



HOUSE OF LORDS

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Witness: Professor Dieter Helm

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Members present

Lord MacGregor of Pulham Market (Chairman)
Baroness Blackstone
Lord Griffiths of Fforestfach
Lord Hollick
Lord Lawson of Blaby
Lord Lipsey
Baroness Noakes
Lord Shipley
Lord Skidelsky
Lord Smith of Clifton

Examination of Witness

Professor Dieter Helm, Oxford University

Q115 The Chairman: Good afternoon, Professor Helm. This is not our normal Committee room, so it is rather large. Worse than that, we gather that some of the lights are not working. I hope you can see all right if you want to make any notes. We will endeavour to make sure that we see you properly.

Professor Dieter Helm: No problem.

The Chairman: We are very grateful indeed to you for coming, because we well know of your wide-ranging expertise in this area. Do you want to make a statement, or shall we go straight into questions?

Professor Dieter Helm: Let us go straight to questions, if that is helpful to you.

The Chairman: It is a very basic first question, because we are getting some differences in responses from some of our witnesses. How do you see the UK and European gas prices influenced by US developments? Is there a global market in the same way as there is a global oil market?

Professor Dieter Helm: The transmission mechanisms from US shale gas to world markets are many, varied, quite complicated, and typically poorly understood, so the impact of US

shale gas on world gas prices is, and is likely to remain, very limited. Even if the US develops all the LNG projects that are currently in the pipeline, they are not enough to make much difference to the world price. If anyone thinks that US shale gas is about to reduce UK gas prices, the answer is that it is very unlikely. However, that does not mean that there are not significant effects. Two of the transmission mechanisms are very obvious. The first is that shale gas has displaced a significant amount of coal in the US, which is now in export markets. Coal prices are and have been falling quite sharply for some time for a variety of reasons, but US coal exports have added to that. The immediate price impact is to drive down the price of coal in Europe. The coal burn has expanded very substantially in Europe, and since the coal burn has gone up a lot in Britain and the coal price has gone down, you might have expected that electricity prices would be falling in the UK rather than going up. That is a major transmission effect.

The second one is clearly in the product market. It is not so much that energy-intensive companies in Europe are leaving Europe; it is just that no investment is being made in energy-intensive activities across the whole of Europe. Major petrochemical and other investments are being made in the United States, which is a serious long-term competitive threat. The inhibition on oil exports from the United States means that much of the unconventional oil surplus in the US is refined and turned into refined products. That is why places like Grangemouth are in some difficulty now, as the US is very competitive in that territory too.

Apart from that, the other major effect on US gas exports will probably be to raise the price of gas in the United States. That is another poorly understood impact, as there is a degree of equilibration, but only a degree, between world prices and much cheaper prices in the US, with people seeking to choose export markets to get higher rents.

Lord Lawson of Blaby: That is why in the United States, of course, there is considerable resistance, which appears gradually to be breaking down, to exporting its gas.

Professor Dieter Helm: Yes. For the incumbent energy-intensive users, having a gas price of about 3 or 4 in the United States compared with, say, 10 to 12 in Europe or 16 in China is a huge competitive advantage, and I do not think that any time soon US prices will rise to anything like the levels experienced in Europe or the Far East. Indeed, if you look at the forward price of gas in the United States, there are good reasons for believing, even with the exports, that it will remain amazingly competitive against the UK.

You have to bear in mind one other thing when it comes to the industrial companies. Ethane, which is gas based, is used as the feedstock for petrochemicals in the US, whereas we in Europe tend to use oil-based feedstocks for petrochemicals, and there is an enormous difference between what the ethane costs and what the oil-based inputs are to petrochemicals in Europe. This is an enormous strategic threat, and it is likely to remain so even without the exports.

Q116 Lord Lawson of Blaby: What about other countries? Obviously the shale gas revolution in technological terms is not US-specific, and it is well known that there is shale in many if not most places around the world. Where would you see the capacity for significant production of gas from shale outside the United States?

Professor Dieter Helm: The first thing to say is that shale as a rock structure is ubiquitous around most of the planet, so there is a very large amount of shale rock about. Where there is shale there tend to be carbon deposits, most of which are uneconomic and unexplored, and we cannot know in advance in any detail what these resources are like until we have done some drilling. I started to write down the countries that you might think of in this category. Argentina clearly has enormous deposits. Russia has substantial deposits. Ukraine has pretty good deposits. Algeria has enormous deposits. Then there is Saudi, the Middle

Eastern states, China, South Africa, indeed Europe, Canada. Once you start to list them, it is quite hard to think the other way around, which is: which countries do not have the potential for these resources? That does not mean that they are necessarily going to be economic, but it is a complete illusion to think that in the medium term this is a US phenomenon.

Lord Lawson of Blaby: Right.

Professor Dieter Helm: That is only the case in the short term, and there are very good reasons for that, but one can imagine a world of potential gas supplies—it depends on the price—which means that from a policy point of view, instead of assuming that gas is a scarce fuel source that is likely to run out any time soon, you would be better placed to assume that there is so much of the stuff that you should assume not that it is infinite but that there is enough to last through a full technological cycle. That is all one is really concerned about when one is thinking about security of supply.

Lord Lawson of Blaby: Just one last point on this. You have reeled off the list of countries, and a continent in one case, where there are substantial reserves. As you say, until exploration is done we do not know whether it is going to be economic, but it would clearly be very odd indeed if the only place in the world where it was economic was the United States. There must be a presumption, surely, that at least in some of these other places it will be economic.

Professor Dieter Helm: There are some areas where it is speculative, but quite a lot of drilling has already been done outside the United States, so it would be quite surprising if Argentina did not turn out to have a pretty economic and substantive position to bring to the market. Indeed, that is already being developed, and similarly with Russia. The Algerian deposits look to be enormous, and they are right on the border with Europe, although there are issues about the availability of water and other kinds of resources for those. China is

putting serious effort into developing its resources. It has some water issues as well. Ukraine is developing substantial resources. Poland has done quite a lot of drilling. We are not in ignorance about some of these countries coming forward; it is just that there is great demand in the wider policy discourse to know how much of it there is and how quickly it will turn up. The answer is that we do not know, but that does not mean that one should conclude that there is not much of it or that it is not going to have a big impact. We still do not know how much oil there is going to turn out to be in the North Sea. Only recently, Statoil found three large oil deposits in the southern North Sea after 10 years of exploration. One must always bear in mind that the potential is large; we already know that. Some of it is almost certainly going to be economic. Much of it may turn out to be economic.

Q117 Lord Lawson of Blaby: One very last question on this. What you have just said, I would have thought—contradict me if you wish—is likely to have a considerable bearing on the likely future course of gas prices worldwide. As I understand it, DECC's forecasts at the present time are based on a substantial further rise in the price of gas. Do you share that view or do you think that the shale gas revolution has changed that?

Professor Dieter Helm: I am very reluctant to forecast prices, and I think the Government should be very reluctant to forecast prices as well. However, there are certain things that you know. The world with shale gas as opposed to the world without it is clearly a different world. The perception and the possibilities of gas supplies are clearly much, much higher than they were five or 10 years ago. How much this has impacted on the price of gas is quite a complicated economic consideration, because it depends on how fast you think people can switch from oil to gas: in other words, how fast the demand is going to chase up against this now much more abundant resource that is available. I personally have no particular reason for believing that the gas price is going to go up in the medium term. There are quite good

reasons for thinking that it is going to go down. It is abundant in supply, and I think one should be very sceptical about this Government and the last Government embarking on policies that require them to assume that the oil and gas prices are going to go up and then pursuing those policies and not being willing to contemplate the consequence of that not being the case. It is not long ago that Ministers from both parties—it is not tied to any particular political grouping—loosely talked about oil and gas prices doubling. This was very much common parlance across the European Community at the end of the last decade. If you think the oil and gas price is going to double and that peak oil and peak gas means that we are going to run out of the stuff, you had better build as many wind farms and solar panels as you can, because these things are going to be in the market relatively quickly because the oil and gas price is going up way above. Europe will then have a competitive advantage over those poor Americans who have been encumbered with all that fossil fuel, and the petrochemical industry and others will be flocking to the shores of Aberdeen and elsewhere to get access to what in relative terms will be cheap offshore wind. This is the danger of trying to base an energy policy on assuming that you know the future course of prices. As an aside, I see no good reasons for believing that there is any better case for thinking that the oil and gas prices are going to go up than thinking that they are going to go down. Indeed, normally what happens is that when the price of fossil fuels rises, that contains the seeds of its own destruction, as it did in the 1970s, and a lot more resource then comes on course. You can understand shale gas and shale oil being a response to relatively high prices in the 2000s.

Q118 Lord Griffiths of Fforestfach: Can I ask you for your view of the potential for shale gas development in the UK?

Professor Dieter Helm: There are two answers to that. One is a potential question: what do the rock structures look like, and are they are the kinds of rocks that might contain

significant shale deposits? That is a question for the geologists, and I understand that the answer, pretty unsurprisingly since we have lots of coal, conventional gas and conventional oil anyway, is that they are potentially pretty large. The reality, though, is about economics. It is not about whether rocks contain shale gas; it is about whether they are accessible at reasonable cost. The answer to that, as I understand it—and I am an economist rather than an engineer or a geologist—is that you have to find out, and that means that you have to drill some holes. My suspicion is that we do not really know until we have done quite a lot of drilling how much is there. That was true of offshore oil and gas as well; it took a long time to realise the scale of the deposits. You might think that my answer is evasive, but from a policy point of view it is right to assume ignorance, except in respect of the possibility, and to get on and drill some holes and find out what is there. Then you can decide what to do about it, or not.

Lord Griffiths of Fforestfach: That is certainly an honest response. I just wonder whether any possible lessons, any hints, could come from the drilling that is taking place in America and so on that would give us a little clearer guide than you have given.

Professor Dieter Helm: On the one hand, America has engaged in an enormous R&D programme. We should remember that all we are talking about here is the combination of three technologies: the ability to drill horizontally, the ability physically to frack the rock, and the ability of IT to detect where the drill bit needs to go. That is what it is about. It is not the rocket science of any particular technology; it is the combination of those technologies. A lot of that is practical stuff: drilling, seeing how it works, trying it out in different rock structures et cetera. So the benefit from the United States' extensive work in this area is that it ought to be cheaper to get it out than it otherwise would have been. That means that the deposit that is available could be larger than you previously thought it to be.

In terms of rock structures et cetera, the geology is well beyond me, but again I would have thought that you learn a lot about geology by getting on and drilling some holes and finding out what is there. So my guess would be that the first mover is the United States, of course in different formations and so on, but this must make it easier for us than it otherwise would have been.

Lord Hollick: Following up on Lord Griffiths' question, you said that quite a lot of wells would have to be drilled to establish whether or not there was exploitable gas from an economic point of view. Has the US experience given a ratio of the number of wells you need to drill in order to establish whether or not there is an economic field there, and could that help us to establish and take a view here as to what quite a lot of wells might be numerically?

Professor Dieter Helm: I am probably not competent to answer that question. I certainly do not have the data and I do not have the geological knowledge to give you a good answer to that question. You have to understand that shale gas is not like conventional drilling for a big natural gas deposit or a big oil well. You drill a well, you go horizontal, you go a certain distance, you stop, you then move and drill the next one. This is about relatively mobile small-scale individual capital investments. It is much more flexible. You can even decide how much drilling you want to do on the future price six months ahead of the gas price. That is completely different from trying to drill an oil well, sitting on that and running that deposit out through its time. So I suspect that the costs of doing the exploration are quite limited. On the question of how many you need, if you struck a deposit that was much better than you imagined, you would end up with a very different answer, but I am probably not expert enough to give you a good and full answer to your question.

Q119 The Chairman: In terms of exploration, we are obviously at a very early stage indeed in the UK. The United States is obviously in advance of us, but are there other countries that are much more advanced in exploring their resources than we are?

Professor Dieter Helm: Yes. There are other countries in Europe. Poland in particular has drilled quite a lot of holes. Ukraine is drilling quite a lot of holes. A lot more are drilled in Argentina. China is getting on with this process. Russia is drilling holes. Lots of countries are doing it. It is not actually that difficult or expensive to drill a hole once you are allowed to do it, because it is not on the scale, as I say, of an enormous oil or gas well development. This is quite small scale and quite focused. I do not know the number of wells that were drilled last year, but it is not negligible outside the United States.

Lord Griffiths of Fforestfach: Could I just ask one follow-up question? There is this potentially phenomenal resource that we can tap, and we have a lot of private sector companies that are potentially interested in doing it. Do you have a comment on the response that we have seen so far from companies on drilling?

Professor Dieter Helm: The problem is not the drilling; the problem is getting the permission to do the drilling and facing the kinds of difficulties that have confronted particular drillers in particular sites. The reasons for this are pretty obvious. If you follow the line of argument that I pursued earlier, which is that you need to assume that the oil and gas prices are going to double and that gas is going to be a scarce fuel like oil in order to make the renewables economic, if you come from the renewables side and you are collecting the economic rents associated with wind and existing solar et cetera, this kind of technology is a real threat to you. It might even turn out to be a much more efficient way of reducing carbon emissions in the short term by going from oil to gas, but from the perspective of being an advocate, a lobbyist or a rent seeker in some of the existing winners the Government have picked, you have a vested interest in making sure that this stuff does not

get off the ground. If in a small crowded island you play up the nightmare visions of the water out of your tap catching fire, earthquakes shattering around you and huge machinery coming on to your landscape, it is not hard to create a coalition of interests that make it extremely difficult even to get past what you might call go, which is the initial drilling to find out what is there.

The Chairman: In terms of your previous answer about the amount of exploratory drilling that is going on elsewhere, presumably there will be less of the resistance—we will come on to this—to exploratory drilling there than there is in the UK.

Professor Dieter Helm: Yes. There are very special reasons why it is more difficult in the UK than in a number of other countries. We are an extremely densely populated island and a relatively wealthy economy, and if you are in a less densely populated country that does not have the wealth, you are more likely to want to drive to exploit that resource. If you are a country like Ukraine, which is dependent on the Russians and the Russian pipelines of gas, and you have the kind of income levels in those kinds of countries, of course you are going to push on a lot quicker. I think there are perfectly legitimate and understandable reasons why it might be more difficult, slower and indeed more restricted in a country like Britain than it would be in the wide open spaces of the United States, China, Ukraine, Poland, Argentina or a host of other countries. That is just part of the frame.

Q120 Lord Shipley: It might be more restrictive in the UK, but there is still significant public hostility to the development of shale gas. I wondered whether you had a view as to why this was, and whether you think that it is the responsibility of government or regulators to intervene more in that debate.

Professor Dieter Helm: If you know nothing about the complexities of shale gas drilling, which must be 99.9% of the population, and look on the web and see films of the water coming out of your tap catching fire or open your newspaper and read about earthquakes

happening around you, and you have a vociferous lobby group that has a vested interest in making sure that drilling does not happen, it is hardly surprising that this builds up a difficult framework that is all in advance of showing what would be involved. This is before you really see whether this would be an intrusion on the landscape and whether it would create these kinds of outcomes. Any responsible Government, and indeed any responsible media, should want to explore the factual basis behind some of these claims. Of course one would want to make sure that regulators are on top of any environmental consequences that might flow from drilling, but I find it truly extraordinary that people want to ban fracking in a context where they are not prepared to ban coal mining, and indeed across Europe actually promote coal mining. When one thinks about the relative environmental impacts of the alternatives, coal mining is truly evil in comparison. I find it extraordinary that people are legally allowed to mine coal if you want at the same time to have a blanket ban on shale gas extraction.

Lord Lawson of Blaby: If I may say so, that is the point of Lord Shipley's question. On the one hand you say that there are the rent-seeking groups and so on with a vested interest in preventing it. On the other hand, you have the drilling companies that might well say that there is nothing to worry about, but people will say, "Well, they would, wouldn't they". Lord Shipley was asking whether there was not a case for the Environment Agency or the Government in some shape or form setting out objectively the state of play. What do think the position is?

Professor Dieter Helm: I think, more than that, that it is entirely appropriate, as it is for any of these fossil fuels—indeed, any fuels—that there be appropriate environmental regulations. If you look at shale gas, there are a number of issues which you would want addressed. In some contexts, because shale deposits vary from context to context, you would want to prohibit them, and in some circumstances you would want to be very careful about regulation. Methane leakage is an issue. It should be regulated. You do not want to drill for

this stuff along a geological fault line that is going to cause earthquakes that are going to bring down cities. On the other hand, you might not be bothered about minor tremors that happen on a very regular basis all over the place. You might well want to regulate what happens to water, and you will be very concerned about whether this is close or not close to water tables and so on, as you should be with coal. It seems to me appropriate that these public bodies should set out an appropriate regulatory framework. To be fair, that is being done both in the EU and here. Whether they should engage in the public debate about these things is well beyond my competence to comment upon.

The Chairman: But you made the point earlier that we do not actually know what the resources are until we do the experimental drilling. Do you think, as some of our witnesses have argued, that a distinction should be made between exploration and drilling and that the Government could make a stronger case for the exploratory approach?

Professor Dieter Helm: There is no point in doing exploratory stuff unless you think there is a serious prospect of doing the drilling. There is not much difference in environmental impact—the things you want to regulate—between an exploratory drill and an actual drill. I would much prefer a comprehensive regulatory framework but one that puts it in context with the regulatory framework around coal, oil and other sources of energy. As I said earlier, when you do a proper like for like comparison between coal and gas, it seems to me extraordinarily hard to make the case that the damage done by fracking for gas could be remotely like the damage done by coal mining and its consequences. Therefore, one wants relatively consistent, proper, enforced, credible regulation of these activities.

Q121 Baroness Blackstone: Should the comparison really be between coal mining and fracking for shale gas, rather than between shale gas and nuclear or renewables? You keep referring to coal, but there is an alternative approach. I wonder whether that is what the

French have done: decide that they want protect nuclear and their investments in renewables, rather than because they see it as somehow preferable to mine coal.

Professor Dieter Helm: There are lots of different issues, with respect, in that question. Practically now, in Europe and the UK, we are switching from gas to coal. We have gone from about 28% of our electricity generated by coal a couple of years ago to about 40% today. Germany is bringing 7 to 8 gigawatts of new coal on to its system. Coal stations are being built across eastern Europe. The coal burn generally has gone up across Europe. Germany has gone from nuclear to coal and from gas to coal. This is a really serious environmental development across Europe. There are people who argue that we should go straight from coal to renewables or nuclear power. There are two answers to that. The first is that people who argue that we should be honest with the public and tell them the costs that they are going to bear for doing that. There should be no shilly-shallying about trying to cap rises in energy prices. This is a world in which, as we already know, the first nuclear power station is twice the current wholesale price in this country, and that wholesale price is much higher than other wholesale prices in Europe. Just as a factual point, the wholesale price in Britain is about £50 a megawatt hour, or a bit more, and in Germany it is €30-something a megawatt hour. If you compare German wholesale prices with the cost of new nuclear, it is a ratio of about 3:1. If you want to go straight to nuclear or to renewables and miss out the gas bit in between, that entails an enormous investment programme and a massive increase in electricity bills. I have always thought that an energy policy is sustainable only if, first, the customers can pay and, secondly, they are willing to vote for politicians who will force them to pay, neither of which criteria seem to be applicable for part of the population now. That is my first answer. I do not think that we have the political framework to force customers to do that. Now, of course, it would be sensible if you thought that oil and gas prices were going to double but, as I pointed out earlier, that is a myth which a

number of politicians sadly espoused in the development of the current technologies. The second thing to say is that conventional wind and conventional solar cannot crack climate change. There just is not enough land, surfaces and shallow water to make any significant difference to climate change. The third thing to say is that the climate change problem over the next 10 to 20 years is almost entirely about heading off the already enormous and increasing coal burn globally.

China is on course, even if it achieves all its latest 12-year plan, to add between 400 and 600 gigawatts of new coal by 2020. Emissions have been going up since 1990 to now, with no impact from Kyoto or any of the European activities, because the coal burn has gone up from about 25% of world energy to about 28% or nearly 30%. That is a percentage of an absolute increase through time. So the question, if you are serious about global warming, is whether there is anything that is politically affordable that people will sign up to that could cut into that coal burn quicker. The answer from the United States is that it has about the fastest-falling CO₂ emissions of any developed country without having any serious climate or energy policies that I can detect. It is going from coal to gas. Gas is not the long-term solution, but neither are the current technologies. The final thing I would say is that there is really is not much option but to develop some more gas. By 2015 or 2016, the capacity margin this country will be very close to zero; in fact, I have done some numbers which suggests that it might be below zero. What is going to fill the gap in 2017, 2018, 2019 and 2020? We will be lucky if Hinckley is on the system by 2022 or 2023. More nuclear power stations are coming off between now and then. Most of the coal, through emissions control, thankfully, is being closed. There are not enough wind farms and solar panels to fill that gap in a credible way. I would love to believe that you can go from fossil fuels immediately to zero or low-carbon options, but I do not think that that is practically possible. That is why I think that it is inescapable that gas is a transitional fuel and can actually make a big impact

quickly. That is the lesson from the United States. Compare the United States with Europe. The United States has the fastest-growing oil production in the world. It has an enormous increase in its competitiveness and it has among the fastest-falling CO₂ emissions. It is going from coal to gas. In Europe, we are going from gas to coal. As I say, people are building new coal power stations in many places in Europe, and that is a locked-in disaster, which would make gas stations look like a picnic in comparison.

The Chairman: We have a lot of other questions that we would like to ask you, so we must move on.

Q122 Baroness Noakes: Staying with this issue about gas being a transition to a low-carbon future, back in May of this year, at a European Commission seminar, you said that there was clearly a massive argument in the UK Government as to whether that was the case. I wonder whether you would like to expand on where you see the sources of that disagreement within the Government. You also said that you thought that it was starting to win some credibility in government. I would be interested to see whether, since May, you think that that opinion has moved on.

Professor Dieter Helm: I think it is fair to say that in virtually every Government in Europe, and in a number of Governments around the world, this is a hot issue. That is because there is one group of people who had absolutely convinced themselves that they knew what the future was going to be like. If you are absolutely certain that the oil and gas price is going to double and go on ever upwards, you must be extremely reluctant to allow a world in which you develop oil, gas and coal reserves on your system. You know the answer, so it is straightforward, and you therefore think that it is economically nonsensical to allow any development of fossil fuels because you know that they are going to be incredibly expensive. That is one group. There is another group of people in most political systems who believe that the future is in decentralised, small-scale renewables, in particular wind and existing

solar panels. They are utterly convinced that that is how societies should be organised. You can find in the Energiewende supporters in Germany people who have a whole ideology—that is not to criticise it; it is a world view—about how society should be organised, within which these decentralised technologies fit. That group is committed to a particular outcome. It is represented, and I say this without criticism, in the Green Party in Britain, and among some aspects of the green components of all the major parties. Then there are people who think that actually our climate change policy should be addressed in a global context, and that since nobody else is doing very much, maybe we should not do a great deal either. I am not in favour, nor do I support, any of those positions, but that creates a political argument. In terms of how it has been contextualised in the UK, the previous Secretary of State at DECC held a very strong view about the role of renewables and how one should avoid a great build-out of gas. The climate change committee at one stage held a pretty strong view about limiting gas on to the system. It is no secret that other elements of the coalition took a more pro-gas position. When I alluded to the fact that things had moved on, it is highly significant in energy policy terms in Britain that the Secretary of State at DECC is now supportive of developing fracking. As an aside, it is also significant that after the party conferences this year, all three political parties are supportive of nuclear power. That is a big shift in the politics of energy policy here.

Baroness Noakes: So you would not characterise it today as a massive argument within the Government.

Professor Dieter Helm: No, I think quite a lot of the argument is over. That was not true in 2010 or 2011. We have moved on a long way since then.

Q123 Lord Skidelsky: Absent from indigenous production of shale gas, are you worried that energy-intensive industries may leave the United Kingdom because of the high energy prices with a loss of competitiveness to the UK economy?

Professor Dieter Helm: I think that is, as I alluded to earlier, not really the question, although that is what everyone measures particularly when it comes to carbon leakage. The real question is whether anyone is going to invest in any energy-intensive industries in Europe, to which the answer at the moment is no. If you were in the boardroom of a major petrochemical or energy-intensive company in Europe and your board was confronted with the question, “Shall we build our new plant”—that is the footloose bit—“in the US or in Europe?”, the answer would be blindingly obvious, and that is what we see happening. I would put it the other way: name me a single energy-intensive investment taking place anywhere within the European Union now, then do the comparator and list the numerous developments in the United States. You will see immediately what is going on. It is a major competitive threat. We can decide in Europe that we do not want to produce energy-intensive stuff. Then we can pretend that our emissions have fallen as a result by deindustrialising, but of course we will just import the stuff from somewhere else. That is why our carbon consumption, our carbon footprint, in Europe has been going up since 1990, whereas we pretended that we have made a difference to climate change by reducing our carbon production.

Just in the UK sense, our carbon production—that is, the emissions from our installations—went down by about 15% between 1990 and 2005. If you recalculate it for the stuff that we used to produce here which we now import, carbon consumption went up by about 18% to 19% in the same period. That is why world emissions carry on going up. It is just that China produces the emissions for us and for the US, and by relocating these industries elsewhere we pat ourselves on the back and say that we have achieved our Kyoto targets. We have actually made no difference to climate change whatever. You can argue that since these things have been offshored to more polluting places like China, at least with its current electricity industry configuration, we may well have made emissions worse globally while

pretending that we had made them better here. However, the competitive threat here is enormous and substantive, and currently, with the gas price differential, it is hard to make a case for imagining that Europe is going to have an energy-intensive industry in the future.

Lord Skidelsky: In other words, in your view, the decline of investment in energy-intensive industry is a secular thing in Europe rather than a cyclical thing.

Professor Dieter Helm: Oh absolutely. It has been going on for a considerable period of time. That is what lies behind the emissions. There are special features to this. When the Berlin Wall came down and the rust-bucket energy-intensive industries of eastern Europe came into the EU fold, that created a wonderful baseline in 1990, against which to claim that our emissions were reduced. It is smoke and mirrors. The only thing that matters in climate change terms is your genuine carbon footprint. That is your carbon consumption. The Kyoto measures and the triumphant statements that come from the Europeans do not measure that. To make matters worse, in this country and particularly in Germany, even our emissions of CO₂ are now going up. Why? Because we are going from gas and nuclear to coal. You could not make it up as a strategy on climate change. It is disastrous if you care about the growth of emissions, and you can only care about the growth of emissions in a global sense.

Baroness Blackstone: I just want to pick up on one thing that you have just been saying. If it is the case, as you are claiming, that this lack of investment in energy-intensive industries has been going on for some time, can you put a bit of flesh on which sectors in the UK in particular, but maybe also in countries like Germany, are being affected? Presumably that is happening already. Which part of our economy do you see declining in competitiveness in relation to the US, or indeed anywhere else?

Professor Dieter Helm: My first comment was that nobody is making any new investment in these areas. That is probably too strong a statement. You might find some energy-intensive

investment here or there, but BASF is not building anything new in Germany and you do not see people opening new steel mills in Britain. If you look at the core energy-intensive industries, we have lost quite a lot of them anyway. Part of that has been being a petrocurrency, which we were in the 1980s and 1990s, with a high exchange rate, et cetera. If you think about chemicals generally, petrochemicals, fertiliser, steel and things like that, these are the industries that one has in mind—and refineries, too. We are closing refineries in Europe. Grangemouth is on the margin. It is another example of an industry driven by US, in this case, shale and conventional oil production. As I say, it is not that anything is just about to close, although Grangemouth did get quite close, it is that nobody is making new investments in this territory. I would love to be found to be wrong on that, but I do not see any steel mills being built anywhere in the UK any time soon.

Q124 Baroness Blackstone: I will go on to the main question. We had evidence from the Tyndall Centre for Climate Change Research in Manchester about what it calls the gilded cage phenomenon, whereby we may be locked into high carbon emissions as a result of investing in gas or shale. What is your view about that? Is the Tyndall Centre right or not?

Professor Dieter Helm: As I tried to argue earlier, lock-in in Europe is especially a problem associated with coal. Building a new coal plant, particularly in Germany when it is based on lignite coal, is a pretty serious consequence. The difference between gas stations, coal stations, nuclear stations and so on is that gas stations are very cheap to build relative to other technologies and they can be built very quickly. Therefore they can be depreciated very fast, so you get your economic return back pretty early on in the cycle. You might say, “Well, since you built the thing, you will just carry on running it”. If you would forgo the carbon reductions between coal and gas in order to avoid facing the policy decision later on that you could just tell them to close, why not? We are telling coal stations to close. The Germans told the nuclear industry to close. It might be a sensible framework for policy to

say, “These are our targets going forward. Within that envelope, if there are more fossil fuels than are consistent with the targets, these stations may have to close”. But if you are so worried about the possibility that in 10 or 15 years’ time you cannot face up to closing kit that has already recovered its costs, and you are willing to forgo the advantage of building that kit now relative to the other alternatives, that is a pretty sad position to be in, and a weak one. I think it should be clarified. Remember my earlier point: we do not have any other options. If you do not want to build any stations, you have to tell the public the price of electricity that will be necessary to cut demand by so much that supply equals demand. You cannot wish the electricity to be there if you do not want build gas stations. Something else has to generate the electricity, particularly if the economy is growing. What else is going to generate that electricity in the next five to 10 years? Not wind farms, not solar panels and, by definition, not nuclear power stations. Remember: we are closing an enormous amount of our capacity in the short term. Our coal and closures of nuclear power stations are on virtually the same path as Germany, except for Sizewell B and, after 2023 or beyond, Hinckley. There is a big gap. It would be nice to have the luxury to say, “We don’t like this, we don’t like that, we won’t have this, we won’t have that, we mustn’t have a gilded cage”. My practical question is: so what are you going to do instead? I do not think that there is any answer provided to that question.

Q125 Lord Lawson of Blaby: I would like to follow up the lock-in point raised by Baroness Blackstone. For the record, you said that the bulk of Germany was undergoing a big switch to coal and that the new coal-fired power stations were lignite. In fact, they are not; that is a minority.

Professor Dieter Helm: One of the recent ones is. It is hard coal and lignite.

Lord Lawson of Blaby: The bulk is hard coal. Anyway, on the lock-in, the Government are in the process of signing long-term contracts for nuclear. They are going ahead very strongly,

under the Energy Bill that is being debated on the Floor of the House as we speak today, with contracts for wind farms, particularly offshore. Do you think there is a danger that what you implied might be sensible—to use gas and, if we have the indigenous resources, shale gas—as a bridge fuel on a large scale will not come to be, because it will not be economic as we will be locked into these contracts for nuclear and renewables?

Professor Dieter Helm: The contracts have a time period, and clearly a lock-in can be applied to any technology in the sense that the sunk costs for things on the system and whatever the marginal costs are determine its economic attractiveness. I think the problem is slightly more complicated than that, with respect, and it is this: once you have developed a sufficient amount of intermittent generation on your system with zero marginal cost, you render everything else on the system intermittent too. Something has not been understood about the nature of renewables, because we have not had many of them to date, but it is obviously becoming apparent in Germany already, and it is coming within the investment horizon of those who might build new gas stations: rather than the normal economics under which you build the thing—run it flat out when it is new and efficient, depreciate the asset and get your sunk costs back to make your investment sensible—suddenly you are in a world in which you do not know when it is going to run. If there is sufficient wind with priority on the grid, it displaces everything else. So now you have to sign a gas contract with a gas supplier, and you say, “How much gas do you want?”. “Well, I don’t know”. The gas contract has to be intermittent, dependent on the wind flows. This is very, very important in changing the economics of gas stations. Therefore you end up in a world where, since you have given a fixed price to wind, solar and nuclear, the only way you are going to get the gas stations built is if you given them a fixed price, too. That is where the capacity market issue comes into play. I would personally prefer the whole thing to be auctioned in a coherent and consistent way, but since that is not going to have any effect on the system until at least

2018, we have a major energy crisis to get through between now and then. My guess is that what is going through in the Bill at the moment is almost as if the underlying fundamentals of what is happening in our energy market are happening on another planet. When we get the price spikes that come from a capacity margin tending towards zero in winter 2015-16 or earlier—because the economic demand for electricity will be in my view considerably higher than the assumptions that are based in the result that gives the 2% margin—reality will have to hit the framework of that Bill. You could say, optimistically, that these are powers that the Government are taking that they do not have to use. They do not have to issue lots of FIT contracts if they decide that this is not a good thing to do. They do not have to issue lots of nuclear contracts. However, I always wonder, from an investor's point of view, if you are thinking about building something and the Government have lots of residual powers that can change the nature of the economics of your project, how high you want to cost of capital to go before your project looks economic. This is a mess. I have written about it. It is a very, very slow-motion car crash. The date is pretty well known. Things will happen in advance of that date. It is pretty clear what will happen to prices through that framework, and it is very clear that the prices that are consistent with a capacity margin close to zero are not ones that consumers can pay, or that I suspect politicians can live with. That is where the coincidence of this comes. In the meantime, why would you build a gas station when you do not know what the contract is, you do not know how much wind is going to be on the system, you do not know whether you are going to be able to run your plant and you have no idea what to tell the gas supplier about the gas supply arrangements that you want. We have thought about everything else, because we thought the future was windmills, solar power and nuclear, and have forgotten that there is a consequence of the one bit that you have missed out: what are you going to do about gas? Benign neglect was the policy, because it was just assumed that people would build the gas stations anyway. That has

turned out not to be the case. If you look to 2015-16, the next power station coming on is Carrington. That will not be coming on until 2016. Nothing else can be built in the time period between now and then. That is the problem we find ourselves with.

Lord Lawson of Blaby: So if you were Secretary of State for Energy, what would you do now?

The Chairman: Regretfully, I have to leave for a long-standing engagement. I look forward to reading the transcript, but I now ask Lord Lipsey to take the Chair.

Q126 Lord Lawson of Blaby: I will give you a moment to think about it, but I am sure that you have thought it over. If you were Secretary of State for Energy and Climate change, what would you do now?

Professor Dieter Helm: I would probably emigrate as quickly as possible; I would hate to perform such a task. The obvious answer is that when you are in a hole, the first thing you do is stop digging. Many things are currently being pursued that would make things significantly worse. The second thing is that you have to get on with getting some power stations built. The die is cast. The Government are committed to being a central buyer by issuing all these contracts. Therefore they have to think seriously about auctioning capacity contracts. I would have a single unified capacity auction that included the FITs and the non-FITs in one framework. I would be in the business of doing two things: first, getting contracts in place for new gas stations as fast as possible; and, secondly, thinking about emergency procedures to use in the event that the capacity margin gets extremely tight. You need then to think about the role of the system operator who is going to make this system function in those circumstances. The general point is that energy policy is not rocket science. It is not an unsolvable problem. There are solutions to these things but, sadly, the current policy will not solve those problems and the seriousness of the potential crisis will be looming very soon.

The Chairman: I think that is a wonderful note on which to conclude one of the most trenchant pieces of evidence we have had. Tuesday afternoons are not always this entertaining, so thank you very much for giving us the benefit of your considerable knowledge and expertise.

Professor Dieter Helm: Thank you very much indeed for listening.