understand the scale on which the drilling needs to take place. In the future, it may be possible to reduce the scale of that drilling but I think what you can say is, if in any specific country you have drilled 100 wells, you may know something about the resource base. If you are going to produce shale gas on any scale, you probably need to be drilling somewhere between 300 and 500 wells a year, every year. But I do not think 100 wells have been drilled in the whole of Europe, looking for unconventional gas. We simply do not know the properties of the resource base and we are not going to know them until we have done that kind of work.

Q157 Lord Renton of Mount Harry: Is it correct that in the United States now shale gas is being sold locally at \$2 but it is still being sold at \$22 to China?

Professor Stern: No.

Lord Renton of Mount Harry: No? I heard that. It may be true.

Professor Stern: No. North America is a very unusual place in that they have drilled massively on the Lower 48. What happened was, when they realised they knew how to commercialise shale gas, they simply went back to their seismic and their drilling logs and they had all the information they needed. Today, or at least last week—sorry to go back to the hub price—the Henry Hub price in the US was \$3.50. That was up from \$2 earlier this year. So the price from the US has nearly doubled in less than a year. That fits in, incidentally, with virtually all estimates, either academic or consultancy or by anybody else, that the long-run marginal costs of dry shale in North America is between \$5 and \$6 per million Btu. The wet shale, which they are now increasingly commercialising, is about \$3 to \$4. We think the long-run marginal cost, even in the US, is higher than it is today.

China is importing LNG from a variety of Pacific basin countries and it is importing pipeline gas from Turkmenistan.

Lord Renton of Mount Harry: From?

Professor Stern: Turkmenistan in central Asia. The price of those imports varies from a low of about \$8 to a high of about \$16 because of the peculiar way in which Pacific LNG is priced, but the key thing is that China is a major domestic gas conventional gas producer. It has some unconventional gas, mainly coal bed methane at the moment, and it is trying to develop shale gas, but again our work on Chinese shale gas suggests similar results to Europe; nothing much this decade, maybe in the 2020s.

Q158 Lord Renton of Mount Harry: Just to sum up, you are saying you are not expecting any more large deposits of unconventional gas to be found in Europe?

Professor Stern: No, I am saying that they may be found but it is going to take 10 years to commercialise them.

Lord Renton of Mount Harry: Because of price?

Professor Stern: Not necessarily because of price; because of environmental intolerance to the scale of the drilling that needs to be done to establish the technical characteristics and, therefore, how to develop the shale. Unless you allow large-scale drilling, you are not going to be able to commercialise this resource by drilling one or two wells; like you can, for example, for a conventional gas field.

Lord Renton of Mount Harry: Thank you.

Q159 Lord Giddens: I just wondered what you think this means in terms of European versus US competitiveness, because part of our brief is about job creation and a return to some kind of growth. We are already talking about bringing quite a lot of industries back to the US partly because of the price of gas. That is not the only factor, but is that not going to inhibit European competitiveness in your opinion?

Professor Stern: Yes, it is. I do not expect the US gas price to rise much above \$6, whereas I do not expect the European price to fall much below \$10. I think there is a significant competitive disadvantage on gas-based industries.

Lord Giddens: That means we might be stuck with coal.

Professor Stern: I think what will have to do, and I know you want to move on to this at some stage, is think about how the relationship between gas and renewables enables us to move to a lower carbon energy balance. But one of the great ironies, which I am sure you have been told about in other evidence, is how Europe has sucked in cheap US coal and backed out natural gas over the last year or two.

Q160 Lord MacLennan of Rogart: Slightly moving the focus, we have read recently in the Financial Times about the fact that we have something like 4% to 5% of storage capacity for gas of our annual demand. That is very low compared to other European countries. Why is this and does it have any significance?

Professor Stern: The reason for our low storage is historical. It is because, when the UK continental shelf was operating at its maximum, we simply used the flexibility in the fields as storage; in other words, when we needed more gas, British Gas used to instruct producers to turn up the flow and then, when we needed less gas, they turned down the flow. Now, with the UKCS in decline, we are in a different situation. I have spent a long time trying to persuade Committees like yours, but also in published work, that we do not have nearly enough storage in the UK for a market our size.

Something happened in the last decade that I think none of us anticipated—I certainly did not see the scale of it coming. We now have a huge volume of LNG and pipeline import capacity and that gives us some more flexibility to bring in gas, either by pipeline or LNG tanker, at short notice. It also gives us quite a significant amount of stored gas at LNG terminals that we were not expecting. The UK's position has therefore changed a little, but I do not think it impacts the main point that I am concerned about, which is that we do not have enough storage either for short-term disruptions or for strategic disruptions as, for example, we experienced in February 2006 when the Rough storage was knocked out for a period of months.

There have been a lot of reports about this and the best one, in fact, is by the late Malcolm Wicks. He did a report on UK energy security, not just gas, and that was published in the last few months of the previous Government. That came to the conclusion that we needed a great deal more storage and I basically endorse that, but I can tell you that, with the kind of

market framework we have at the moment, we are not going to get that storage. We have a big study of this coming out quite soon at Oxford. Simply, the commercial side of this is that it does not pay to build large-scale storage in the UK.

I know the Government has indicated in the last two documents they issued a couple of weeks back that they will look at this again, but what has tended to happen over the last five years is that all Government documents have looked at it and they have said, “No, we do not want to distort the market and we are not going to do anything”. I do not really have any expectation that we will build more storage, but we should.

The Chairman: That is very clear.

Q161 The Earl of Caithness: What is fascinating from the evidence we have received is how the whole energy market has changed in a totally unpredicted way from 10 years ago. You have told us that we can rule out unconventional gas from shale for the next 10 years. What about carbon capture and storage? Here was going to be one of the great solutions to our problem and we seem to be getting nowhere with that. Looking into your crystal ball, where do the next 10 and 20 years take us?

Professor Stern: Carbon capture and storage, again we have done some work on this recently in Oxford and what we have concluded is that the technical side is not a big problem. We know how to do this technically. The problem is the commercial side. It is quite a similar situation to storage. When you look at the complexity of the commercial chain—that is, trying to fit the pieces together between the people who produce the CO₂, those who will transport it and those who will store it—and the fact that all of those actors have to make some money out of this (otherwise they are not going to do it)—it is going to be very difficult.

In our study, we looked around the world at carbon capture and storage. I did not do the research, but I personally was astounded at how little is going on in terms of CCS projects. There is not a single CCS project that is taking CO₂ from a power station and storing it. The only successful projects for carbon capture are enhanced oil recovery projects. You have some enhanced oil recovery projects where the CO₂ is taken and then injected into oil fields in order to enhance the recovery and you have, very recently, CO₂ storage from Canadian oil sands. The reason you can do that in the oil projects is the price you are getting for the oil. That is what makes these projects work commercially.

For regular power generation, there is nothing that will make it work and, in fact, it is a huge drain on anybody's commercial model. That is why, even with the offers of £1 billion of subsidy, you see no take-up. Something has to happen very soon for carbon capture and storage from regular power stations to become a technology that anybody wants to invest in on a large scale.

The Earl of Caithness: What is that?

Professor Stern: The first thing that has to happen, I think, if we are serious about it, is that Government has to pay for one of these projects to happen, so that we see, on a commercial scale, “Can this happen, yes or no?” Then maybe we can reduce the cost of it. But, of course, the other problem is it does reduce the efficiency of the power station very substantially; so, again, the cost of that power is much higher than it otherwise would have been.

Q162 The Earl of Caithness: But do you think this is likely in Europe—you said a Government has to make a decision—when Germany seems to have set its face against carbon capture and storage?

Professor Stern: I suppose the best way to answer that is to say that it depends whether other low carbon solutions prove to be easier and cheaper. At the moment, what is interesting is that our author, Howard Rogers, is quite optimistic about carbon capture but, having read his study, I am rather pessimistic about it because I just think the commercial side of it is so incredibly difficult that I cannot see it being put together.

As I say, for me, some Government has to say, “Right, we are going to fund at least one project and we are going to try to do this so that we see what the real commercial problems are and whether, having at least done one project, we can reduce the cost”.

Q163 Lord Giddens: Do you see any difference between CCS for gas and CCS for coal?

Professor Stern: There are differences and there is some dispute as to whether CCS for gas is easier and cheaper than CCS for coal—the differences being whether the stream of CO₂ in gas is more difficult to collect than the stream of CO₂ in coal, as opposed to the fact that, of course, you are collecting less CO₂ out of the gas stream rather than the coal stream.

My feeling is that CCS for gas is easier because you have to have a pipeline bringing the gas to the station, which means that, once you have established a pipeline bringing the gas to the station, you can establish a pipeline taking the CO₂ away from the station. It does not impact the complexity of the storage, but at least you have a transportation system that you have already established that can be replicated for CO₂.

Q164 Lord Giddens: It makes a huge difference because, if we are going to use gas as a transitional technology towards a low carbon economy, we would need at some point to have CCS for gas operational to make sure that it would not get locked in and just defeat the purpose.

Professor Stern: I completely agree with you and that is why we have pursued CCS as a research interest in our unit. We need at least to have a project somewhere, even if it is not in Europe, where we can see what the experience is of building it and then running it.

Lord Giddens: But could it come above gas and coal?

Professor Stern: I am hesitant to say that it could. Potentially it could, but my guess is that what somebody would want to do is take a very large station somewhere, so you had economies of scale, or maybe a place where you have a cluster of stations, and then try to run a big project out of there to see what the parameters would be.

Q165 The Earl of Caithness: I would like to move on to another question and that is gas in the EU’s future energy mix. If one has to balance security, climate change, cheapness, the “trilemma” as we all know it, what is the right proportion for gas over the next 10 to 20 years? It has been termed as a bridging technology, but how are you going to get companies to invest in a bridging technology where they can guarantee a decent rate of return over the life of the plant?

Professor Stern: Can I start by saying two things. It is impossible to say anything about Europe as a whole. You have to speak about individual countries and that makes things very complicated.

The Chairman: Could you just expand on that, because we are an EU Committee and we have to write an EU report?

Professor Stern: Absolutely. Let us take the two biggest markets in Europe. In Germany, I think gas is being progressively phased out of power generation, and renewables and coal will essentially take Germany forward. We have now a large amount of mothballed plants in Germany and it is simply not profitable to run them under any circumstances because, unlike most countries, their new coal-fired plant can follow the intermittency of the renewables sector. In the UK, I believe we have the opposite scenario where we, essentially, are going to phase out a lot of old plant and, as far as I can see, for at least the next 10 years our power sector is going to be largely run by renewables and gas. We will need the gas both as medium load and also to follow the intermittency of renewables.

You can go around the countries and talk about them individually. Spain and Italy are a bit more like the UK. Eastern Europe is much more like Germany. But you cannot talk about Europe as a whole and the role of gas in Europe without looking at those very substantial differences, both currently and going forward, in individual countries. My feeling about Europe as a whole, if you aggregate everything, is that we are beginning to see the decline of gas in Europe; not in all countries but in Europe as a whole.

You are an EU Committee so you will not be including Turkey. If you include Turkey, that ruins the whole picture because their gas demand is still increasing in double digits. But in the EU, I think we are probably going to see the decline of gas in Europe in numerical terms.

Q166 Lord Renton of Mount Harry: What about nuclear?

Professor Stern: I am not saying this because I am pro or anti-nuclear. My guess is that we will see very little new nuclear built in Europe for a variety of different reasons, some relating to environment, some relating to cost. I thought this before Fukushima; I think it even more after Fukushima. I simply think that, with the kind of electricity systems we are creating in Europe, we simply will not see very much nuclear built.

Lord Renton of Mount Harry: What about France? Are they not the ones who depend most on nuclear?

Professor Stern: They depend most on nuclear but the current President, at least when he was campaigning, was talking about reducing the share of nuclear. Whether he does that is another matter. They may replace what they have. I do not think they are going to increase very much, and there is nowhere in Europe that I see nuclear increasing its share. The big question for nuclear in Europe is: as the older stations close, will they be replaced by new stations? My guess is not at the rate at which we are going to see stations close over the next 10 to 15 years.

Q167 Lord MacLennan of Rogart: Describing, as you have, the diversity of national experience in this area, do you think the European Union can attempt to bridge some of these gaps by helping to finance research such as carbon capture and storage? It would obviously have different benefits and disbenefits in different countries, but overall, if we are looking for ways out of the problems, should the Union not be investing in that despite these differences?

Professor Stern: Coming from a research institute, I am always in favour of financing research. The key question is: where do you put your research money? That is the difficulty that I have and I am sure you have heard the phrase about picking winners and the difficulties of doing that, but at the moment what I see is a real difficulty in knowing what the Union

should be focusing on. Should it be focusing on a next generation of renewables? Should it be focusing on carbon capture? Should it be focusing on advanced nuclear? It is not obvious where the right place to put that money is.

One very interesting area, although I am not remotely a scientist or a technical person, is storage of electricity because, if you can resolve even a part of that, the renewable intermittency problem becomes much easier and you begin to move, I think, much more easily into a low carbon future that you can see is both sustainable and affordable.

Lord MacLennan of Rogart: Thank you.

Q168 The Earl of Caithness: I just want to know, Professor, if you wanted to add more to the original question that I asked before we went off at tangents.

Professor Stern: Yes. The key thing here is that all countries now, or virtually all countries, are running commercial electricity systems. If you are going to build a gas-fired power station, a new CCGT, very roughly, depending on a lot of things like electricity prices, gas prices, your internal rate of return, and the size of your station, you will have a pay-back period of about eight or nine years if your station runs at 75% load factor. If your station is running on middle load or backing up renewables and only running at 50% load factor, you are going to increase that pay-back period to about 15 or 16 years. I understand that in 2012, UK CCGTs were running at below 40% load factor. That is the reason why today we have about 4 GW of CCGTs mothballed, not running at all in this country, and about 10 GW that are fully permitted but nobody is going to build. We have to understand that, depending on the properties of both the market and how we see these CCGTs operating, companies are going to need to have inducements like capacity payments or something similar if they are going to build new CCGTs.

Incidentally, one of the things I found totally baffling is that, although I completely welcomed the Government's gas generation strategy, I could not understand the reaction to it where everybody was saying, "We are going to have a new dash for gas. We are going to build all these new gas-fired stations". These stations are already pretty much a reality. We have them, we are not running them, and we could build many more very quickly. I think people do not generally understand that if you are going to get a lot of gas-fired generation built, if that it is what you want, then you have to change the market framework in order to make that happen. It is not a situation where we do not know where we are going to build these stations or whether they can get planning permission. That is not a problem with gas.

Q169 The Earl of Caithness: In order to keep the lights on, are we going to have to induce more gas into the UK?

Professor Stern: I confess, I hate the phrase "keeping the lights on" because I think it gives the impression of the lights going out everywhere because we have not built enough capacity. That is the wrong way to look at it. My feeling, as I said before, is there has been a lot of agonising about the UK power situation but I have always thought it was completely straightforward. We are going to build as much renewables as we can and the rest will be gas. There is not a problem about keeping the lights on. The only question is: is that going to give us the carbon reduction that we need? For me, it is a very simple equation. There has been a lot of agonising about it, but I do not know why.

Q170 Lord Giddens: Could you say what you think of the German experiment and what is the likely outcome, especially in relation to decarbonisation and the continuing plans for lignite? We have heard different views on it because some people say these stations will

never been built, the coal-fired ones are the ones. Other people seem to think that they will be built because they will have to be built.

Lord Renton of Mount Harry: I was just saying to my colleague it is totally impossible to hear you.

Lord Giddens: Sorry. I was asking what the take on Germany would be and what the implications would be for decarbonisation—sorry, I am sitting at a very strange angle here—since Germany is such a key case in Europe and it has taken such an unorthodox path, or some people think so.

Professor Stern: I am not an expert on Germany, but we see a lot of German research in Oxford and a lot of Germans come through the university and I do not think there is much doubt that they are going ahead with this experiment. Will it succeed in the sense of, “Will it produce the carbon reduction they want?” I am not sure about that. Are they going to step back from the experiment in terms of lignite-fired powered stations and the renewables they are building? I do not think so.

Having already spent €140 billion on this experiment and with at least another €50 billion to spend on grid reinforcement, there are those who argue that this is an economically crazy thing to have done. But, of course, once they have done it—and they already have 30 GW of wind and 30 GW of solar and they are building more—it is installed. They are going to run it. They are going to use it. Does it make sense to do that and back it up with lignite? It depends how you want to argue it, but I would not feel at all confident to say, “No, they are suddenly going to decide this has all been a big mistake and they’re going to change their policy”.

Lord Giddens: No, I do not think they can do that. I agree.

Q171 The Chairman: Just in conclusion, because we have two or three minutes, there are a couple of points. You seem to be saying: no CCS in the next 10 years; no shale gas in the next 10 years and then a question after that, 2020, and a sense that clearly gas may become more involved. Do you think in Germany they will ever go back to gas, or will they just rely on lignite now? Increasingly, are we going, as you suggest, to gas, and our coal consumption will drop dramatically?

Professor Stern: I would not be quite as definite as saying, “No CCS and no shale”, but no significant—

The Chairman: Of course, yes.

Professor Stern: I suppose what I would say is that, if the German experiment fails in the sense that they do not reduce their carbon emissions to the levels that they want, the option they have is to burn more gas, because they have the stations. The stations are there. For us, again, if we do not get the carbon emissions reduction that we want, we will have to do something else. But the sense in which gas has been used in the UK—and again, I think people do not quite realise this—is that it has happened not because anybody wanted it to happen but because it was the easiest and cheapest thing to do, and everything else has proved so difficult and so expensive.

In a sense gas has just been the fuel of consequence in the UK. It was not the fuel of policy and now we finally recognised, “Okay, this is what we have in the UK and this is what we are going to use”.

The Chairman: A marvellous note to end on, Professor. Thank you.

Q172 Lord Renton of Mount Harry: This follows. Do you foresee any issues with later fitting of CCS onto the new gas plants?

Professor Stern: I do not think there are technical issues. The issues are simply the commercial ones that we talked about earlier.

Lord Renton of Mount Harry: They are not technically difficult?

Professor Stern: No, as long as you have set aside the land. You need a significant amount of land for a CCS plant, but, as long as you have the land available approximate to the station, I do not understand that there are any technical issues involved.

Lord Renton of Mount Harry: Thank you.

The Chairman: Thank you very much indeed.

Professor Jonathan Stern—Supplementary Written Evidence

During the evidence session, I did not explain clearly the main physical and financial processes of UK gas supply, demand and pricing and this brief note attempts to do so. Much more information can be found in: Patrick Heather, *The Evolution and Functioning of the Traded Gas Market in Britain*, OIES, August 2010, <http://www.oxfordenergy.org/2010/08/the-evolution-and-functioning-of-the-traded-gas-market-in-britain/> (from which much of this text is taken).

Physical daily gas balancing: the balancing regime as set out in the Network Code puts the obligation on National Grid to balance the NTS physically within day. This was devised as, and is primarily, a safety issue, and requires National Grid Gas to maintain a safe pressure at all times in the NTS. National Grid discharges this Network Code obligation as “agent” on behalf of the shipper community and this activity is self-financing and does not form part of National Grid Gas's financial accounts.

Daily gas balancing is conducted via the On-the-day Commodity Market (OCM) which was introduced in 1999 as part of the New Gas Trading Arrangements and is a screen-based trading system operated by APX-Endex. It is an anonymous cleared exchange, thereby offering zero counterparty risk. The nominations procedure (ie the volumes of gas that market participants are offering to buy or sell) is conducted through ‘Gemini’, a dedicated computer system for trade nominations, operated by Xoserve on behalf of National Grid Gas.

Gas trading and gas prices: are invariably conducted and quoted at the National Balancing Point (NBP). There is a standard contract for trading at the NBP (NBP 97) which is used by the entire industry. Daily, monthly, quarterly and further ahead prices are created by a range of different transactions: bilateral contracts, “over the counter” trades, financial (paper) trades, options, exchange futures and cleared trades. The major actors involved in OTC transactions are three brokers (ICAP, Spectron and Tullett Prebon); the International Petroleum Exchange (IPE) is the major exchange. There are also a number of price reporting services: Platts, Argus, ICIS Heren and others which report daily prices and the forward curve every day.

4 January 2013

Niki Tzavela MEP and Fiona Hall MEP—Oral Evidence (QQ 237 – 247)

Niki Tzavela MEP and Fiona Hall MEP—Oral Evidence (QQ 237 – 247)

[Transcript to be found under Fiona Hall MEP and Niki Tzavela MEP](#)

Vestas—Written evidence

1. Vestas is the world's largest manufacturer of wind turbines. It designs, manufactures, builds and maintains turbines for the onshore and offshore markets. In the UK Vestas employs over 500 people, across in R+D, operations, sales and construction. We welcome the opportunity to submit evidence to the Committee. We would like to make the following points:
 - Wind energy is already creating economic benefit to the UK and wider EU and has the potential to create substantially greater benefit in future.
 - The UK's wind resource is significant; it can play a major part in decarbonising, securing and diversifying the UK's power supply.
 - Government has a key role in creating the right environment for investments to proceed, this will also stimulate the economy, help drive down costs and minimise the long term cost of decarbonisation.
 - The cost of offshore wind continues falling, government must create the right conditions to realise further cost reductions.
 - A 2030 decarbonisation cap should be included in the forthcoming Energy Bill to give a long term signal to investors that the power sector must decarbonise.
 - A 2030 renewable energy target set at EU level would help smooth the cliff edge currently expected in 2020, in the same way as it is driving developments until then.
 - There is significant consumer support for wind in the UK.

Wind energy's contribution to economic competitiveness

2. Wind energy can simultaneously contribute to the UK's economic and decarbonisation ambitions. Increases in wind generation reduce the need for gas and coal to be used in power generation. A recent analysis¹¹⁰ indicated that for every 1MWh increase in wind production there was a corresponding 1MWh decrease in fossil generation (gas in the period studied). Reducing the amount of fossil fuels used in electricity generation reduces the carbon intensity of the power sector. It also reduces the UK's dependency on imported gas, increasing fuel security and helps create price stability by shielding electricity consumers from the volatility of international gas prices.
3. Wind can also create a considerable amount of jobs, in both the construction and operation of wind farms. It has been estimated by RenewableUK¹¹¹ that the UK's wind and marine energy sectors could employ between 44,000 and 115,000 people by 2021. In 2009 Vestas commissioned Oxford Economics to carry out a study¹¹² on the employment impact of the operations and maintenance (O+M) of offshore wind in the UK. It found that in a scenario of 20.5GW offshore wind installed in 2020 in the UK just over 7,200 people could be employed in the operations and maintenance of offshore wind farms. These are long term jobs, needed throughout the life of the project. They are in addition to manufacturing and construction jobs associated with

¹¹⁰ <http://www.guardian.co.uk/environment/blog/2012/sep/26/myth-wind-turbines-carbon-emissions>

¹¹¹ RenewableUK, Working for a Green Britain http://bwea.com/pdf/publications/Working_for_Green_Britain_V2.pdf

¹¹² Analysis of the Employment Effects of the operation and maintenance of UK offshore wind parks <http://www.oxfordeconomics.com/samples/vestas.pdf>

offshore wind. Importantly, the vast majority of the O+M jobs created are in coastal areas, which are often economically deprived with above average unemployment. The employment and economic impact of offshore wind is therefore particularly important.

Wind energy's contribution to decarbonisation of the power sector

4. The Committee on Climate Change has estimated¹¹³ that the UK's practical wind resource is around 480TWh per year. This is significantly more than the current electricity demand in the UK of 320TWh. Wind could, therefore, become a very considerable part of the UK electricity mix.
5. National Grid has stated that it can accommodate on the current network up to 30GW¹¹⁴ of wind power (current peak demand is around 60GW), enough to meet the 2020 renewable energy targets, without requiring any changes to the way the system is operated. It should be noted that there are a number of factors that could enable much larger amounts of wind to be accommodated, including increased interconnection with other markets and greater demand side response. Spain with 40 to 45 GW of peak demand currently accommodates 22 GW of wind power.
6. It is expected that some gas capacity will be needed to provide back up to wind should much greater amounts of wind be integrated into the system. We would expect that in the longer term, as the power sector neared decarbonisation, gas plants would operate in largely compensatory patterns to wind output.

Government must create the right conditions for investment

7. Market failures prevent decarbonisation from taking place naturally. Vestas considers energy policy, and the stability of energy policy, are vital to push decarbonisation. Realising investments in wind energy is among the most effective and efficient ways of decarbonising the power sector. Government has an important role in setting an energy policy that can trigger the investment needed. It also has an important role to play in ensuring energy policy and the investment environment are sufficiently stable to give investors confidence to invest.
8. Within the global financial crisis the current Electricity Market Reform is creating considerable uncertainty for investors in long term wind projects, in particular the large offshore wind projects that will become operational after the closure of the Renewables Obligation in 2017. Vestas is fully supportive of the Government's objectives for EMR; we believe it is crucial to make investments in wind and other low carbon projects attractive for investors. However, to ensure that these large, long term projects can be realised, it is important for investors to have clear visibility of the market framework that projects will operate under. At present that visibility is lacking. When developers face such uncertainty it is difficult for manufacturers to have confidence to invest in the market.

Reducing the cost of offshore wind

9. At present offshore wind, the UK's most plentiful renewable energy resource deployable at scale is more expensive than other forms of renewable electricity.

¹¹³ <http://www.theccc.org.uk/sectors/power/options/renewable-energy>

¹¹⁴ <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/1448/1448.pdf>

Levelised costs are in the region of £130-140/MWh. The Cost Reduction Task Force and Crown Estates Pathways Study, both published in 2012, found that costs can fall to £100/MWh for projects contracting in 2020, provided certain prerequisites are in place. Those prerequisites include new technology development, the establishment of new 'alliancing' strategies across the sector and the creation of a stable market and regulatory environment. Vestas strongly supports the findings of the reports and believes that costs can fall to £100/MWh by 2020 provided certain conditions are in place.

10. Vestas' is contributing to cost reduction through the development of significantly larger offshore turbines. Vestas is developing the V164, a turbine specifically designed to reduce the cost of offshore wind. It has an 8MW generator, each blade is over 80 metres in length. Its large generator means that fewer individual turbines are needed in each project. Fewer turbines reduces the number of foundations needed on each project and reduces the amount of sub-sea cabling required within the project. There are numerous other design features that help the V164 to minimise the levelised cost of offshore wind. The prototype for the V164 is expected to be installed in January 2014. Serial production is dependent upon the market development and unconditional orders from customers.

2030 power sector decarbonisation targets in the Energy Bill

11. Vestas considers that the forthcoming Energy Bill should establish 2030 decarbonisation caps for the power sector. Such long term targets would give a clear signal of the direction of travel of the UK power sector. It would help give clarity to investors in all plants, not just wind and low carbon plants. Clarity helps to reduce risk and ensure that decisions can be made as efficiently as possible. This ultimately reduces the cost of investment.

2030 EU renewable energy targets

12. Vestas is also strongly supportive of EU level 2030 renewable energy targets. We believe that the momentum that is currently building up towards the 2020 renewable energy targets needs to be maintained. Many of the investments in new, transformative technologies have long lead times. For example Vestas' V164 8.0MW offshore turbine is expected to enter serial production in 2016; only four years before the 2020 targets need to be met. Such technology is currently facing a cliff edge in 2020. There is a risk that if in 2020 such technologies are not entirely competitive with other low carbon technologies, there will be no market for them. The establishment of 2030 renewable energy targets would create a trajectory beyond 2020 to enable such technologies to support investment whilst costs became competitive with other low carbon technologies.

Consumers prefer renewable energy

13. In 2012 Vestas commissioned the Global Consumer Wind Study¹¹⁵. The study surveyed over 24,000 consumers across 20 countries. Over 1000 UK consumers were surveyed as part of the study. The results outlined in this submission relate only to results from UK consumers so as to ensure it is as relevant as possible for the enquiry. Vestas would be happy to supply the full results should that be helpful.

¹¹⁵ <http://energytransparency.com/reports/vestas-report-global-consumer-wind-study-2012.pdf>

14. The results of the GCWS found:

- 70% of UK consumers wanted their electricity to be supplied from renewable sources of energy compared to 12% from nuclear and just 7% from fossil sources.
- 80% wanted to see an increased use of renewable sources, compared to just 6% for fossil fuels and 23% for nuclear power.
- 77% were concerned about the UK's dependence on imported fossil fuels.
- 65% would prefer to see wind farms built offshore, compared to 16% onshore
- 68% would be in favour of a wind farm located within visibility of their home or workplace.
- 58% would not be willing to pay more for power from renewable sources.
- Governments were clearly identified as the group that should be leading the adoption of renewable energy sources, above utilities, citizen, the UN and the COP.

15. The results of the GCWS show a very clear consumer preference for renewable sources of energy. Renewables are preferred to nuclear and fossil fuels. Consumer preferences could, potentially, have an implication on costs. For example the preference for wind farms to be sited offshore as opposed to onshore would increase cost to consumers compared to a mix of onshore and offshore. It is therefore important for consumers to understand the relative cost and impact of each source of renewable energy.

16. To conclude, wind energy can contribute to both decarbonisation and economic competitiveness for the UK. There is, however, a vital role for Government to play in ensuring that the right environment for investment is created. Without the right environment investment in the new technologies and projects that will drive down costs will not happen.

5 October 2012

Joseph Wheatley PhD—Written evidence

[1] Wind power and grid interconnection are dominant themes in EU energy policy. It is believed that (1) large amounts of wind capacity can achieve dramatic reductions in CO₂ emissions while ensuring energy security but that (2) this requires sufficiently high levels of interconnection between European grids. The complex scientific and economic studies needed to justify this vision have not been carried out to date, but state supports for wind power are well established and the EU is actively promoting electricity grid interconnection.¹¹⁶

[2] The combination large-scale interconnection and low energy density renewable technologies give rise to a number of financial and other risks that should to be considered by policy-makers. Some of these issues can be clarified in the context of the recently proposed development of an Ireland-UK wind energy export market. An MoU on Renewable Energy is being worked on by UK and Irish governments.¹¹⁷ Press releases by two Irish wind power development companies have outlined ambitious plans for wind farms in the Irish midlands designed to supply the UK grid (apparently 3GW and 5GW).¹¹⁸ These projects are extremely large especially in an Irish context. For comparison, the total installed wind capacity in Ireland after nearly a decade of aggressive development is currently 1.8GW.¹¹⁹ At first sight, proposals such as these seem to provide an attractive opportunity on both sides of the Irish Sea. From the point of view of the UK, they offer the possibility of adding significant wind capacity without having to pay the large premium associated with offshore wind or without dealing with the environmental and planning difficulties raised by domestic onshore wind. From the point of view of RoI, the proposals seem offer to develop an export market for an indigenous resource.

[3] Multiple factors undermine these points of view however.

(1) Wind power projects of this scale could only be accommodated in the Irish midlands. There are few wind farms in this area because wind speeds are relatively low. Gortahile (a 20MW wind farm commissioned 2010) in County Laois had a capacity factor of just 19% in 2011, for example.¹²⁰ The average capacity factor for the RoI as a whole was 30%. True “off-shore” wind has capacity factors closer to 40%. Lower capacity factor means lower financial return.

(2) Critically, there is high correlation between UK and Irish wind speeds (e.g. calm anti-cyclonic “blocking” conditions were experienced across the entire region during the harsh winters of 2009 and 2010). Mid-latitude weather systems are large ~ 1000km and interconnection over much larger distances than the Irish Sea is required to genuine achieve diversification of wind power supply. In other words, sourcing wind power in Ireland provides additional energy, but it does not necessarily provide a significant contribution to *capacity* or security of supply from a UK point of view.

(3) In both UK and RoI, wind power displaces relatively flexible gas plant (“CCGT”). This picture will not change significantly as a result of interconnection. In fact, it is known that

¹¹⁶ http://ec.europa.eu/energy/infrastructure/strategy/2020_en.htm

¹¹⁷ <http://www.merrionstreet.ie/index.php/2012/06/irish-energy-minister-pat-rabbitte-meets-with-uk-minister-charles-hendry-in-london-wednesday-20th-june-2012/>

¹¹⁸ Element Power (Greenwire project <http://www.greenwire.ie/>) and Mainstream Renewables <http://www.mainstreamrp.com/>

¹¹⁹ <http://www.eirgrid.com>

¹²⁰ Irish Single Electricity Market Operator www.sem-o.ie

operational CO₂ savings are a function of wind penetration (% of demand satisfied by wind). The marginal CO₂ savings arising from an additional 8GW of “offshore” Irish wind are likely to be lower than the efficiency of CCGT plant (~ 0.35tCO₂/MWh).¹²¹

(4) Interconnector infrastructure is expensive. For example, the cost of the recently completed East-West interconnector (500MW) was €600m.¹²² These large additional costs (~ £1M per MW of installed) are of course borne by UK business and consumers. In conclusion, financial viability requires that rates well in excess of the UK onshore ROC rate would need to be paid. On the other hand, it is doubtful that there are any special advantages for the operation of the UK grid in terms of capacity factor or diversity of supply that could justify this premium.

[4] An EU policy of large-scale interconnection in combination with high impact, low energy density renewable technologies might have perverse consequences. Developers might engage in planning system “arbitrage” where high impact projects are promoted in jurisdictions that have weaker planning systems or enforcement in order to exploit financial incentives available from another jurisdiction. The proposed Ireland-UK wind/interconnection project may carry such risk. Wind farming has become a contentious issue in the Ireland as well as in the UK. 8GW of wind power would cover an area of perhaps 2000km² or nearly 3% of the area of RoI. Inevitably, projects on such scales have an extremely large environmental footprint. RoI’s record in planning matters is not good. The 15 year-long Mahon Tribunal concluded pessimistically that corruption around the planning system was “endemic and systemic”.¹²³ The Irish government has been fined for multiple breaches of EU environmental law, some of these in connection with wind farms.¹²⁴ It is unclear how the Irish planning system would cope with a project on this scale, where strong financial incentives are available to development companies. Whatever the reality, some will view this project as an attempt by the promoters to exploit a weaker Irish planning regime in order to facilitate a project that would not be permitted or acceptable in the UK.

[5] RoI and UK are signatories to the Aarhus convention of the UN.¹²⁵ The convention is meant to ensure access by citizens to environmental information and to the justice system. RoI’s domestic wind power programme (National Renewable Action Plan) has already been found to be in breach of the convention.¹²⁶ Without rigorous *advance* scrutiny of the costs and benefits of the proposed wind/interconnection project, the probability of litigation in relation to it is high.¹²⁷

4 October 2012

¹²¹ e.g. Sustainable Development Commission, November 2005.
http://www.sd-commission.org.uk/data/files/publications/Wind_Energy-NovRev2005.pdf

¹²² <http://www.eirgridprojects.com/projects/east-westinterconnector/>

¹²³ Mahon Tribunal Report, March 2012, <http://www.planningtribunal.ie/>

¹²⁴ http://ec.europa.eu/eu_law/eulaw/decisions/dec_20120621.htm - ie

¹²⁵ Ireland ratified the Aarhus convention on Jun 20 2012 <http://www.unece.org/index.php?id=30226>

¹²⁶ <http://www.unece.org/env/pp/compliance/Compliancecommittee/54TableEU.html>

¹²⁷ For example, Article 9 (3) of the Aarhus Convention:
<http://www.unece.org/fileadmin/DAM/env/pp/documents/cep43e.pdf>

Martin Wolf and Dimitri Zenghelis—Oral evidence (QQ 203-215)

Evidence Session No. 10

Heard in Public.

Questions 203 - 215

WEDNESDAY 16 JANUARY 2013

Members present

Lord Carter of Coles (Chairman)
The Earl of Caithness
Lord Cameron of Dillington
Lord Giddens
Lord Lewis of Newnham
Lord MacLennan of Rogart
Baroness Parminter
Lord Plumb
Lord Renton of Mount Harry
Lord Whitty

Examination of Witnesses

Martin Wolf, Chief Economics Commentator, *Financial Times*, and **Dimitri Zenghelis**, Senior Visiting Fellow at the Grantham Research Institute for Climate Change (LSE), Associate Fellow at Chatham House and Senior Economic Advisor, Cisco

Q203 The Chairman: Mr Wolf, Mr Zenghelis, welcome and thank you very much for coming to see us. Mr Wolf, this is getting to be quite a habit of yours. I think you were here yesterday.

Martin Wolf: Your information and intelligence is excellent. I feel that I might as well take up residence here.

Q204 The Chairman: It is very kind of you to come.

Martin Wolf: I am supposed to be writing a book.

Q205 The Chairman: Before we come to the formal questions, I have to deal with the formalities. You should have in front of you a list of interests that have been declared by Committee Members. This is a formal evidence-taking session of our Committee, and a full shorthand note is being taken. That will go on the public record in printed form and on the parliamentary website. We will send you a copy of the transcript, and you can revise it any minor errors. The session is live and on the record. It is being webcast and will subsequently go on the parliamentary website.

I do not know whether you would like to start by making any general comments or whether you wish to go straight to the questions that I think we sent you.

Martin Wolf: I am happy to go straight to the questions.

Q206 The Chairman: I will take the first question, on investment being a driver of growth and jobs. Mr Zenghelis, you said—and I am quoting from your stuff—that “standard macroeconomics tells us that the best time to support low-carbon investment is during a protracted economic slowdown”. Starting with Mr Wolf, do you support this, and could you explain it further? In particular, what conditions, if that were the case, would turn that into a reality?

Martin Wolf: The general argument is a macroeconomic one, which is not directly related to low-carbon as opposed to other forms of investment. There is a second set of questions about what you should invest in. Anyone who knows any of my writing will know that I am very much in agreement with the line of argument that Mr Zenghelis has put forward in his papers—or paper; I think it is just one background paper, in your case. It is pretty obvious; we have about as unambiguous a condition of excess savings in the private sector at the moment as can be imagined. This is not just national but worldwide. This can be seen both in what are unprecedentedly low rates of real interest on safe securities, predominantly government securities of AAA and AA-rated countries, with real interest rates, which we can now measure very precisely at zero to negative, which is not a normal condition. That itself suggests a massively savings-surplus condition. In addition, we can see it directly, as Mr Zenghelis points out, in the savings surpluses of the private, corporate and household sectors, which exist now in every major developed country and, by the way, in some quite important emerging countries, particularly China, although it has diminished somewhat there.

These surpluses are of an extraordinary scale, and they are the counterpart—unfortunately, they are an inadequately focused-upon counterpart—to the huge fiscal deficits of our Governments. This is a savings surplus situation measured on both criteria. I believe, and have believed now for many years, that this is a long-term condition, not a short-term condition. It is very clearly shown in the UK, as the charts show, that the UK corporate sector—this is a big issue that we cannot go into—has been running a very substantial surplus since the early 2000s, long before the crisis started. Therefore, government policy should be directed at encouraging appropriate investment. This is the right long-term answer, because it means that the liabilities that are being taken on to finance investment have as their counterpart genuine assets, so it is not just a liability; it is also an asset. Therefore, the net worth of the country and the public sector, to the extent that it is financing this, will not worsen, and it will possibly even improve. The fundamental argument here is incredibly powerful.

I have always felt—and I have argued this often—that the focus that we have on the liabilities of the public sector, without looking at the assets of the public sector, is conceptually wrong. The public-sector accounts are essentially economically worthless, and I use that word precisely—they are worthless. They tell you nothing useful. It is very important, particularly in this long-term situation that we are in, alas, that we think about both assets and liabilities.

Q207 The Chairman: Mr Wolf, do you think that there are mechanisms that the Government could bring forward to get that investment going? Given that people are paying corporation tax—

Martin Wolf: There clearly are mechanisms. They are of very many different kinds. Broadly speaking—very crudely—there are three sorts of mechanisms. Perhaps it is two. There are changes in incentives for the private sector, which break down into two parts: changes in the corporate tax code and changes in the incentives—prices and so forth—that affect where you would want to invest. For instance, you could change prices in favour of more capital-intensive sectors, which is one of the things that we are discussing here. There is also the possibility of direct government financing or co-financing—some element of budget support that itself could be done either directly on the budget of the Government or via the creation of state investment banks. There are many possibilities.

These are the things I would have liked to have seen the Government consider—of either party, by the way; this is not a partisan point—as soon as the crisis hit us. It was obvious to anybody who understood the history of these crises that we were likely to be in this condition for a decade or so, and we would now have all these policies in place instead of nothing. It is clear that there are policies. Whether they are desirable is another matter, but there is no question that there are policies that can raise investment. They have been used in the past, and they are being used by countries elsewhere.

Dimitri Zenghelis: Unsurprisingly, perhaps, I agree with absolutely all of that. Another way of expressing the economic situation at the moment, and therefore the potential leverage of additional investment, is to understand that there are a lot of underutilised resources. When the economy is running at full capacity, as arguably it was five or six years ago, if you want to create new investment in energy or jobs in the green sector or whatever, you will more or less one for one crowd out the investment or jobs in another sector. You will put pressure on an already tight labour market, which will push up wages, which will crowd out jobs, and you will put pressure on an already tight capital market, which will push up interest rates, which will reduce investment somewhere else. You will also have the monetary authorities responding to the extent that they see additional inflationary pressure in the system.

Right now, that is precisely not the case. There are huge scarce resources available. If you look at the economic literature on what they call fiscal multipliers, that literature tells us that, in environments such as the present, when nominal interest rates are close to the zero-bound, those multipliers are substantially greater than one. They depend on a number of conditions, and we can come back to those, but that means that, if you can leverage in a little bit of extra spending, you find that the knock-on effect—if you like, the cascade of extra spending—is substantially greater than the initial injection that you put in. Why is that? Because we are in this environment primarily—I will be careful. This economic slowdown began by, I would argue, a necessary and unavoidable balance sheet adjustment. It was clear that there were substantial financial imbalances and that assets were overvalued. When people realised that, they naturally had to retrench and restore their private net worth. Some slowdown, and possibly recession, was utterly unavoidable.

What has since happened, as is evidenced by the collapse in risk-free real interest rates and the excess of savings over desired investment, is that, since then, people have continued to retrench, which is the perfectly rational thing for an individual to do. If you are a household, you are worried about your jobs and demand and your income. You will cut back on spending. If you are a firm, similarly, you will cut back on employment and investment. If you are a bank, you will retrench on credit. The collective consequence of everybody doing that at the same time is that their worst fears become self-fulfilling, and demand comes in lower than expected. Then you embark on another round of retrenchment. That is kind of where we are at.

To the extent that you can produce spending, create employment and create investment, not only do you not crowd out utilised resources, because those resources are underutilised and exceedingly cheap, you also can incur a confidence effect, to the extent that people see additional demand as a reason to be less cautious in cutting costs. The reason we are in this protracted recession is that everybody is trying to cut costs simultaneously, and that has collective action problems.

Q208 The Earl of Caithness: As far as the energy sector specifically is concerned, can investment drive growth and secure long-term jobs in this sector for the UK? If it can, can growth in one particular sector of energy be more beneficial to the UK than another? In other words, do you agree with the Cambridge Econometrics report of November last year, which said that the wind scenario is going to be better for the UK overall? If wind is better, the third question is: who is going to finance the decommissioning of all these windmills when this technology is outdated and we do not want these windmills sticking up in the middle of the sea and all round our countryside?

Martin Wolf: There are some parts of that question that I can answer and some parts that, quite honestly, I cannot. I am not an expert on technological choice in the energy sector and the precise points regarding possible future prices and shadow prices, particularly for carbon—the value that we put on carbon—that would make wind, as opposed to other renewable technologies and as opposed to conventional technologies, more efficient or not. That is not in my area of expertise, and it would be very foolish for me to claim that it was. I hope that my colleague here will be able to answer that.

As a general point—I will treat this in a slightly broader way, I am afraid, and will not directly deal with the question of wind, with one exception—it is important, following from the logic of what we have just said, to say that investment, although there are problems with it in macro terms, is a much more desirable way of driving demand in present conditions than pure current spending. There are difficulties of definition at the margin, but it seems pretty clear. First, the investment rate in this country is extremely low, and it has been for a very long time. At the moment, it is quite horrifyingly low, such as to be incompatible, in my view, with the long-term growth that we want.

Secondly, if we invest successfully, we generate demand, particularly in areas such as construction, where we clearly have excess capacity—very obviously so—and we also generate future supply. The energy sector is one of the most important supply-constraining sectors in the medium to long run. There is an enormous debate among economists, in which I have participated, on the extent to which the economy is supply constrained. There is a very pessimistic view held by many economists—including the Office for Budget Responsibility—that the economy is substantially supply constrained. That is to say, we are subject to a loss of GDP that will be permanent. The main reason for that is that investment has been so low since the crisis hit. Anything that generates increased investment generates both demand in the short run and additional capacity in the long run is doubly blessed. That seems to be key, particularly in a country that already had a very low investment rate.

Thirdly, the energy sector is one of the very limited number of crucial general input capacity sectors. Without a supply of reasonably cheap energy, future growth in the economy will inevitably be seriously constrained. This obviously applies particularly to electricity, which is relatively non-tradable. It does not apply in the same way to the direct use of imported fuels in the transport sector, say. Investment in the expansion of the electricity supply in particular is very desirable.

Finally, these are very long-term investments, so the decisions that we make to use the current surplus-savings and demand-deficient conditions to generate additional capacity, which is relatively cheap in true terms for reasons explained, will give us benefits and potential future supply for many, many decades. We are not talking just about the short run.

For all these reasons, it seems pretty obvious at the macroeconomic level that a very large investment in energy supply is, potentially, a particularly attractive way of generating the demand and future supply that we want.

There is another set of questions, which we can turn to, about the characteristics of that supply, which relate particularly to long-term sustainability issues of various kinds. I will put that aside for the moment.

I have one particular point about wind. No capital stock has an infinite life. I am just thinking about sewers—sorry. There is some capital stock that lasts for a very long time, and the decommissioning issue does not arise as such, but most capital stock, certainly with power supply, does not have an infinite life, and decommissioning does arise as an issue. It is a feature of capital stock that it depreciates and has to be replaced. It does not seem at all obvious that wind is in any way special among the energy supply technologies that we have in that regard. We will presumably have to decommission or replace windmills in exactly the same way that, in the long run, one has to decommission and/or replace nuclear or conventional power supplies. It is not something special to this sector—it is just a characteristic of the investment cycle.

Q209 Lord MacLennan of Rogart: As you know, Mr Wolf, we are looking at European energy policy. You mentioned specifically that Britain was holding back on investment more than anyone else. Do you think that the British position would galvanise other European countries if we were to make more investment? Do you think that there are any institutions in the European Union that are sympathetic to the point of view that you have expressed, and which might, through encouragement or some form of rulings, have an effect continent-wide?

Martin Wolf: We are clearly among the major countries of Europe. I am thinking of Germany, France and northern Europe—Italy is much more like us, with chronic underinvestment in energy supply. I am not an expert on Spain. Vis-à-vis France, Germany and northern Europe, we have clearly underinvested in this sector, and we have underinvested generally. We have exceptionally low public and private investment rates in comparison with those countries.

The French option has been nuclear, as we all know, and the German is the absolute antithesis. The chances that we will influence either in the choices that we make are very small. We have chosen neither, relative to them. Depending on the choices that we make, we would end up in a rather different place from either Germany or France, I would guess, although I imagine that, in the end, we would probably be aiming closer to Germany than to France. That is my sense of where we are.

We have had a chronic investment deficiency, pretty well throughout the whole economy, and we have managed to avoid the costs of that because our most dynamic sectors have been service sectors, which do not require much investment. I do not believe that that will turn out to be a sustainable future for us. That creates quite big strategic questions for the UK. We have to become more like them.

What influence would we have on Europe in this regard? Since we are a laggard relative to those countries, not much—but I may be being too pessimistic. Yes, there are clearly

institutions such as the European Investment Bank, which has been mentioned, that are interested in this sort of thing.

Interestingly, while the general temper or view, particularly in Germany, which of course is the dominant voice in the eurozone, is against all the Keynesian sort of arguments that I have made, they are very keen on investment and they believe in investment. I have thought for some time that, if one were ever to persuade German policymakers that it would be appropriate to view the future of European macroeconomic policy and co-ordination in terms of expanding investment, and somewhat downplaying the demand-generating aspects but emphasising the future supply-generating aspects of that, it could be a very fruitful way of persuading them to have a slightly more sensible view of how Europe as a whole starts growing again. In that regard, this investment emphasis, particularly on sustainable energy, which is something they believe in very strongly, might turn out to be a very fruitful way of thinking about meeting the macroeconomic challenges of Europe as a whole.

Dimitri Zenghelis: I do not want to repeat things that Martin has articulated a lot better than I possibly could, but I will add some angles. Likewise, I am not an energy technology expert. I know that onshore wind is relatively competitive with conventional fuels, but it suffers from some environmental problems, which need to be taken seriously. There may be ways around those, I do not know—if people were given some rent for every wind turbine they could see from their window, they might change their view in terms of opposing them, although, of course, that would increase the costs. That needs to be given serious consideration.

Offshore wind is more expensive, but the costs are coming down quite quickly. That is to be expected with a new technology. It is not just the new technology; skilling up engineers such that they know how to operate, repair and maintain them is subject to substantial cost reductions as the skills, learning and experience increase.

As Martin has already said, there are specific short-term advantages to investment. The multipliers that I mentioned earlier tend to be higher in investment if you are going to spend than is the case with tax cuts or current consumption. Why? A lot of it goes into domestic employment and a lot of it goes into domestic supply chains. There tends to be a lower import content, especially for infrastructural investment, and a higher labour intensity. However, you need to be mindful of the timing, to some extent. You do not want to embark on substantial infrastructural investment and have the real extra spending come on stream just as the economy is back at full capacity. Bearing in mind everything that Martin said about underinvestment, you need to be careful about what else you would be crowding out under those circumstances, but if you can start the investment soon enough, Martin is absolutely right: you both have a short-run stimulus and leave a lasting legacy on something that is desperately required. You do so—to repeat the point that I made a moment ago—at uniquely cheap rates. You do so now with the ability, potentially, to borrow very cheaply. In particular, if there is some form of public involvement, perhaps more especially with the public sector taking on policy risk that it owns and that the private sector does not own, that can supply much lower-risk premia to infrastructural investment, which depends not just on policy today but on policy over the next five or 10 years, and which relies on that not being reversed.

There is something about energy and resource efficiency in general that is long-term credible. Most people, although I will not say all, buy into the idea that, one way or another, the economies of the developed and, eventually, the developing world—in some cases it is happening faster in the developing world than in the developed world—will become resource constrained and carbon constrained, and they will transition to that. Given that

that is going to happen one way or the other, either for environmental reasons or, more immediately, because, as India and China industrialise, the pressure on the prices of some of these resources will start—and already has begun—to show. That is at a time when one-third of the world is barely growing—we are still seeing these essential resources and energy prices rising. That rate is going to accelerate, and that will put a premium on to energy efficiency, renewables and resource efficiency. Given that that is the case and that the private sector knows it is the case, and given that it is transformational and covers all sectors, not just energy but transport, buildings, smart grids, land use and efficiency generally, the private sector sees this as a credible long-term market against which to invest. All it requires is a short-term signal to suggest that the policy framework in the current environment is going to be supportive of that kind of investment.

What would be a real mistake, and what would increase the cost of any investment, whatever project it might be, is an environment in which the policy signals are mixed, muddled or unclear. For any given project, that will only increase the costs and the risks associated with it and will reduce the effectiveness of that project. Clarity and a clear vision in the current environment, where there are huge surplus savings, could have a very powerful potential leveraged impact in bringing those surplus savings into productive investment, provided that the framework is credible to the private sector.

Q210 The Chairman: That leads us to Lord Renton's question.

Q211 Lord Renton of Mount Harry: It does. One listens to you both with extreme interest and, slightly, wonder. We are a European Union Committee, and our wish is to be able, in our report, to show how there will be sufficient capital expenditure in the energy sector, so that when present sources disappear, 2020 onwards, good things will be happening instead. In your very interesting paper, Mr Zenghelis, you say: "The green sector is one of the few vibrant parts of our economy at the moment". You touched on that briefly. From the European Commission, we have the view that capital expenditure in the EU's energy sector over the next decade will need to be of the order of €1 trillion. Do you think that is possible? Do you think that that money could be raised? Who do you think it could come from?

Dimitri Zenghelis: Yes, I think it is possible. As Martin says, the energy system will constantly require upgrading, rebuilding, decommissioning, expanding and modernising. Those kinds of sums in the current environment, where you want to move towards resource and energy efficiency, are the right kinds of sums. The CBI talked about the UK and a comparable figure of, I think, £150 billion, which would be just over €100 billion over the next 20 years. These are the same ballpark figures. As for how you implement them, it is everything that Martin has already said. You need to provide the right policy environment and pricing structure, and you need to provide a degree of policy certainty, so that investors can take long-term decisions and build assets that can guarantee a long-term return, much of which, in this sector, will rely on credible and consistent policy rather than trying to build cheap assets at low investment costs that they can sweat quickly. If you want a kind of transformation that is cost-effective in the long run and that requires this kind of investment, it is a mistake, at any time, to send unclear signals, and it is particularly foolish to do so at a time when the reason the economy in general is in such a malaise is precisely because private investors are lacking confidence and are not wanting to take on risks. The returns to policymakers taking on policy risk are probably higher now than they will ever be, and they are pretty high at the best of times.

Martin Wolf: I have been trying to do back of the envelope calculations. My very rough guess—this is certainly in the right ballpark—is that, over the next decade, under plausible assumptions, the cumulative GDP of the EU will be somewhere in the neighbourhood of €120 trillion; so, €1 trillion is less than 1%. I am surprised that it is as small as that. It is a very small sum; it is trivial. I get very angry with people who produce numbers over 10 years, which I think are designed to terrify us. The relevant thing is to think of it as a share of GDP. The EU as a whole—public and private investment—ought to be somewhere between 18% and 20% of GDP. I am not saying it will be, but it will not be vastly short of that. If my assumptions are right, that gives us about €25 trillion of investment, of which €1 trillion, on these figures, will be in the energy sector. That strikes me as rather low, as I have said. It could well be more. They are probably being very pessimistic—possibly quite rightly—about the growth of the EU, and that is why they are coming up with this small sum.

How will it be financed? The savings of the EU in aggregate is a current-account balance region, so it can finance it internally. There is no doubt about that. It does not need to draw on foreign savings for this purpose. The excess savings of the private sector can easily be seen, given that assumption, because they are simply the counterpart of the deficits of the government sector, which we know are very large.

The question is not whether the savings exist, nor whether the investment is extraordinarily large, but what microinstitutions are needed to mobilise a very small part of these savings for this purpose. Dimitri has discussed this. There needs to be policy certainty, so that people can credibly believe that these long-lived investments will be rewarding.

Banks are not central to this. Banks are not going to finance a large part of this, in my view. This is much more likely to go through the bond and equity markets—the bond markets predominantly. Having a stronger banking sector is important—although I know that this is way outside your remit. It is difficult to finance, but it is less important than the bond market. I have a lot of friends who work in bond funds, and my sense is that they are desperately looking for first-rate corporate investment opportunities. Provided the right signals are available—this, of course, is a real issue here, because policy certainty is difficult to provide, and price certainty is difficult to provide; energy prices are extremely volatile and have been for quite a long time now, and that is a very important issue—the possibility for bond funds, which are now, to put it brutally, being stuck with government bonds, the safe ones, that are yielding 2% or less, which is frightening from their point of view—that they might have yields at a couple of percentage points above that, or possibly even more, to finance these things—will, I would have thought, be incredibly attractive. From all these points of view, I regard the financing problem in itself as trivial but the policy environment and fiscal regime environment, which will encourage people to make a specific investment, as being the central issue.

Q212 Lord Renton of Mount Harry: It is very encouraging to hear you both—and you are experts—talking in this relatively bullish way, given what else is happening on the markets at the moment. I have listened to you with great interest, but, to get going with bonds and so forth in the way that would be necessary, is it necessary to have some public-sector capital in as well?

Martin Wolf: I will put it this way. I have no problem with public-sector capital being involved; I have no theological objections to it. Dimitri has described this very well. Essentially, the reason you might want to do this is that those in the private sector—I am thinking particularly of the companies that might make these investments and, to some degree, the bond investors—are exceptionally risk averse. They are risk averse for very

good reasons. They have had a series of colossal and unexpected shocks. If they were not risk averse, they would be irresponsible and foolish. I do not wish to list all the shocks that the private sector has been subject to in the last six years or so, but it is reasonably obvious.

If you are being asked to make a very large investment whose life is several decades, you are assuming an enormous amount of risk about the future market—growth, prices and potential volatility. The volatility of demand is particularly important for a capital-intensive industry, because finding yourself in a situation with potential excess capacity means that your prices will start becoming very volatile. There is a very large amount of risk involved in making long-lived investments anyway, and this will be particularly obvious to any investor who has experienced the unexpected shocks of the last five or six years. In this situation, if you want the private sector to make these sorts of investments for good reason and you have policy reasons to want to do it, the public sector almost certainly has to engage in risk sharing in some way. There are many different ways to do that. I have discussed that in a different context in my own work in this country.

Just to give an example of something different—what we do about financing small and medium enterprise in this country—I suggest that the public sector could take the tail risk. Insurance of that kind might well be an appropriate means of encouraging investment, because the tail risks are so large for investors. Price certainty and tax certainty are more difficult to deliver.

Q213 Lord Renton of Mount Harry: Sorry—“tail risk”?

Martin Wolf: What I mean by tail risk is just “act as an insurer”. If there are states of the world in which you could say, for instance, that investment is being undertaken on the assumption of certain sorts of prices for electricity in the future and, for whatever reason, should the price fall below that, the Government would set a floor. It caps the risk. The private sector would not be able to insure these sorts of risks. For 30-year or 40-year insurance, if you look at credit default swaps, which is one way of insuring bonds, they are not going to carry the risk over that sort of period. If you are concerned, as you could legitimately be, that the private sector, although it could in principle do this and could finance it but does not want to take the risk—it is too risk averse in the current situation, and we have lots of evidence to suggest that is the case—then the public sector can act as an insurer of last resort. It can do that in many different ways, and we can discuss the detail. That, in my view, is how one would approach thinking about getting this to happen. It is not a financing problem; it is a risk problem.

Dimitri Zenghelis: That is exactly the right question. As Martin has said, some form of public involvement, either directly through spending or through taking on some of the risk, would be required. Martin is absolutely right. If you look at risk-free or relatively risk-free sovereign bonds in the US, Germany and the UK, the rates are below the expected rates of inflation for the next 15 years or so. That means that our pension funds and our financial institutions that, as a result of this caution, have invested heavily in those financial instruments are making no return. We are in effect paying these Governments for the privilege of borrowing, in real terms. That is an extraordinary situation, and the private sector would rather make a better return if there was some productive investment that they could commit to, so long as they felt that the risks were low enough. The policy target should be to think of ways—and there are ways, not least the ones that Martin just outlined—of trying to provide some of that certainty and underpin that risk and then for that small amount of public input potentially to leverage a huge amount of private investment.

Of course you have to keep an eye on the fiscal consequences of this. If you undermine fiscal sustainability through additional public spending, the markets may be spooked, and that will increase the risk premium on government borrowing and so on. There is a genuine nervousness. However, it is not obvious that the best way to fiscal sustainability is to cut as much as possible now. If you undermine growth, your fiscal sustainability position could be reduced even more than it would be if you did not. One of the things that worries bond markets is not so much—or should not be—whether Governments balance budgets this year and next; it is whether they have a credible growth and fiscal plan for the next decade. That is what might eventually spur a default or monetisation of the debt and therefore undermine the returns that bond-makers make.

I echo the point that Martin made right at the beginning. Debt is not what matters. It is what that debt is used to finance. If it is financing assets that generate a return, either directly to the state through returns on investment or even indirectly through creating a prosperous economy, which generates tax revenues, that should improve the fiscal sustainability of any arbitrary debt number. Looking at an arbitrary debt number is a foolish thing to do, and excess obsessiveness on that can undermine the very things that will allow you to secure both investment and debt sustainability in the long run.

Q214 Lord Giddens: I have a question that you could perhaps answer fairly shortly, because there are two formal questions still to go. Essentially, it is on the divided nature of Europe at the moment. As we know, Europe is in a dislocated position. Can energy investment help stimulate growth in the south, specifically? If that is the case, how could this be organised, especially against the backdrop of German attitudes, which, if I might say so, and as you hinted at more than said, appear to be very different from those that you are describing?

Dimitri Zenghelis: There is a role, but we need to be cognisant that the elephant in the room is not just the current euro crisis and how we get over that, but how you design a monetary union with the right degree of pooling of sovereignty and fiscal federalism that is going to be required to make that monetary union effective. At the moment, without sufficient fiscal flows across borders and without sufficient labour flows across borders—unlike the US, when you have asymmetric shocks or asymmetric responses to symmetric shocks across regions in the euro area, you do not get the labour mobility that you get in America where, if there is a crisis in Texas, people move to California. In fact, you get the wrong sort of labour mobility. The educated multilingual Greeks will move to London, but the ones who want to move, the unemployed ones who need to find jobs, stay put, and that just enhances the imbalances. I have written a paper on this very question, and I do not want to get into too much detail, but I can send you the reference.

Q215 Lord Giddens: More specifically, could energy investment—

Dimitri Zenghelis: Ultimately, energy investment—

Q216 Lord Giddens: Could it be organised, in resource terms, on a pan-European level in some sense? Surely we need to make investments in the countries that most need them.

Dimitri Zenghelis: Exactly. That would be the starting point. To the extent that there is investment that is necessary, can you make a long-run credible case for doing so? Actually, you can. One project that might be foremost among those is having an integrated super-grid across Europe, which will start to address some of the problems of intermittency. Yes, it is true that the wind will not always be blowing in the UK or in Germany, or that the sun will not always be shining in Spain, but one or other will be the case, and if you can have an

efficient grid connecting Europe, that will allow substantial investment in solar, for example, in some regions in the south, and they can export that energy at quite a profit, so that it creates jobs in the short run and it creates a revenue source that helps offset some of the regional imbalances for which you would otherwise provide current account support in the medium to long term. You would need a degree of political consensus on that, and you would need an understanding. To get to that, you would probably first—sad but true—have to overcome the kinds of hurdles that we are seeing now, which threaten to unwind the degree of collaboration and co-operation on the economy across the euro area.

It would be a mistake just to say that energy investment will be the panacea, because you begin to look a little bit foolish, but I think it will definitely be part of the solution. Trying to get out of the current malaise in Europe without structural reform and without a credible growth plan particularly affects the south. The euro area as a whole does not have a public sector debt and deficit problem. The debt and deficit position of the euro area is better than the UK, it is better than the US and it is better than Japan.

Q217 Lord Giddens: Everybody is better than Japan.

Dimitri Zenghelis: That is true—for now. That is right.

It is the imbalances and the lack of a credible growth strategy that are undermining investment. In principle, energy investment could play a substantial role in correcting that.

Martin Wolf: I agree. The figures that have been given, for the reasons that I have set down, are not large enough to generate substantial growth on their own, so it has to be seen, if you are talking about the macro effects, in a wider context, 1% of GDP is not going to transform it. That is point one.

Secondly, it is incredibly important, and possible, to ensure that the rules that are generated on fiscal policy are focused on the current budget, rather than on the overall budget. Interestingly, that has been the historic German position, with the golden rule—which, by the way, we imported from Germany; Gordon Brown did—that public investment is different from current spending, which has always seemed to me to be quite rational. It is very important that that remains in the understanding of the EU. As I pointed out earlier, this is one of the points on which the Germans, although they utterly reject the Keynesian aspects of this, accept the growth aspects, and they are very keen on the supply-side aspects—so you can talk about investment.

That brings me to my third point. Yes, absolutely, it would be incredibly sensible to focus on investment in general, and energy investment in particular, as one way of generating growth-oriented policies in the countries that are now in difficulty. Try and get away from the austerity approach alone and focus on future supply. Historically, the German perception of budgets, the role of investment and how fiscal budgets should be handled are completely compatible with that. I have been rather surprised that there has been so little emphasis of that in the discussion of how to handle the eurozone crisis. It has to be said that, as outsiders, our influence in this respect is next to nothing.

Q218 Lord Whitty: Can we focus for a moment on one aspect of the public sector involvement: the state investment banks? You have referred to it already, and you have referred to the EIB. A number of witnesses have said that the EIB and banks like the German investment banks could play a major role in delivering these funds. Here we have the rather smaller, stuttering start of the Green Investment Bank. On the other hand, I am told that the *FT* reported that developments in Europe might lead to the interest rates on the EIB being a little bit higher than has been the case recently, which may restrict that. Could you say

something about the track record and future role of state investment banks in this and how this is going to operate in the forthcoming climate?

Martin Wolf: I was fascinated by this story, and I still do not fully understand the mechanism. The link between the ESM and the cost of borrowing for the EIB is, to me, obscure.

Q219 Lord Whitty: I am glad that it is to you; it is fairly obscure to me.

Martin Wolf: I thought about it very hard, and I cannot work out what the connection is. I looked at the story, and I still cannot. This is probably my own stupidity, for which I apologise, but I am not going to be able to help you.

Dimitri Zenghelis: Is it a pooling of risks? I could not work it out either. The only explanation that I could think of is that the more you pool risk, the more you get bad debts than average. I do not know.

Martin Wolf: The EIB's rating depends on the rating of the Governments who back it—the same is true for the ESM, of course—to the extent that Governments in Europe lose AAA ratings, which they are doing. One might hypothesise that this will have an effect on the cost of borrowing for the EIB, but I suspect it will be an unbelievably small one. I had thought that both the ESM and the EIB are exposed to the same risks. Of course, the ESM generates—God, this gets complicated—contingent liabilities for Governments. If you think that the rating agencies will take the view that the creation of the ESM is going to be the straw that breaks the camel's back—that it will be enough to push them over the edge—then, indirectly, it could have this result. However, the honest truth is that I do not know, and the ESM in its current form—it is €500 billion, if I remember correctly—is simply not large enough, given the aggregate debt of the eurozone countries, to be a decisive determinant of their future solvency. This is very rough, but it is something like 5% of the total debt of the eurozone countries. It cannot be enough to make a difference. It strikes me that this is possibly a red herring—probably, I would guess.

On the bigger issue, institutions like the EIB can play a role in co-financing, but there is no doubt at all that, in a predominantly privatised energy sector—and even if it were not privatised—the principal source of finance will be either states themselves or the private sector. The EIB is not big enough to finance huge proportions of this, although it could play a very important role—this brings us back to the previous question from Lord Giddens—in helping the countries that are now essentially credit-constrained: the big countries; the Italians and Spanish, particularly.

This is a change in view of mine. I personally think there is a case for public sector investment banks to deal with very long-term funding in cases where the sectors are privatised. Otherwise, the private companies' investment decision-making tends to be dominated by payback considerations, which generate relatively short time horizons. If you are in a sector where investment is really long term—there are very few such sectors, but energy is clearly one of them and airports is another—this will tend to encourage the private sector to underinvest. One way it underinvests is by going for technologies that are relatively capital unintensive. That is a very important bias in this case. That is to say, they will choose technologies rationally, if I am right—and I think I am—in which the costs are more on the current side than on the capital side. I think there are very powerful reasons for believing that, in a number of sectors, of which energy and transport are probably the most important—energy is the most important, because there is the most substitutability

between technologies that use current inputs rather than capital inputs—the result is going to be very undesirable investments.

Having vehicles for investment that finance over the very long term at reasonable rates not so desperately far from the rates that Governments themselves can borrow at for what are essentially utilities, and which are pretty well guaranteed to be profitable in the long run, strikes me as very important not just in getting the level of investment up but because it is likely to affect the composition of investment.

Q220 Lord Whitty: I derive from that that you think it would be sensible for the British Government, at least at the EIB level, to consider the creation of a guiding Act establishing a largely state investment bank that could perform this function, which the Green Investment Bank hardly measures up to in its present form.

Martin Wolf: I think now, which I did not think 25 years ago, that, when we privatised the energy industry, generation and supply, with which I completely agree for a whole host of reasons, we did not think about the way in which this would affect the nature and scale of capacity decisions in the industry. It did not matter much for 20 years, because the precursor, the Central Electricity Generating Board, had overinvested so massively. This goes way beyond what we are discussing here—energy security and issues of this kind—but there is quite a big problem there.

This brings us back to our earlier discussion. You can handle that through the creation of public-sector investment banks and/or through insurance mechanisms, but there is quite a big issue about the implication of that sort of structure in the industry. When the technological decisions that you have to make involve very long investment decisions, and once you have made the decision, you—the owner of the plant—are stuck with it, and that exposes you to very severe long-term risks, which most private businesses will want to avoid. I think that, for that reason, they will tend to underinvest and, when they do invest, they will tend to choose the investments that give them the greatest flexibility, because it is the short-run, current costs that determine your supply price, rather than the capital costs.

There are some very big policy issues there, which presumably go a little bit beyond your Committee—I am not too sure about that. One possible solution is this—but there are possible solutions. I do not see a British Government creating a gigantic public sector investment bank so, from a realistic point of view, I would think of other possibilities. The issue is clearly there.

Q221 The Chairman: I do not know if you wish to comment, Mr Zenghelis. We are a bit tight for time, but if you make a comment, perhaps we can then go to our final question.

Dimitri Zenghelis: I have only one thing to add to that. I was not going to add anything, but there is one thing; if you are going to have an investment bank, the time to allow it to borrow on capital markets, somewhat self-evidently, is now, because it can do so very cheaply. To tie in its borrowing capacity to something like the level of public debt is not only wrong but precisely wrong. If you are allowed to borrow only if public debt has come down within certain thresholds, that is probably because the economy is recovering. If the economy is recovering, both the returns to having an investment bank and the costs at which that bank can borrow will be less favourable than they will be today. The reverse would make sense—allowing it to borrow only if public debt is above a certain level, and then limiting its borrowing capability. I would understand the macroeconomic logic for that. To have it the other way round seems deeply mistaken.

Q222 Baroness Parminter: You both said that clear policy signals were critical for boosting low-carbon investment, but you said that they are mixed and unclear at the moment. Is that the British Government, or is it the EU? Can the EU policy send clearer signals in the market to encourage resource-efficient investment? Are there any other public-policy tools that they have at their disposal that can do that?

Dimitri Zenghelis: I think the answer is both. At both the EU level and the UK level there are mixed signals. It is a harder act to play at the EU level, because it is a bunch of sovereign states with different interests. What might make sense in Poland may be very different to what might make sense in Denmark or whatever. Therefore, there is a rather harder political background against which to operate than you might find within a sovereign state. Also, the returns to sending credible signals are clearer within a sovereign state, where you can set up the institutions and the policy frameworks in such a way that they are likely to endure.

Both the costs of mixed signals and their prevalence are not unique to any one country, but where you get very clear signals, the returns are immediately apparent. That goes beyond Europe. You can take examples in South Korea or China, where the signals are so clear that the investors have put a lot of money in, and they are now creating green technologies and green export markets that are proving to be very profitable. Within Europe there are examples, good and bad. There are a lot of good examples in Scandinavian countries, in Germany and even in Spain, where a very clear policy signal has led to substantial investment.

We live in a world full of uncertainty. If you want to have a clear and credible signal, it has to be a flexible one, so that it allows for the evolution of technologies to come in in a way that is unexpected. I do not think that private investors have a problem with that. They would prefer to have the framework. It is a bit like monetary policy; everybody knows that interest rates are going to go up and down, and nobody is going to believe a central bank that guarantees one interest rate. What the private sector wants to know is why rates have gone up and down, so that you limit the shocks to the private sector. It is much the same with energy technology and the cost of solar panels. They may go down, they may go up or they may evolve in a different manner. So long as you have a clearly spelled out, transparent policy framework that says, “This is how we are going to review the process and these are the criteria against which we make our decisions,” allowing some flexibility and variation in policy is probably a good thing, so long as that policy is not arbitrary and does not provide shocks to businesses that could otherwise have been avoided—the classic example being retroactive legislation or changing legislation in some other ways. That spooks investors, and that will deter future investment and raise the cost of any given investment project.

Martin Wolf: I do not have much to add to that, and I believe we are running out of time. I have taken the view that the determinants of the price of carbon need to be pretty predictable so that this fits into the policy regime, and it has to be true over a pretty long time horizon, which is very problematic for policymakers. Nothing that policymakers state can ever be fully predictable, because they cannot commit their successors. That is self-evident.

I would add one element, which has, in my view, made it much more difficult. This morning I received an e-mail from a friend of mine, who is one of the leading energy economists in the United States. I have known him for a very long time, and I have always found him amazingly well informed. He has been around for a long time. Basically, he was saying that he has come to the conclusion that, as a result of what is going on in what you would call tight gas and tight oil, the economics of fossil fuels are transformed for the next generation. That is not

something that he thought a year ago or two years ago. That is a massive technology shock. From the climate change point of view, it is a disaster. From everybody else's point of view, it is probably wonderful.

Q223 Lord Giddens: It is possibly mixed if you close down coal-fired power stations.

Martin Wolf: Yes, it is mixed, you are right. Long run, bad; short run, actually rather good. The point is, that is an example of an uncertainty. Nobody thought this 10 years ago. Nobody really thought about it five years ago, except for a tiny group of people. Its implications for the global energy system are unclear if true—it could well be not true. There are fundamental and ineradicable uncertainties in our economy. Within that, and given that, Governments have to try to make their policy regime. Here, I agree completely with Dimitri that their policy regime is as transparent and predictable as possible, even if they cannot make the prices completely transparent and predictable. We do not know what the prices will be 40 years hence.

If they really feel that certain policy objectives are important—I do, and on climate change very much so—the Government have to be willing to take some of the risks. It is a public-policy objective. You cannot expect private profit-seeking firms to internalise a public policy objective that the public sector is not clearly and predictably behind. If we accept that public policy objective, Governments have to be clear and precise about the implications of that for the private sector. Otherwise, the private sector will not deliver.

Q224 The Chairman: Mr Wolf and Mr Zenghelis, I think I speak for the whole Committee. You have given us a totally different perspective. We particularly like the trivialness of the €1 trillion. Actually, it has put it into context for us with regard to the availability of the capital to come forward to do this if government gets the policies right. We are very grateful to you both.

Martin Wolf: That is not the problem.

Q225 The Chairman: It is not—

Martin Wolf: Money is not the problem.

Q226 The Chairman: No, money is not the problem—exactly.

Martin Wolf: Policy is the problem.

Q227 The Chairman: Policy is the problem—exactly so. Thank you very much.

Q228 Lord Giddens: Is there anything that you two disagree on?

Dimitri Zenghelis: Not that I can think of.

Martin Wolf: I have been astonished by how sensible he is.

Q229 Lord Giddens: The things I discover that I did not know: he was the main Treasury forecaster for many years. I have always had a long-standing view, which I held for 40 years, since I first studied economics, which has almost never been falsified: that the Treasury is always wrong. It is a good prior assumption.

Martin Wolf: Thank you very much.

WWF-UK—Written evidence

Executive Summary

1. **Focus of this response:** This response is mainly focused on the power sector, given the substantial share of greenhouse gas emissions currently attributable to that sector but also because power sector decarbonisation and electrification are going to be key in reducing emissions from other sectors of the economy such as surface transport, heat in buildings and possibly heat in industry.

2. **The need to decarbonise is urgent:** As made clear by recent reports from the International Energy Agency and the United Nations Environment Programme, the EU Energy Roadmap 2050 sits in the context of an urgent need to decarbonise the world economy. Infrastructure investment decisions made in this decade will have a critical impact on whether the world can remain on track to prevent temperature rises in excess of 2°C or will be locked into much higher levels of warming. The EU Energy Roadmap is a positive development towards delivering the EU's emission reduction objectives out to 2050 and compellingly points out that much greater levels of investment in renewable energy, energy efficiency and smart grid infrastructure are “no-regrets” option for the EU. However, the Roadmap under-estimates the potential of energy efficiency and renewable energy technologies and should therefore not be seen as a definitive guide to meeting the EU's 80% to 95% emission reduction target for 2050 (see question 1).

3. **3 fundamental pillars for energy policy:** In order to deliver a decarbonisation that is successful, affordable and which stimulates economic growth, UK and EU energy policy should be based on 3 fundamental pillars:

- a strong focus on energy efficiency across all sectors of the economy to reduce new infrastructure requirements (see question 4);
- the provision of long-term investment certainty to the low-carbon sector (especially renewables) through clear volume signals out to 2030 and stable financial support policies. This is particularly important given that 2030 is only one investment cycle away (see question 1); and
- the development of much greater interconnection between European power grids to allow for the optimum use of the EU's renewable energy resources and substantially reduce the amount of back-up power stations required to maintain security of supply (see question 2).

4. **The role of gas has to be limited by 2030:** Whilst gas-fired generation will have a useful role to play as a system balancing and transitional capacity in the EU and UK's power sectors by 2030, the role of gas in the power sector will need to be carefully limited by 2030 on both environmental and energy security grounds. In the case of the UK, the Committee on Climate Change (CCC) recently stated that a share of unabated gas in excess of 10% of UK

electricity consumption by 2030 would be incompatible with the Fourth Carbon Budget¹²⁸. From an energy security perspective, the UK's current over-reliance on gas has already played a major role in UK energy bill rises since 2004 and increasing this dependence even further as the UK becomes a greater net importer of gas would make very little strategic sense (see question 5).

5. The Energy Bill is a major opportunity: The upcoming Energy Bill is a major opportunity to put the UK firmly on track to deliver a successful decarbonisation of its power sector by 2030, in a way that is both affordable and generates growth. To ensure its success, the Bill needs to provide (i) a clear sense of direction to low-carbon investors through a binding decarbonisation target of 50gCO₂/kWh by 2030, (ii) should provide stable feed-in tariff proposals which are well tailored to renewable energy technologies and backed up by credible counterparty arrangements and (iii) should contain enabling powers to introduce support measures for electricity efficiency (see questions 1 and 3).

Introduction

6. Recent reports from the International Energy Agency (IEA) and the United Nations Environment Programme¹²⁹ have highlighted the urgency with which substantial investment in low-carbon infrastructure needs to be made if the world is serious about preventing the worst impacts of climate change. In its *World Energy Outlook 2011*, the IEA made it very clear that in the absence of rapid investment in zero carbon technologies such as renewables, the infrastructure we will have in place by 2017 will produce all the carbon dioxide that we can afford to see emitted if the world is to limit global average temperature rises to within 2°C¹³⁰:

*“If stringent new action is not forthcoming by 2017, the energy-related infrastructure then in place will generate all the CO₂ emissions allowed in the 450 Scenario up to 2035, leaving no room for additional power plants, factories and other infrastructure unless they are zero-carbon, which would be extremely costly. **Delaying action is a false economy: for every \$1 of investment avoided in the power sector before 2020 an additional \$4.3 would need to be spent after 2020 to compensate for the increased emissions.**”*

7. The EU Energy Roadmap therefore sits in a context where there is an urgent need to decarbonise the world's energy systems and especially those of the most advanced economies. The consumption of energy throughout the economy represents a significant proportion of greenhouse gas emissions, with the power sector alone representing approximately 25% of the UK's greenhouse gas emissions¹³¹. Whilst the EU Roadmap focuses on 2050, it is important to highlight that 2030 is a key date on the way to delivering the EU's and UK's commitments to reducing greenhouse gas emissions by at least 80% by 2050. From an environmental perspective, achieving substantial progress in decarbonising the energy system by 2030 will be key, with in the case of the UK, the independent Committee on Climate Change (CCC) recommending that the power sector should be near-decarbonised by that date. **However, 2030 is also a key date in that it is only**

¹²⁸ <http://www.theccc.org.uk/reports/fourth-carbon-budget>

¹²⁹ *Bridging the Emissions Gap, a UNEP Synthesis Report*, United Nations Environment Programme, November 2011: http://www.unep.org/pdf/UNEP_bridging_gap.pdf, see Chapter 3.

¹³⁰ *World Energy Outlook 2011*, International Energy Agency, November 2011: http://www.iea.org/weo/docs/weo2011/executive_summary.pdf, page 2.

¹³¹ Committee on Climate Change, Letter to Edward Davey, 13 September 2012: <http://www.theccc.org.uk/news/latest-news/1215-ccc-writes-to-ed-davey-over-government-stance-on-unabated-gas-fired-generation>

one investment cycle away, which means that little progress will be made towards decarbonising our energy systems unless policy certainty can be provided to low-carbon investors at both EU and member state level out to 2030.

8. Whilst the energy system captures a wide range of energy uses across the economy from transport and heating needs to electricity use, this submission focuses primarily on issues relating to the power sector. This is because the power sector not only represents a significant chunk of the EU's and the UK's current greenhouse emissions but also because, as recommended by the UK's CCC, "power sector decarbonisation and electrification is key to cutting emissions in surface transport, heat in buildings, and possibly heat in industry", which together "account for just over half of UK greenhouse gas emissions" today¹³².

9. WWF is strongly of the view that an increased deployment of renewable energy technologies¹³³ coupled with a greater focus on improving energy efficiency and increasing interconnection between European grids are the most viable options to deliver a successful and cost-effective decarbonisation of European power sectors over the next two decades. This is becoming increasingly clear following recent developments in the nuclear market and the repeated delays to the UK's Carbon Capture and Storage (CCS) programme, which make it unlikely that either technology will be able to provide significant amounts of low-carbon capacity by 2030.

10. In the case of the UK, WWF-UK's *Positive Energy* report¹³⁴, based on analysis by energy consultants Garrad Hassan, shows that if the UK's renewable sector is allowed to grow at a steady rate over the next 2 decades, renewables could provide well over 60% (and potentially up to 88%) of the UK's electricity demand by 2030 and be the key technological driver for delivering a near-decarbonised power sector for the UK. Garrad Hassan's analysis also showed that energy efficiency measures could reduce the required capital investment in renewables, gas power stations, CCS and interconnection infrastructure by up to £40bn by 2030. **The UK's upcoming Energy Bill is therefore a major opportunity to put the UK firmly on track towards a near-decarbonisation of the power sector by 2030, as recommended on several occasions by the CCC¹³⁵, in a way that is affordable and stimulates growth.**

Question 1: Energy policy's contribution to economic growth

Some context on the Commission's Energy 2050 Roadmap

11. WWF welcomes the publication of the EU Energy Roadmap and in particular the finding that regardless of which scenario is pursued, much greater levels of investment in renewable energy, energy efficiency and smart grid infrastructure are "no-regrets" option for the EU, a point which was also emphasised in a recent conclusion paper from the EU Council

¹³² Committee on Climate Change, Letter to Edward Davey, 13 September 2012: <http://www.theccc.org.uk/news/latest-news/1215-ccc-writes-to-ed-davey-over-government-stance-on-unabated-gas-fired-generation>

¹³³ WWF-UK would urge the Committee to review the conclusions of the Crown Estate *Offshore Wind Cost Reduction* project, which was released on 13 June 2012: <http://www.thecrownestate.co.uk/news-media/news/2012/reducing-the-lifetime-costs-of-offshore-wind-pathways-to-success/>

¹³⁴ *Positive Energy: How renewable electricity could transform the UK by 2030*, WWF-UK, October 2011: www.wwf.org.uk/positiveenergy. The underlying technical analysis carried out by Garrad Hassan is also available on the same page.

¹³⁵ See in particular the CCC's Fourth Carbon Budget report: <http://www.theccc.org.uk/reports/fourth-carbon-budget>

supported by 26 member states¹³⁶. Whilst one of the dominant themes of the Roadmap is decarbonisation and the role of renewables within that, the Roadmap does not however fully investigate the potential of renewables in the EU. Upcoming analysis from WWF's European Policy Office (which will shortly be shared with the Committee) shows in particular that while the Roadmap presents different decarbonisation scenarios, it under-estimates the pace at which renewable energy and energy efficiency infrastructure can be deployed over the next 20 years, with in particular the share of renewable energy evolving within a narrow range of 28% to 31% of gross final energy consumption by 2030¹³⁷. The different scenarios should therefore be seen as variations within a central theme as opposed to scenarios which fully explore the technical potential of all options. **WWF shares the view held by many other stakeholders that the Commission has thereby failed to give sufficient consideration to the potential for higher levels of both energy efficiency and renewable energy, especially out to 2030.**

12. The Energy Roadmap scenarios are dependent on significant amounts of both nuclear power and CCS technology¹³⁸ in order to achieve decarbonisation targets, despite the significant non-delivery risks that each individual technology faces. Rather than taking the chance of having to fill any generation gap at late notice, WWF recommends that the full range of renewable generation technologies and energy efficiency solutions are scaled up to replace the large amount of generation capacity that will be closing in the EU over the next 20 years.

Energy policy's contribution to decarbonisation and growth

13. Whilst it comes with challenges, the prospect of decarbonising the EU's energy systems and especially its power sectors is not only perfectly feasible, it also represents a major economic growth opportunity in areas where the EU and/or the UK are currently early movers.

14. The CBI's *Colour of Growth* report¹³⁹ recently highlighted the substantial economic benefit that the UK is currently deriving from its "green business" (which includes but is not limited to renewables): **"in trying economic times, the UK's green business has continued to grow in real terms, carving out a £122bn share of a global market worth £3.3 trillion and employing close to a million people. And in 2014/2015, it is expected to roughly halve the UK's trade deficit"**. Looking further ahead, analysis provided by Cambridge Econometrics to Renewable UK shows that the offshore wind and marine renewable sectors alone could create from 44,000 to 115,000 jobs in the UK by 2021 depending on deployment ambitions¹⁴⁰.

15. At EU level, a recent impact assessment carried out by the Commission on renewable energy policy¹⁴¹ found that the EU renewable energy industry already employed 1.1 million people at the end of 2010 and that *"while renewable energy growth also triggers sectoral*

¹³⁶ EU Council conclusions, 18 June 2012: <http://register.consilium.europa.eu/pdf/en/12/stl1/stl1553.en12.pdf>, page 4.

¹³⁷ http://ec.europa.eu/energy/energy2020/roadmap/doc/sec_2011_1565_part2.pdf (p.38)

¹³⁸ http://ec.europa.eu/energy/energy2020/roadmap/doc/sec_2011_1565_part2.pdf. See table 22 on page 16

¹³⁹ *Colour of Growth*, CBI, July 2012: http://www.cbi.org.uk/media/1552876/energy_climatechangerpt_web.pdf.

¹⁴⁰ *Working for a Green Britain*, Vol 2, July 2011,

http://www.bwea.com/pdf/publications/Working_for_Green_Britain_V2.pdf

¹⁴¹ European Commission, Executive Summary of the Impact Assessment accompanying the Communication "Renewable Energy: a major player in the European Energy Market", June 2012:

http://ec.europa.eu/energy/renewables/doc/communication/2012/ia_summary_en.pdf, page 5.

restructuring, research shows that net employment impacts or renewables policies are still positive”, a conclusion also reached with respect to Germany’s growing renewable energy industry¹⁴². The impact assessment goes on to suggest that setting binding EU and member state level renewable energy targets post-2020, together with co-ordinated support policies, is likely to provide higher employment benefits than other policy options, such as options based solely on setting a strengthened greenhouse gas reduction target across the EU.

16. For EU and UK energy policy to deliver a successful decarbonisation of the energy system and for it to harness the substantial economic growth opportunities that sectors such as the renewables industry have to offer, energy policy must have, as its fundamental objective, the need to provide investors with long-term policy certainty. Investment certainty, which requires clear long-term volume signals and stable financial support mechanisms¹⁴³, holds the key to reducing the cost of capital, increasing private sector investment in R&D (see question 6), incentivising companies to invest in domestic supply chains and incentivising the mass-production of new technologies, all of which will reduce technology costs for the benefit of consumers and incentivise growth.

17. **In this context, 2030 is a key date given that it is only one investment cycle away and policy decisions made today will therefore have an important bearing on what type of power sector infrastructure the EU and the UK will have in place by 2030.** The need for long-term investment certainty was well captured in a recent impact assessment by the Commission on renewable energy policy: *“it is increasingly clear that the EU 2020 renewable energy target may not in itself be sufficient to promote the necessary long-term investments that will allow for further cost reduction and a greater share of renewable energy post-2020. Clarity about the future direction of EU policy has thus become important for investors and the business community in order to make long-term investment decisions in the renewables sector today.”*¹⁴⁴

Providing investment certainty and the upcoming Energy Bill

18. As stated in our response to the Energy and Climate Change Committee’s inquiry into the draft Energy Bill (attached) and a recent joint NGO / industry / consumer group briefing¹⁴⁵, we believe that the following measures will be essential in providing investment certainty in the UK’s low-carbon power sector, especially the renewables industry:

- the introduction of a legally binding 2030 decarbonisation target set at 50gCO₂/kWh, as recommended by the CCC on numerous occasions. This would provide a clear sense of direction to the Bill and could also be compatible with the UK joining a future 2030 renewable energy target at EU level, which would send a strong volume signal to the EU’s renewables sector and create potential export opportunities for the UK’s renewable energy industry.

¹⁴² *Renewable Energy Sources in Figures*, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, July 2011: http://www.erneuerbare-energien.de/files/english/pdf/application/pdf/broschuere_ee_zahlen_en_bf.pdf, page 36.

¹⁴³ An Imperial College Report, funded by WWF-UK, which sets out the importance of financial support policies for accelerating the cost reductions and deployment of renewable technologies, will be launched on 22 October 2012.

¹⁴⁴ European Commission, Executive Summary of the Impact Assessment accompanying the Communication “Renewable Energy: a major player in the European Energy Market”, page 2.

¹⁴⁵ *Securing the UK’s Power Supplies*, 27 June 2012: http://www.wwf.org.uk/wwf_articles.cfm?unewsid=6074

- **the introduction of stable feed-in tariff support measures, which are properly tailored to the wide range of renewable energy technologies and project sizes which can be developed in the UK.** We would urge the Government to depart from its initial proposal to impose a ‘one size fits all’ feed-in tariff designed for new nuclear on all other low-carbon technologies.

- **the provision of credible counterparty arrangements for the feed-in tariff contracts which minimise risks to investors:** This will require a contract and counterparty design that is simple, legally enforceable, and ideally backed by Government.

Question 2: A common EU approach to transforming the energy system

19. A common European approach can play a key role in reducing the costs of decarbonising our energy systems and maintaining security of supply. Even in areas where there is not currently much formal European collaboration, the EU provides a vitally important forum in which new policy ideas and collaboration on new technical areas can be discussed.

Greater electricity interconnection as a key area for collaboration

20. One of the best examples of areas in which a common European approach can help increase the effectiveness with which the energy system can be transformed is greater interconnection between Europe’s power grids. As made clear in WWF-UK’s response to the Energy and Climate Change Select Committee’s inquiry into a European supergrid (attached), greater interconnection between Europe’s power grids could help:

- **decrease the costs of decarbonisation:** Greater European interconnection has the potential to reduce electricity prices for consumers and businesses, as it is the key physical pre-requisite to improving electricity resource sharing across Europe and reducing the amount of back-up generation required at Member state level to support a greater deployment of renewables. According to the European Climate Foundation’s *Roadmap 2050* report, increased interconnection at EU level could reduce total back-up power station requirements by up to 40% in an 80% renewable energy scenario¹⁴⁶. It is worth noting that the investment required in grid infrastructure is likely to be a very small part of the overall electricity infrastructure costs required as part of decarbonising the European power sector (in the order of 0.5% to 1.6% of total costs)¹⁴⁷.

- **Reduce “congestion rents”:** These are currently estimated at around €1.3bn / year in the 10 most congested interconnectors in Europe¹⁴⁸ and occur as a result of surplus generation in one Member state being unable to be transferred to another member state.

- **Improve security of supply:** From a national perspective, enhanced interconnection can help support a wider penetration of supply-driven renewables on the grid (such as wind power), by allowing for exports of excess power at times of high output and low demand and imports of power from other European markets at times of lower renewable output and

¹⁴⁶ European Climate Foundation, *Roadmap 2050, A Practical Guide to a Prosperous Low-Carbon Europe*, Technical Analysis, Page 19: http://www.roadmap2050.eu/attachments/files/Volume1_fullreport_PressPack.pdf.

¹⁴⁷ See ECF *Roadmap 2050* Analysis, the grid expenditure represents around 0.5% of overall investment in the power sector under the 40% renewable energy scenario to 1.6% in the 80% renewable energy scenario.

¹⁴⁸ Chrysoula Argyriou, DG ENER presentation to ENTSO-ETYNDDP workshop, 19 March 2010.

high demand (such as imports of hydropower from Norway¹⁴⁹, geothermal power from Iceland, etc.). From a European perspective, greater interconnection can help strengthen the EU's ability to respond to external energy crisis – especially at times of high fossil fuel prices - by making optimum use of domestic renewable energy resources and reducing European reliance on imported fossil fuels.

- Unlock the value of the UK's vast marine renewable resources: Several reports, in particular the joint Crown Estate / DECC / industry's *Offshore Valuation Report*¹⁵⁰, found that the value of the UK's marine renewable resources, equivalent to 6 times UK electricity demand in 2009, was enormous¹⁵¹ and that taking a leadership role in EU 'supergrid' negotiations was key to ensuring that the UK could maximise the benefits from future export opportunities that such a resource offers.

The importance of implementing the EU's internal energy market

21. A more liquid market place across the EU has an important role to play in helping deliver a more efficient roll-out of renewable energy resources across Europe and smoothen the variability of some forms of renewable energy. As the European Wind Energy Association (EWEA) made clear in its recent report on the internal energy market¹⁵², “structural market distortions remain the main obstacle to creating an internal energy market and integrating wind energy” (there were 17 infringement notices on the implementation of the internal energy market served on member states as of late August). The EWEA goes on to argue that the key challenges facing the cost-effective integration of large amounts of wind energy in the European power system are “due to existing rigid market rules and institutional frameworks that were never designed with wind power, or other variable generation technologies, in mind”.

22. This suggests that two priority areas for a common European approach should be to (i) tackle the structural electricity market distortions within the EU (such as through removing regulated prices, addressing market concentration issues, removing fossil fuel subsidies and improving market transparency) and (ii) to design market rules which recognise the intrinsic characteristics of renewable energy and which can help facilitate their cost-effective integration in the European grid (such as through shortening trading time horizons and creating intra-day markets to improve the forecast accuracy of wind energy output and reduce system balancing needs).

Greater co-ordination at EU level should not delay the UK's Energy Bill

23. A movement towards greater co-ordination of EU market rules should not be used as an excuse to delay power sector decarbonisation action in the UK as part of the electricity market reform (EMR), although ensuring that the Energy Bill package can be made to work within a more integrated European power market is important. The UK has at its disposal

¹⁴⁹ Considered in one of Poyry's latest report for the Committee on Climate Change: “Options for Low-Carbon Power Sector Flexibility to 2050: A report to the Committee on Climate Change”, October 2010:

http://downloads.theccc.org.uk/s3.amazonaws.com/4th%20Budget/fourthbudget_supportingresearch_Poyry_%20power%20sector%20flexibility%20to%202050.pdf

¹⁵⁰ The Offshore Valuation Report: A valuation of the UK's offshore renewable energy resource, July 2010:

http://www.offshorevaluation.org/downloads/offshore_valuation_full.pdf

¹⁵¹ By using 29% of the UK's practical offshore resource, “the electricity equivalent to 1 billion barrels of oil could be generated annually, matching North Sea oil and gas production and making Britain a net electricity exporter” (page 6 & 7).

¹⁵² The European Wind Energy Association, *Creating the Internal Energy Market in Europe*, September 2012:

http://www.ewea.org/index.php?id=60&no_cache=1&tx_ttnews%5Btt_news%5D=1958&tx_ttnews%5BbackPid%5D=1&cHash=d63b2c533cfd9df12b192e40d69b4ff3

one of the most valuable renewable energy resources (and potentially CO₂ storage resources) in Europe¹⁵³, which can offer the UK substantial energy security in a low-carbon world and industrial growth benefits¹⁵⁴. Early action from the UK in reducing its carbon intensity and building strong industrial leadership in marine renewables and potentially CCS will put the UK in a strong position, as greater co-ordination between the EU's energy markets develops and more stringent European emission reductions kick in.

Question 4: Reducing the costs of energy for business and consumers

24. Whilst ensuring that energy prices do not undermine EU competitiveness is important, artificially reducing energy prices to achieve this is unlikely to be sustainable in the long run.

25. We believe that the key to developing a long-term environmentally sustainable and affordable energy system is to:

- **reduce dependence on fossil fuels:** According to Commissioner Hedegaard, the EU incurred €573bn in fossil fuel import costs in 2011 alone¹⁵⁵. In the case of the UK, the UK is already over-reliant on gas with 41% of electricity having been generated from gas in 2011¹⁵⁶ and 80% of its 26.2 million homes using gas for domestic heating¹⁵⁷. This over-reliance on gas has meant that UK energy bills have been very vulnerable to movements in the wholesale price of gas, with increases in the price of gas accounting for some 63% of dual-fuel energy bill rises between 2004 and 2010 according to the CCC¹⁵⁸. Going forward, a recent study by Oxford Economics for DECC also recently found that “the impact on UK output from oil and gas price shocks could be reduced by around 60% in 2050 through the introduction of climate policies”¹⁵⁹ such as a greater focus on energy efficiency and the large-scale deployment of renewable energy.

- **provide investment certainty to the low-carbon power sector:** as referred to in answer to question 1, providing investment certainty to the low-carbon power sector, especially to support the deployment of new technologies such as renewables, is absolutely key in terms of accelerating their cost reductions.

- **place energy efficiency on equal footing with energy supply policies:** energy policy regularly under-estimates the potential of energy efficiency and its ability to reduce overall energy sector spend, thereby reducing costs for consumers. This needs to be rectified given the significant potential for energy efficiency to reduce system costs. As an illustration, a recent **McKinsey report commissioned by DECC**¹⁶⁰ shows that energy efficiency

¹⁵³ See reference to *Offshore Valuation Report* above. The report found that the net value of the UK's marine renewable energy sales in the period from 2010 to 2050 could be worth up to £126bn under the “High High” DECC price scenario (see page 78).

¹⁵⁴ Building a low-carbon economy: the UK's innovation challenge, Committee on Climate Change, July 2010, http://hmccc.s3.amazonaws.com/CCC_Low-Carbon_web_August%202010.pdf, see in particular part 2, pages 14 to 16.

¹⁵⁵ http://ec.europa.eu/commission_2010-2014/hedegaard/headlines/news/2012-06-14_01_en.htm

¹⁵⁶ <http://www.decc.gov.uk/assets/decc/11/stats/publications/dukes/5955-dukes-2012-chapter-5-electricity.pdf>

¹⁵⁷ <http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/heat/4805-future-heating-strategic-framework.pdf>

¹⁵⁸ Households Energy Bills – impacts of meeting carbon budgets, the CCC, December 2011:

http://downloads.theccc.org.uk.s3.amazonaws.com/Household%20Energy%20Bills/CCC_Energy%20Note%20Bill_bookmarked_1.pdf

¹⁵⁹ Oxford Economics, *Fossil Fuel Price Shocks and a low carbon economy*, December 2011:

<http://www.decc.gov.uk/publications/basket.aspx?filetype=4&filepath=11%2Ftackling-climate-change%2Finternational-climate-change%2F5276-fossil-fuel-price-shocks-and-a-low-carbon-economy-.pdf&minwidth=true>

¹⁶⁰ McKinsey for DECC, 2012, *Capturing the full electricity efficiency potential of the U.K.* Online:

<http://www.decc.gov.uk/assets/decc/11/cutting-emissions/5776-capturing-the-full-electricity-efficiency-potential.pdf>

could reduce projected UK electricity demand for 2030 by 40%, a significant 155TWh, by implementing electricity saving measures in the domestic, commercial and industrial sectors. The existing policy framework is, however, insufficient to deliver this. McKinsey estimate that existing policy will only deliver savings of 14% or 54TWh, only a third of the total potential. This is a key reason why an upcoming WWF/Green Alliance report will be recommending the incorporation of energy efficiency support measures in the upcoming Energy Bill¹⁶¹.

- increase interconnection with Europe: As explained in answer to question 2, greater interconnection with European power grids coupled with improving market transparency and the removal of structural market distortions between different member states, will be important in helping harness the efficient use of renewable energy resources across Europe as well as reduce back-up requirements to maintain security of supply.

Question 5: The role of Gas

26. Before looking at the detailed implications of the future role of gas, it is important to put the role of gas in the EU Energy Roadmap in context. Gas has a potentially important role in the EU's electricity mix in the next two decades as it replaces coal and provides a flexible back-up to renewables. However, it should be noted that all of the Roadmap's scenarios envisage absolute gas consumption (both for power generation and other uses) falling from now onwards. Therefore, while gas might still have a useful role out to 2030, the EU does not need to see an increase in overall gas infrastructure. Looking out to 2050, the share of gas infrastructure will have to represent a significantly smaller share of overall energy infrastructure as the EU moves towards its 2050 emission reduction targets.

The role of gas in a decarbonised electricity system

27. Whilst WWF recognises that unabated gas-fired power stations will have a useful role to play as a bridging and system balancing capacity in a power sector that is near-decarbonised by 2030, we are strongly of the view that the role of gas needs to be carefully monitored from both an environmental and system security perspective.

28. Two recent reports from the International Energy Agency¹⁶² show that a new dash for gas would be incompatible with preventing dangerous levels of climate change, as it would put the world on a path to a warming of 3.5°C or more, significantly above the 2°C rise threshold which international policy efforts are trying to avoid. In the case of the UK, the CCC has repeatedly advised that in order for the UK to stay on track for meeting its legally binding commitment of reducing its greenhouse gas emissions by at least 80% by 2050 compared to 1990 levels, the power sector would need to be near-decarbonised by 2030 with a carbon intensity in the region of 50gCO₂/kWh¹⁶³. As part of this, the CCC recently clarified that *“the role for unabated gas fired power generation should be limited to balancing the system in 2030, by which time the share of unabated gas generation in the total should be no more than 10%, compared to 40% today. A*

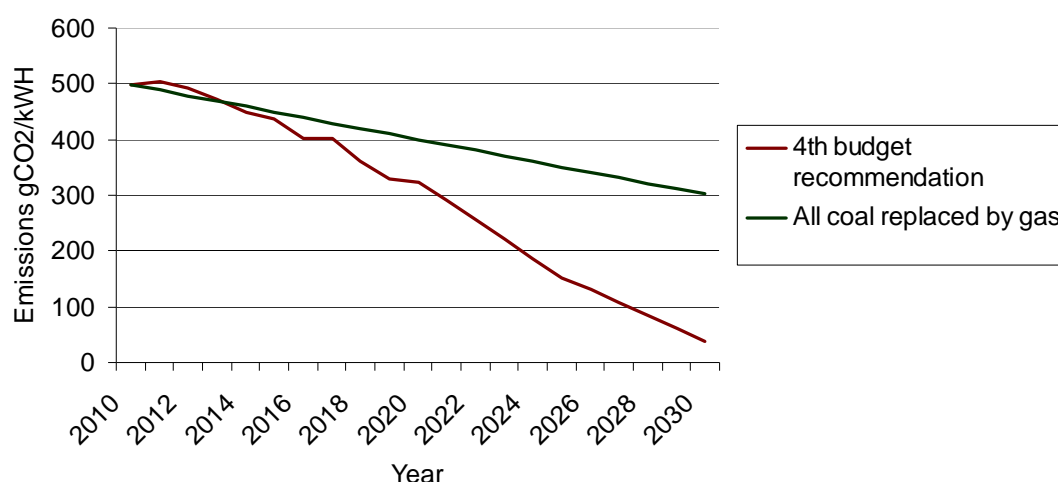
¹⁶¹ Green Alliance / WWF, *Creating a market for electricity savings*, to be released on 15 October 2012.

¹⁶² http://www.iea.org/weo/docs/weo2011/executive_summary.pdf and http://www.worldenergyoutlook.org/media/weowebsite/2012/goldenrules/WEO2012_GoldenRulesReport.pdf

¹⁶³ See in particular the CCC's Fourth Carbon Budget report: <http://www.theccc.org.uk/reports/fourth-carbon-budget>

second dash for gas, resulting in a higher share of unabated gas in 2030, would neither be economically sensible nor compatible with our legislated carbon budgets.¹⁶⁴

29. The idea that all that needs to be done to meet the UK's climate change commitments is a switch from coal to gas generation is deeply flawed. Given that there are no plans to build new coal power stations in the UK, coal will be gradually phased out as older plants are closed down regardless of what replaces them. Whilst the switch from coal to gas may yield some savings, gas capacity built now will last for around 25 years becoming a carbon liability as the UK moves towards a decarbonised power sector. As a theoretical illustration, **the graph below, which draws on supporting data published by the CCC in their 4th carbon budget report¹⁶⁵, demonstrates that a simple switch from coal to unabated gas only would leave emissions from the UK power sector around 6 times higher than the level recommended by the Committee.** The black line represents emissions level if the only change to the power mix between now and 2030 were to be coal power being replaced by gas.



30. Whilst carbon capture and storage technology (CCS) could help reduce emissions from gas plants in the future through a retrofit programme, **it is important to remember that CCS is a technology that is still at the pre-demonstration stage.** As made clear in a recent paper from Green Alliance, the repeated delays to the UK's CCS demonstration programme means that there is still a lot of uncertainty as to the future availability of CCS as a commercially deployable technology and of its future costs¹⁶⁶. Developing a 'high unabated gas' energy strategy in the EU or UK today on the assumption that CCS will be readily available before 2030, and available at reasonable cost, is a very dubious assumption and one which would be very risky from an environmental perspective. The focus of CCS policy for now should be solely on developing a successful demonstration programme and should certainly not be used as an excuse for pursuing a high unabated gas strategy.

¹⁶⁴ CCC, Statement by David Kennedy on Unabated Gas Fired Generation, 24 May 2012: <http://www.theccc.org.uk/news>

¹⁶⁵ <http://www.theccc.org.uk/reports/fourth-carbon-budget>

¹⁶⁶ Green Alliance, *The CCS Challenge: Securing a Second Chance for UK Carbon Capture and Storage*, March 2012: <http://green-alliance.org.uk/uploadedFiles/Publications/reports/A%20second%20chance%20for%20CCS%20-%20web.pdf>

Gas, Shale Gas and Energy Security

31. As referred to in answer to question 4, the UK is already over-reliant on gas with 41% of electricity having been generated from gas-fired plants in 2011¹⁶⁷ and 80% of its 26.2 million homes using gas for domestic heating¹⁶⁸, an over-reliance which has played a key part in energy bill rises since 2004.

32. This over-reliance on gas comes in a context where the UK is increasingly becoming a net importer of gas, with reliance on imports forecast to continue increasing in line with falling domestic production¹⁶⁹. Much has been made of the rise of shale gas in the US which has had a very significant impact on the price of gas in that market. However, a number of studies have concluded that shale gas is unlikely to be a game changer in the UK or the EU¹⁷⁰ and that the low prices experienced in the US are due, in part, to oversupply which will correct itself in time. Furthermore, **a study from Deutsche Bank recently concluded that “we do not expect the impact of shale-gas production on EU gas prices to be anywhere near as great as has been the case with US shale-gas production on Henry Hub prices”¹⁷¹.**

33. UK Shale gas resources are currently highly uncertain. The British Geological Survey is currently updating its estimate of resource levels but current published figures suggest that technically recoverable resources are approximately 150bcm, which equates to approximately 1.5 years of current UK gas consumption. Media reports which reference huge finds of shale gas by onshore licence holders such as Cuadrilla often fail to appreciate the distinction between ‘gas in place’ and ‘technically recoverable reserves’ (estimated at around 10% of gas in place). The proportion of these technically recoverable reserves which are practical, environmentally acceptable and economic to recover will further reduce the volume of gas which is actually extracted. **Even in the most optimistic reports, large shale gas extraction only serves to partially offset declines in UK conventional gas production¹⁷².**

34. At the European level, the IEA recently published its ‘Golden Rules for a Golden Age of Gas’ report, which indicated that even in the most optimistic “gas” scenario (one in which there is rapid growth in shale gas production and emissions are consistent with global temperature rises of 3.5°C), “the upward trend in net gas imports into the EU continues throughout the projection period (to 2035)¹⁷³”. **The implications are clear – even in the most ‘optimistic’ shale gas scenario, the EU will only succeed in slowing down its increasing gas dependency.**

35. From an environmental perspective, as recently made clear in a joint NGO letter to DECC¹⁷⁴, we believe that given the possible local environmental risks linked to shale gas production and the uncertainties surrounding its climate change impacts (an issue recently flagged by the Royal Society and Royal Academy of Engineering Report on UK shale gas

¹⁶⁷ <http://www.decc.gov.uk/assets/decc/11/stats/publications/dukes/5955-dukes-2012-chapter-5-electricity.pdf>

¹⁶⁸ <http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/heat/4805-future-heating-strategic-framework.pdf>

¹⁶⁹ <http://og.decc.gov.uk/assets/og/data-maps/chapters/production-projections.pdf>

¹⁷⁰ http://europeangashub.com/article/detail.php?parent_id=&id=89

¹⁷¹ http://longfinance.net/images/reports/pdf/db_shale_2011.pdf

¹⁷² http://www.iod.com/~media/Documents/PDFs/Influencing/Infrastructure/2012/IOD_Britains_shale_gas_potential

¹⁷³ http://www.worldenergyoutlook.org/media/weowebsite/2012/goldenrules/WEO2012_GoldenRulesReport.pdf

¹⁷⁴ Joint NGO letter to Edward Davey, 7 September 2012: http://assets.wwf.org.uk/downloads/joint_ngo_letter_to_ed_davey_on_shale_gas_7_sept_2012.pdf

exploration¹⁷⁵), no decision about further shale gas exploration and production should be made until (1) a full climate impact assessment has been carried out and (2) the Environment Agency has completed its risk evaluation of the current regulatory regime.

Will gas be cheap in the future?

36. The assertion put forward by some groups that increasing the UK's or the EU's dependence on gas is good for the economy is factually very dubious. As made clear in the latest intervention by the CCC¹⁷⁶, both DECC's central projections¹⁷⁷ and the IEA's gas price projections¹⁷⁸ envisage rising gas prices in both the US and the EU over the next two decades, and envisage in particular a significantly higher gas price in the EU than in the US, notwithstanding the potential impact of possible EU shale gas production. The CCC's analysis goes on to state that **“even in an extremely unlikely case where the gas price in the EU falls to the level in the US (i.e. to around 40% below the lower European price projected by the IEA), there is negligible benefit switching from cost-effective low-carbon generation to unabated gas-fired generation.”**

The role of gas in support of an active renewables policy

37. Whilst gas can play a useful role as a system balancing fuel in a power system increasingly based on renewables, it is important to contextualise the challenge of addressing the variability of wind power and the role of gas within that. In particular, **the CCC made clear in its Renewable Energy Review¹⁷⁹ that the challenge of dealing with the intermittency of certain forms of renewable energy such as wind power should not be over-estimated.** The analysis provided to the CCC by Poyry suggests that “even for renewable shares of up to 65% in 2030 and 80% in 2050, the cost is only up to 1p/kWh of additional intermittent generation”. This is due to the fact that there is a basket of options to deal with intermittency, which includes gas back-up generation but also short term demand-side response, greater interconnection (see answer to question 2) and storage, which can all play a role in addressing intermittency at reasonable cost and in a way that limits the role that gas generation needs to play to support an active renewables policy.

Question 6: Research and Innovation

The importance of investment certainty

38. As stated in answer to question 1, providing investment certainty to the low-carbon power sector, especially with respect to new technologies such as renewables, holds the key to triggering investment in the EU's and UK's low-carbon power sector and accelerating cost reductions. This applies to R&D spend as well, given that a significant amount of R&D spend comes from the private sector. **Whilst the private sector will often finance a significant amount of R&D, these investments will not be made if these companies do not believe that there will be a market for their new technologies**

¹⁷⁵ Royal Society and Royal Academy of Engineering report on Shale Gas Extraction in the UK, June 2012: http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/projects/shale-gas/2012-06-28-Shale-gas.pdf

¹⁷⁶ Committee on Climate Change, Letter to Edward Davey, 13 September 2012: <http://www.theccc.org.uk/news/latest-news/1215-ccc-writes-to-ed-davey-over-government-stance-on-unabated-gas-fired-generation>

¹⁷⁷ DECC, Fossil Fuel Price Projections, October 2011

¹⁷⁸ IEA, Golden Rules for a Golden Age of Gas, May 2012: http://www.worldenergyoutlook.org/media/weowebsite/2012/goldenrules/WEO2012_GoldenRulesReport.pdf

¹⁷⁹ <http://www.theccc.org.uk/reports/renewable-energy-review>

after the demonstration phase. This is where, in the case of the renewables industry, having clear long-term minimum deployment targets coupled with targeted, proportionate and stable financial policies to support the deployment of new technologies are so important in helping stimulate R&D investment and bringing forward new technologies.

39. An Imperial College Report, funded by WWF-UK, which sets out the importance of financial support policies in accelerating innovation, cost reductions and the deployment of renewable technologies, will be published on 22 October 2012.

The need for a focused R&D policy

40. Clearly, an effective R&D policy cannot back every technology and needs to be focused on areas where the EU / UK are currently early movers or have a comparative advantage. In the “*Building a low-carbon economy – the UK’s innovation challenge*”¹⁸⁰ report, the CCC made clear that there were several technological areas where the UK was currently an early mover and which the UK should seek to both “*develop and deploy*” given the economic growth opportunities which could come with pursuing such a strategy. Among the technologies that the UK should seek to develop and deploy, the CCC included offshore wind, marine renewables, CCS and electric vehicles. By contrast, nuclear technology was a technology that could only be “*deployed*” as opposed to “*developed and deployed*” in the UK, given the reliance of a nuclear new build programme on “*on overseas based suppliers offering standardised designs*”.

Concerns on the focus of the EU’s R&D budget

41. When it comes to the EU’s budget, it is key that the EU’s limited R&D budget be used where it is most effective, which should be on new and emerging technologies which need R&D support to move towards the commercial deployment stage. **WWF is particularly concerned by recent discussions in the context of the EU budget (Multilateral Financial Framework) to seek to extend the Horizon 2020 R&D budget to cover the gas sector.** As opposed to emerging technologies such as renewables, the gas industry is certainly mature and wealthy enough to do its own R&D and this is all the more the case given that the overall role of gas in the EU’s energy system will have to become increasingly limited, as the EU and the UK move towards their respective 2030 and 2050 decarbonisation milestones. Secondly, it is important that revenues from the EU Emissions Trading Scheme (EU ETS) are reinvested in the mitigation of and adaptation to climate change, part of which should be used to boost the EU’s R&D funds for the development of new low-carbon technologies.

3 October 2012

¹⁸⁰ *Building a low-carbon economy: the UK’s innovation challenge*, Committee on Climate Change, July 2010, http://hmccc.s3.amazonaws.com/CCC_Low-Carbon_web_August%202010.pdf

WWF and CBI—Oral Evidence (QQ 305 – 338)

WWF and CBI—Oral Evidence (QQ 305 – 338)

[Transcript to be found under CBI and WWF](#)

WWF—Supplementary Written Evidence

Summary

1. WWF-UK is strongly of the view that the most viable and sustainable options to deliver a successful and cost-effective decarbonisation of the UK's power sector by 2030 are an increased deployment of renewable energy technologies coupled with a greater focus on improving energy efficiency and increasing the UK's interconnection with European grids, with gas playing a role as a transitional and system balancing fuel. This is becoming increasingly desirable following the continued economic difficulties facing the nuclear industry referred to below, which make it unlikely that nuclear power will be able to provide significant amounts of low-carbon capacity by 2030.

2. At a global level, WWF is also deeply concerned by the environmental implications of relying on a new fleet of nuclear plants. Despite sixty years of civil nuclear expertise, there is still no long-term solution for storing high level radioactive wastes. Creating more radioactive waste with no real and affordable solution available for its safe and secure long-term disposal is passing on a serious and expensive legacy for future generations.

3. WWF's international *Energy Report*, based on analysis by energy consultants Ecofys, concluded that the transition to an energy-efficient world economy by 2050 powered almost 100% by renewable energy (based only on technologies available today) was not only technically possible but could save the world economy up to €4trillion / year by mid century, roughly equivalent to 2% of world GDP.¹⁸¹ This without any new nuclear power.

4. At the European level, the recent *Re-energising Europe* report¹⁸² from WWF's European Policy Office, based on analysis by energy consultants Ecofys, shows that nuclear power is not needed to decarbonise the European power sector – energy efficiency and renewable energy were sufficient and technically feasible. The report found that, by 2030, the EU could be using 38% less energy than what is currently projected, with over 40% of the EU's demand for energy being met from renewable energy sources, and 65% of the EU's electricity being provided from renewable sources of energy with only a limited role for biomass.

5. WWF-UK's *Positive Energy* report¹⁸³, based on analysis by energy consultants Garrad Hassan, shows that if the UK's renewable sector is allowed to grow at a steady rate over the next two decades, renewable energy sources could provide well over 60% (and potentially up to 88%) of the UK's electricity demand by 2030. This could be the key technological driver for delivering a near-decarbonised power sector for the UK, without having to rely on new nuclear power. The analysis also shows that energy efficiency measures could reduce the required capital investment in renewables, gas power stations, CCS and interconnection infrastructure by up to £40bn by 2030.

¹⁸¹ www.panda.org/energyreport

¹⁸² Re-energising Europe: putting the EU on Track for 100% Renewable Energy, February 2013:

http://www.panda.org/about_our_earth/all_publications/?207608/WWF-report-Putting-the-EU-on-Track-for-100-Renewable-Energy

¹⁸³ Positive Energy: How renewable electricity could transform the UK by 2030, WWF-UK, October 2011:

www.wwf.org.uk/positiveenergy. The underlying technical analysis carried out by Garrad Hassan is also available on the same page.

6. WWF therefore considers that it would not be the right approach to design European climate and energy policy to incentivise new nuclear. This would be detrimental to other more promising and sustainable options such as increased efforts in energy efficiency and renewable energy deployment.

7. Favouring nuclear power would also squander the UK's natural advantages in renewable energy. As made clear in the Committee on Climate Change *Low-Carbon Innovation report*¹⁸⁴, the nuclear route will mean importing standardised reactor designs from overseas which would be far less likely to support economic growth opportunities in the UK at a scale comparable with large-scale deployment of renewable energy sources, in which the UK is currently a world leader in several technologies that can both “develop and deploy” in the UK.

Cost Evolution of Nuclear Power

8. Putting aside WWF's environmental concerns on nuclear power, the continued economic difficulties facing the nuclear industry make it extremely unlikely that much nuclear capacity will be built in the UK or the EU over the next 20 years. This point was well summarised in the special issue on nuclear power (*The Dream that Failed*) published in 2012 by *The Economist*¹⁸⁵, which argued that the complexity and continually rising costs involved in building nuclear reactors and in putting in place appropriate safety, waste management and decommissioning arrangements will always limit the role that nuclear energy can play in the power sector worldwide.

9. The economic difficulties faced by the nuclear industry have been well exemplified of late by the recent withdrawal of major utilities from the UK's nuclear market (RWE, SSE, Centrica, Siemens and E.ON). The EPR reactors currently being built in France and Finland¹⁸⁶ are now around five years late and have more than doubled in budget, now around €8.6bn¹⁸⁷ each. (In the case of the Olkiluoto project in Finland, it is worth noting that the deal included loans to a prosperous Western European country backed by export credit guarantees and a cost of borrowing blatantly far below commercial rates.) Recent reports indicate that the costs of building new nuclear plants in the UK could now be in the region of £7bn per reactor.¹⁸⁸

10. The substantial increase in the cost of nuclear power from the original estimate of £2bn per reactor provided in the early 2000s (and by the Blair Government in 2006) to the latest cost estimates for new reactors in France, Finland and the UK is reminiscent of the “great bandwagon market” which took place in the USA in the 1960s and 70s where early cost

¹⁸⁴ Building a low-carbon economy: the UK's innovation challenge, Committee on Climate Change, July 2010, http://hmccc.s3.amazonaws.com/CCC_Low-Carbon_web_August%202010.pdf. Among the technologies that the UK should “develop and deploy”, the CCC's analysis did not refer to nuclear power, recommending instead that the UK should “develop and deploy” offshore wind, other marine renewables and CCS technologies. The CCC concluded that nuclear power was a technology that could only be “deployed” in the UK as opposed to “developed and deployed”. One of the reasons given for this recommendation was that the UK would “need to rely on overseas based suppliers offering standardised designs” to develop new nuclear power stations.

¹⁸⁵ The Economist, “The Dream That Failed”, Special Issue on Nuclear Power, March 2012: <http://www.economist.com/node/21549936>

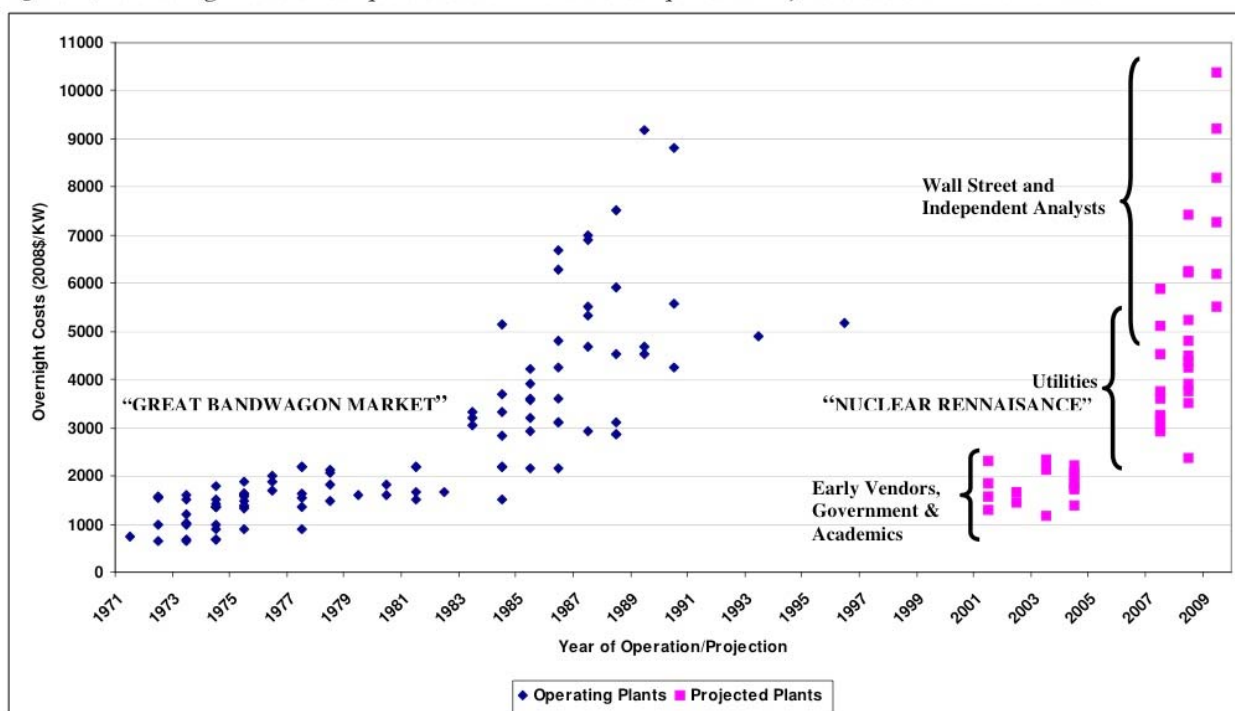
¹⁸⁶ <http://www.reuters.com/article/2013/02/11/teollisuudenvoima-olkiluoto-idUSL5N0BBEZ520130211>

¹⁸⁷ <http://www.reuters.com/article/2012/12/03/us-edf-nuclear-flamanville-idUSBRE8B214620121203>

¹⁸⁸ <http://www.reuters.com/article/2012/05/08/nuclear-britain-edf-idUSL5E8G8FQ620120508>. Recent analysis from Tom Burke puts the costs of a 30 year CfD for new nuclear power stations at £155/MWh: <http://tomburke.co.uk/2012/05/28/hinkley-and-sizewell-will-cost-us-155-billion-over-30-years-under-the-cfd/>

estimates were vastly below the costs of the few reactors that were eventually built. Indeed, as Vermont Law School economist Dr Mark Cooper pointed out, nuclear reactors are almost unique among major technologies in that the cost of the next one is almost always more than the last one.¹⁸⁹ As shown in the diagram below, his 2009 study also found that “the initial cost projections put out early in today’s so-called ‘nuclear renaissance’ were about one-third of what one would have expected, based on the nuclear reactors completed in the 1990s” and “the most recent cost projections for new nuclear reactors are, on average, over four times as high as the initial ‘nuclear renaissance’ projections.” He concludes that “nuclear reactors are the worst option [for carbon reduction] from the point of view of the consumer and society.”

Figure ES-1: Overnight Cost of Completed Nuclear Reactors Compared to Projected Costs of Future Reactors



Sources: Koomey and Hultman, 2007, Data Appendix; University of Chicago 2004, p. S-2, p. S-8; University of Chicago estimate, MIT, 2003, p. 42; Tennessee Valley Authority, 2005, p. I-7; Klein, p. 14; Keystone Center, 2007, p.42; Kaplan, 2008 Appendix B for utility estimates, p. 39; Harding, 2007, p. 71; Lovins and Shiekh, 2008b, p. 2; Congressional Budget Office, 2008, p. 13; Lazard, 2008, Lazard, p. 2; Moody's, 2008, p. 15; Standard and Poor, 2008, p. 11; Severance, 2009, pp. 35-36; Schlissel and Biewald, 2008, p. 2; Energy Information Administration, 2009, p. 89; Harding, 2009. PPL, 2009; Deutch, et al., 2009, p. 6. See Bibliography for full citations.

Figure I: Overnight Cost of Completed Nuclear Reactors Compared to Projected Costs of Future Reactors (Cooper, 2009).

11. These escalating construction costs come in addition to indirect taxpayer subsidies through the UK Government's proposed third party liability regime for nuclear accidents and under the proposed waste transfer price mechanism. With respect to the latter, a recent report by Jackson consulting¹⁹⁰ estimates that the UK Government's proposed waste transfer price mechanism for new nuclear power stations risks providing an additional subsidy of up to £1.5bn per new nuclear power station because the maximum liability cap and the spent fuel unit disposal costs have both been under-estimated. This comes in a

¹⁸⁹ Cooper, M., 2009. *The Economics of Nuclear Reactors: Renaissance or Relapse?* Institute for Energy and the Environment, Vermont Law School.

¹⁹⁰ *Subsidy Assessment of Waste Transfer Pricing for Disposal of Spent Fuel from New Nuclear Power Stations*, Jackson Consulting, March 2011: <http://www.greenpeace.org.uk/sites/files/gpuk/FUP-Subsidy-Report-Mar2011.pdf>

context where the *World's Nuclear Status Report 2009*¹⁹¹ commissioned by the German Government shows that the cost of dealing with radioactive waste in the last 20 years has grown even faster than the actual construction of nuclear plants.

Comparison with the Cost Evolution of Renewable Energy Technologies

12. By contrast, as observed by *The Economist* in its recent study on nuclear, the costs of many renewable energy technologies are falling fast. Bloomberg New Energy Finance, specialists in the field of energy infrastructure costings, recently issued a report showing that the levelised costs of onshore wind were continuing to fall substantially and that the average onshore wind farm would reach cost parity with combined cycle gas plants by 2016.¹⁹² The report also showed that when including the value of the carbon price, onshore wind was already as cheap as gas fired generation globally. Similar cost reductions have also been observed with other renewable technologies such as solar PV, the cost of which fell by 50% in 2011 alone¹⁹³ and on which Ernst & Young recently stated that non-domestic solar PV installations would reach grid parity in the UK by 2020 without subsidy.¹⁹⁴

13. Substantial cost reductions can also be expected for newer forms of renewable technologies such as offshore wind. The Crown Estate's *Offshore Wind Cost Reduction Pathways Study*¹⁹⁵ shows that there are several pathways that could result in the costs of offshore wind going down to £100/MWh or less by 2020, with further substantial cost reductions possible in the 2020s. The report makes clear that long-term term predictability in terms of minimum volumes of deployment and financial support hold the key to delivering these costs reductions. The *Offshore Valuation Report*¹⁹⁶, put together by a consortium of major industry players, reached similar conclusions and argued that the costs of fixed offshore wind could go down by 50% by 2030 (down to a levelised cost of £70-£80/MWh compared to around £150/MWh today).

Overview of key barriers to the construction of new nuclear power stations in the UK

14. There are several barriers to the construction of nuclear new build, including issues relating to high radioactive waste management, third party liability, political commitments, legal barriers, planning and nuclear proliferation:

- **Waste** - the issue of radioactive waste is still unresolved, after sixty years of nuclear operations, with no final location agreed for the UK and an expected bill for the tax payer of at least £85bn for existing waste.¹⁹⁷ Even if one or more repositories are built, this is no justification to create more nuclear waste.
- **Accidents**— corporate liability for any nuclear accident is capped at around £1bn by European law. This means that the taxpayer would pay for the clean-up of any major

¹⁹¹ The World Nuclear Industry Status Report 2009: <http://www.nirs.org/neconomics/weltstatusbericht0908.pdf>

¹⁹² Report from Bloomberg New Energy Finance on Onshore Wind: <http://www.bnef.com/PressReleases/view/172>

¹⁹³ Pew Centre, Clean Energy Race Report 2012: <http://www.pewenvironment.org/news-room/reports/whos-winning-the-clean-energy-race-2011-edition-85899381106>

¹⁹⁴ Ernst & Young, UK Solar PV industry outlook: <http://www.oursolarfuture.org.uk/wp-content/uploads/The-UK-50kW-to-5-MW-solar-PV-market-190611-Final.pdf>

¹⁹⁵ The Crown Estate, Offshore Wind Cost Reduction Pathways Study, May 2012:

<http://www.thecrownestate.co.uk/media/305094/Offshore%20wind%20cost%20reduction%20pathways%20study.pdf>

¹⁹⁶ www.offshorevaluation.org

¹⁹⁷ <http://www.independent.co.uk/news/uk/politics/blair-accused-of-nuclear-waste-coverup-432753.html>

accident.¹⁹⁸ This is at odds with the “polluter pays” principle which features in UK and EU law. A study looking at a medium scale nuclear accident put the full costs at c. £500bn. The compensation costs for the Fukushima nuclear accident in Japan are already estimated to be over £35bn and the total clean-up costs at likely to top £160bn.¹⁹⁹ If the nuclear industry had to insure itself properly, its electricity would be unaffordable.

- **Political** – the UK’s current Electricity Market Reform proposals on nuclear are a clear breach of the Coalition Agreement’s commitment not to subsidise nuclear power.
- **Legal:** The current Electricity Market Reform proposals would be an illegal state aid under EU law because tendering for nuclear energy does not fit the requirements of Directive 2009/72, article 8.²⁰⁰
- **Planning** – although the UK National Policy Statements have classified new nuclear projects as critical infrastructure going forward, there is significant local opposition to nuclear new build. A recent poll carried out by the Guardian²⁰¹ found that 61% of the population would “strongly oppose” the construction of a new nuclear power station in their area, which contrasts for example with 21% of the population “strongly opposing” the construction of a new onshore wind farm in their area.
- **Proliferation of nuclear weapons** – civil nuclear programmes fuel nuclear weapons’ programmes. Opting for a power generation technology which we are not happy to see used in all countries is far from offering international leadership in demonstrating the viability of a low-carbon economy and very much weakens the UK’s intervention in international nuclear proliferation negotiations.

8 March 2013

¹⁹⁸ <http://www.decc.gov.uk/assets/decc/Consultations/paris-brussels-convention-changes/4874-parisbrussels-government-response-to-consultation.pdf>

¹⁹⁹ <http://www.reuters.com/article/2011/12/06/japan-nuclear-cost-idUSL3E7N60MR20111206>

²⁰⁰ The Directive requires tendering for the ‘promotion of infant new technologies’ (which does not describe nuclear energy), and then only when authorisation procedures are proved insufficient to achieve needed capacity.

²⁰¹ <http://www.guardian.co.uk/environment/2012/mar/01/local-opposition-onshore-windfarms-tripled>

Dimitri Zenghelis²⁰²—Written evidence

Restoring growth and confidence through decarbonisation and efficiency investment can overcome the European paradox of thrift.

1. The current period of low confidence and sluggish private investment presents a unique opportunity for policy-makers to boost employment and economic growth by supporting resource-efficient green markets. The transition to a resource-efficient economy is unstoppable and the scale of this transformation is so large that credible policy could quickly leverage record sums of private net saving to productive use.
2. But before this can happen, Europe requires an urgent resolution to the current euro debt crisis based on some form of mutualisation of key member state liabilities and eurozone-wide guarantees to struggling banks. This must be accompanied by institutional reforms to bring the eurozone closer to being an optimal currency area with greater cross-border fiscal and labour flows in order to prevent the build-up of future imbalances. But these necessary reforms must be accompanied by a programme to encourage private sector investment to stimulate growth, at the centre of which should be a policy-driven European transformation to a resource-efficient economy²⁰³.
3. Sending credible market signals in the form of clearly identified market-based policy instruments - involving long-term carbon pricing, standards and regulations, together with carefully designed technology support - has the potential to unlock private investment in renewable energy, energy efficiency and low-carbon vehicles. This could unleash sizeable macroeconomic benefits by boosting private spending, creating jobs, generating tax revenues, and allowing the monetary authorities greater leeway to stimulate demand.
4. Europe's strongest economies, such as Scandinavia and Germany, are among those that have taken social and environmental sustainability most seriously. From recycling and re-use within communities, to public transport, energy infrastructure, communication networks and building standards, European regions have set precedents and learnt through the power of example and shared experiences how policies can be applied and improved. Some have been shown to be more cost-effective than others, but overall Europe's experience has served to reinforce social norms and values in favour of economic and environmental sustainability in a way that has entered the post-war collective consciousness of the Union.
5. The UK and Europe are witnessing a classic case of the "paradox of thrift" in which households, businesses, banks and now government are all retrenching simultaneously, cutting investment, shedding labour, restricting credit and storing money. As a result of this, the UK faces the prospect of a protracted recession even

²⁰² Senior Visiting Fellow at the Grantham Research Institute on Climate Change London School of Economics, Associate Fellow Royal Institute of International Affairs at Chatham House and Senior Economic Adviser Cisco

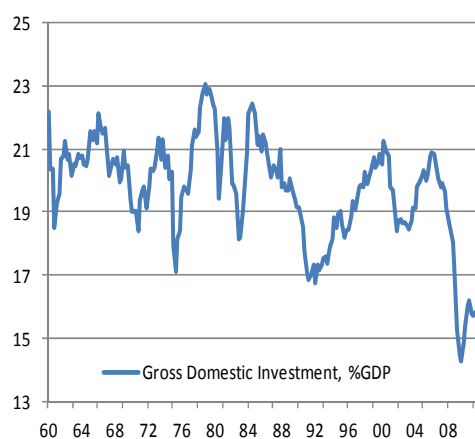
²⁰³ See Zenghelis (2012) 'Delivering environmentally and socially sustainable economic growth in Europe'. Salzburg Trilogue: http://www.bertelsmann-stiftung.de/cps/rde/xbcr/SID-B789C6CE-5805A606/bst_engl/xcms_bst_dms_36380_2.pdf

before output has fully made up the losses from the last recession, with GDP yet to return to its 2008 peak. Yet the current period of low confidence presents a golden opportunity for the UK and the European Union to boost employment and stimulate economic growth, while encouraging competition and innovation.

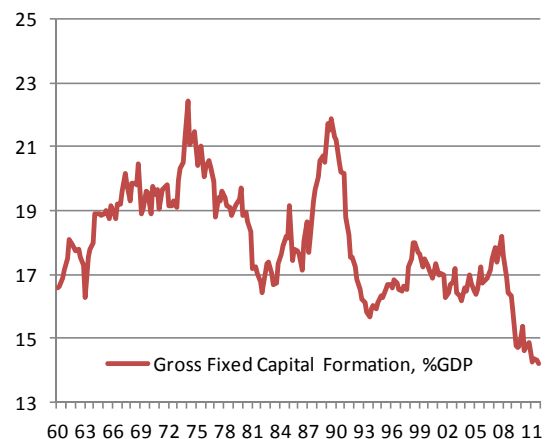
6. Growth requires investment, yet investment has slumped to record lows in Europe mainly because households, businesses and banks are nervous about future demand, and have responded by forgoing more risky investment in physical capital. Gross fixed capital formation (total investment) in the euro area fell to 18.7% of GDP in 2010, the lowest level in more than 40 years. Assets have been ‘sweated’ as borrowing conditions have tightened. This means maintaining the quality of assets sufficient to see growth expanding will require significant investments in Europe’s productive assets (such as renewable energy infrastructures) over the coming decades²⁰⁴. Investment is also languishing at record post-war lows relative to GDP in the UK and US (figure 1).

Figure 1: Fixed investment

United States



United Kingdom



Quarterly data to fourth quarter of 2011

Adapted from data from the Bureau of Economic Analysis

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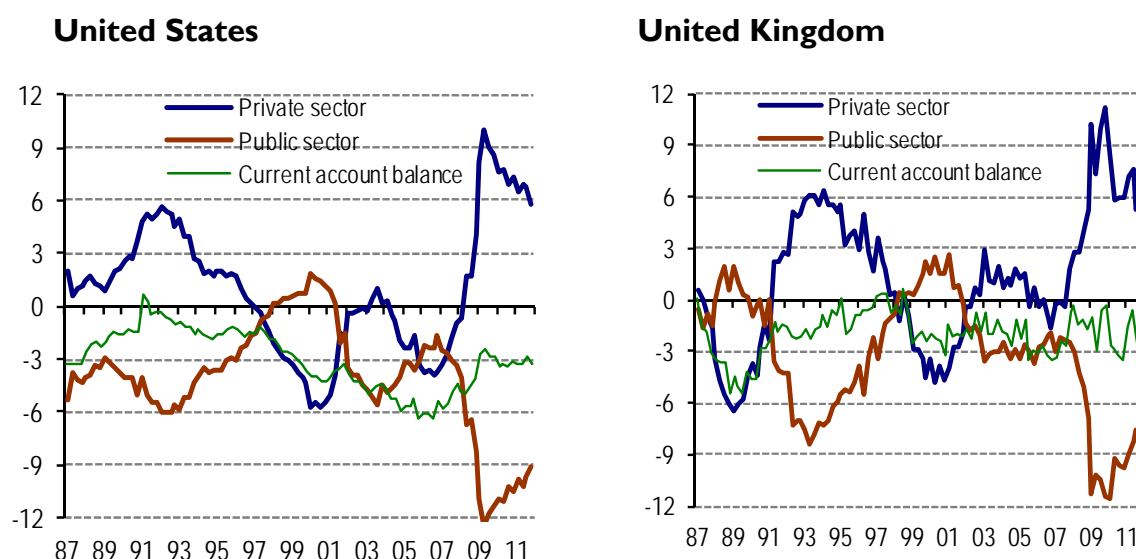
7. Yet instead of investing in assets whose prices have fallen in recent years, companies and households are stashing private saving into ‘risk-free’ assets such as solvent sovereign bonds. As a result, annual private sector surpluses (net lending – the difference between saving and investment) over the past few years have been at record levels in almost all European countries, and in 2010 amounted to 4 per cent in Spain and 10% in Germany²⁰⁵. They amounted to £99bn last year in the UK (and close to \$1 trillion in the US), equivalent to 6 per cent of GDP (figure 2). As private spending and incomes collapsed, so net fiscal revenues slumped fuelling a mirror-image surge in global public sector deficits. With the public sector mostly borrowing

²⁰⁴ See Helm, D. 2011, “The sustainable borders of the state”, Oxford Review of Economic Policy, 27 (4).

²⁰⁵ See Spencer, T. et al, 2011 “Can the EU Budget Support Climate Policy in Central and Eastern Europe?”, Finnish Institute of International Affairs.

from the private sector, net borrowing from abroad (given by the current account balance) has in most major economies remained little changed.

Figure 2: Sector financial balances (net lending)



Data to fourth quarter of 2011

Adapted from data from the Bureau of Economic Analysis

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8. Desired saving has exceeded desired investment to such a degree that global real "risk-free" interest rates for the next 20 years have been pushed to zero and below (table 1). Savings are losing value by the day as pension funds and financial institutions pay real interest to (rather than receive interest from) governments; a truly perverse state of affairs given the need for productive investment. These low rates do not reflect a collapse in the underlying returns to capital, but instead reflect desperately depleted confidence.

Table 1. Daily United States Treasury yield curve rates

Date	1 month	3 month	6 month	1 year	2 year	3 year	5 year	7 year	10 year	20 year
28 Sept 2012	0.06	0.10	0.14	0.17	0.23	0.31	0.62	1.04	1.65	2.42

Source: United States Treasury

9. In the aftermath of the financial crash, households, businesses and banks undertook necessary and unavoidable long-run stock readjustment in balance sheets²⁰⁶. This required a reduction in private spending in order to restore private sector net

²⁰⁶ See Zenghelis D. 2012 'A Strategy for Restoring Confidence and Economic Growth through Green Investment and Innovation', Grantham Research Institute, London School of Economics and Political Science. Available at: <http://www2.lse.ac.uk/GranthamInstitute/publications/Policy/docs/PB-Zenghelis-economic-growth-green-investment-innovation.pdf>.

worth. A slowdown in growth or even recession was an inevitable consequence of this necessary balance sheet adjustment. But when everyone retrenches simultaneously over a period of years, fear of recession becomes a self-fulfilling prophecy, sustaining a vicious circle of low demand and low investment that affects the whole economy. The collapse in long run interest rates testifies to the degree to which the global economy has strayed from its long run market equilibrium. This is no longer just a market adjustment – it is a crisis of confidence.

10. The UK, like most EU economies, needs to stimulate economic growth to reduce deficits and debt, but growth requires investment, and investment levels have slumped to record lows relative to output. The longer recovery is delayed and capital sits idle, the more skills are lost and the higher the misallocation of resources, making it harder to restore growth.
11. Fiscal policy is generally constrained by the need to restore confidence in the sustainability of public debt and, with short-term interest rates close to zero, the effectiveness of monetary policy to stimulate growth is reaching its limits.
12. What is needed to restore confidence is a clear strategic vision with supporting policies to guide investors. A vision to build an innovative, resource-efficient market economy which restores energy security, tackles climate change, and saves consumers and businesses costs in the long run.
13. Standard macroeconomics tells us that the best time to support low-carbon investment is during a protracted economic slowdown. Resource costs are low and the potential to crowd out alternative investment and employment is small. In addition, although public budgets are stretched, there is no shortage either of private capital available for investment, or of investment opportunities with potential for profitable returns. The current opportunity should not be missed.
14. This is about more than correcting market failures, such as those associated with greenhouse gas emissions; it is about restoring confidence through mission-driven investment which spurs innovation in a way comparable to, but bigger in scale than, the space race or the struggle to defeat cancer.
15. Policies to encourage low-carbon investment would provide new business opportunities, generate income for investors and would have credibility in the long term because they address growing global resource challenges, while tapping into a fast-growing global market for resource-efficient activities.
16. The most recent figures published by the Department for Business, Innovation and Skills show that the UK low-carbon and environmental goods and services sector had sales of £122.2bn in 2010-11, growing 4.7 per cent from the previous year and placing us sixth in the global league table.
17. But the private sector is not investing as heavily as it could in green innovation and infrastructure in many parts of Europe because of a lack of confidence in future returns in this policy-driven sector. European governments should incentivise such investment by taking on elements of this policy risk which it "controls". By backing its

own low-carbon policies, they can stimulate additional net private sector investment, and thereby make a significant contribution to economic growth and employment.

18. A clear and credible policy steer can help break the risk-averse 'paradox-of-thrift' cycle. In order to support the policies already in place, the euro area could incentivise low-carbon investment by itself taking on elements of the policy risk which governments 'control', and which put off investors, through setting up well capitalised public investment banks. These might include public European banks like EIB and EBRD, public national banks, like KfW in Germany, CDC in France, ICO in Spain, and CDP in Italy, or national or municipal governments and agencies. There is also scope to use unspent structural funds in peripheral countries. The UK can encourage green investment by allowing the Green Investment Bank to operate as a lending institution, offering loans to private companies so that it shares some of the risk of private investments in green infrastructure.
19. In past global recessions, rearmament, electrification and space races have helped restore investor confidence – this time the vision could be a war on resource inefficiency. This is not about Keynesian versus monetarist or state versus market. It is about recognising and responding to the macroeconomic evidence.
20. The economy is being held back by a collective lack of confidence. At the same time the green sector is one of the few vibrant parts of our economy at the moment. Investment in the sector is long run credible because a transition to resource efficiency is widely recognised as inevitable. Two of the world's fastest growing economies, South Korea and China, have moved decisively to embrace high technology low-carbon growth in their recent stimulus packages in 2008 and 2009, and in China's outline for the 12th five-year plan²⁰⁷. These countries recognise that investment flows to the pioneers of the revolutions.²⁰⁸
21. Resource efficient investment provides a transformational scale that can leverage substantial sums of capital. It relies on policy rather than depleted private confidence to kick-start the market, which gives government institutions unique macroeconomic leverage. There is an opportunity to generate growth with minimal call on the public purse, as long as European government restore private confidence in 'green' investment through credible and durable policy signals.

2 October 2012

²⁰⁷ Of the seven "Magic Growth sectors" identified in the Twelfth Five Year Plan, three are low-carbon industries: clean energy, energy efficiency, clean energy vehicles; the others are high-end manufacturing.

²⁰⁸ See Carlota Perez (2002) 'Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages'. London: Elgar.

Dimitri Zenghelis and Martin Wolf—Oral evidence (QQ 203-215)

Dimitri Zenghelis and Martin Wolf—Oral evidence (QQ 203-215)

[Transcript to be founder under Martin Wolf and Dimitri Zenghelis](#)