Electricity and Renewables Sector Report

1. This is a report for the House of Commons Committee on Exiting the European Union following the motion passed at the Opposition Day debate on 1 November, which called on the Government to provide the Committee with impact assessments arising from the sectoral analysis it has conducted with regards to the list of 58 sectors referred to in the answer of 26 June 2017 to Question 239.

2. As the Government has already made clear, it is not the case that 58 sectoral impact assessments exist. The Government's sectoral analysis is a wide mix of qualitative and quantitative analysis contained in a range of documents developed at different times since the referendum. This report brings together information about the sector in a way that is accessible and informative. Some reports aggregate some sectors in order to either avoid repetition of information or because of the strong interlinkages between some of these sectors.

3. This report covers: a description of the sector, the current EU regulatory regime, existing frameworks for how trade is facilitated between countries in this sector, and sector views. It does not contain commercially-, market- or negotiation-sensitive information.

Description of Sector

4. Under the electricity sector, this paper covers: wholesale electricity market including generation, transmission and distribution networks, and retail market. While the electricity sector as a whole is covered here, issues specific to nuclear generation are covered in a separate paper on nuclear.

5. This section is structured as follows:
    - Electricity Sector;
    - Wholesale Electricity Market including generation;
    - Transmission and Distribution;
    - Retail Electricity Market; and
    - Energy Efficiency Sector

Electricity Sector

6. Electricity is a fundamental part of modern society. Residential and industrial users rely on its use to ensure basic and vital needs such as lighting, heating or refrigeration are met on a daily basis. ONS data[1] show that every sector in the economy depends on the availability of electricity to operate. As the amount of energy that can be stored is limited at present, demand and supply for electricity have to match in real time, making electricity markets particularly complex. Failures in the effective operation of electricity markets expose the economy to the risk of

[1] https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/inputoutputsupplyandusetables

blackouts, which have detrimental effects in the affected areas. Ensuring security of supply in the electricity sector is therefore a key objective of governments, together with ensuring electricity is affordable for all consumers and sourced from clean technologies as much as possible.

7. Electricity is produced domestically by generators (from renewables, nuclear power and fossil fuel plants) or imported from (or exported to) other countries through interconnectors. Electricity is traded in the wholesale market between generators and suppliers;suppliers then sell electricity in the retail market to end consumers. Electricity can be produced using different technologies, and is transported to end users via high voltage transmission lines (transmission network) and low voltage distribution lines (distribution network). Market participants pay transmission and distribution charges to network companies in exchange for using transportation services. To maintain stability, power must be balanced in real time by a system operator. The system operator monitors and ensures that the quantity of electricity produced by generators and used by consumers match second by second.

Wholesale Electricity Market

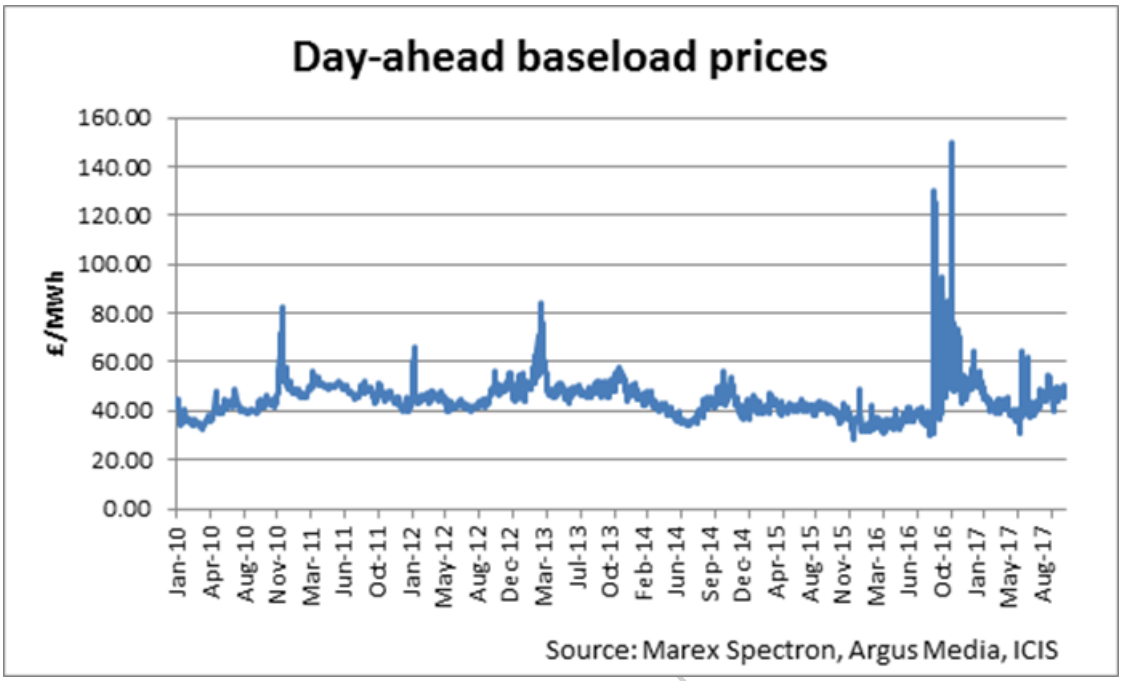
8. In the wholesale electricity market, generators trade power with suppliers. Power can be traded for delivery over different time horizons, from several seasons in advance to day-ahead and intra-day delivery. Trading takes places through brokers (over-the-counter trading) or on formal exchanges.

Wholesale Electricity Prices

9. Wholesale electricity market prices are determined by the marginal technology on the market merit order curve (a stack of technologies based on their short run marginal cost) at the point where the curve meets demand for electricity. Wholesale prices are sensitive to changes in the market generation mix as well as changes in the determinants of short run marginal costs of technologies. Gas has historically been the marginal technology in the GB market[2] setting the wholesale price of electricity. However, recent changes in fossil fuel prices have led to changes in the merit order curve so that coal plants can now also operate at the margin. As wholesale prices are set by fossil fuel generators, they are also sensitive to changes in carbon prices. In the UK, carbon prices are determined by the price of allowances under the EU Emissions Trading Scheme and by the Carbon Price Support rates that are set by HM Government.

[2] The GB market covers England, Scotland and Wales and the Single Electricity Market covers Ireland and Northern Ireland. While this paper covers the UK, sometimes it is necessary to talk about the separate markets hence the references to GB.

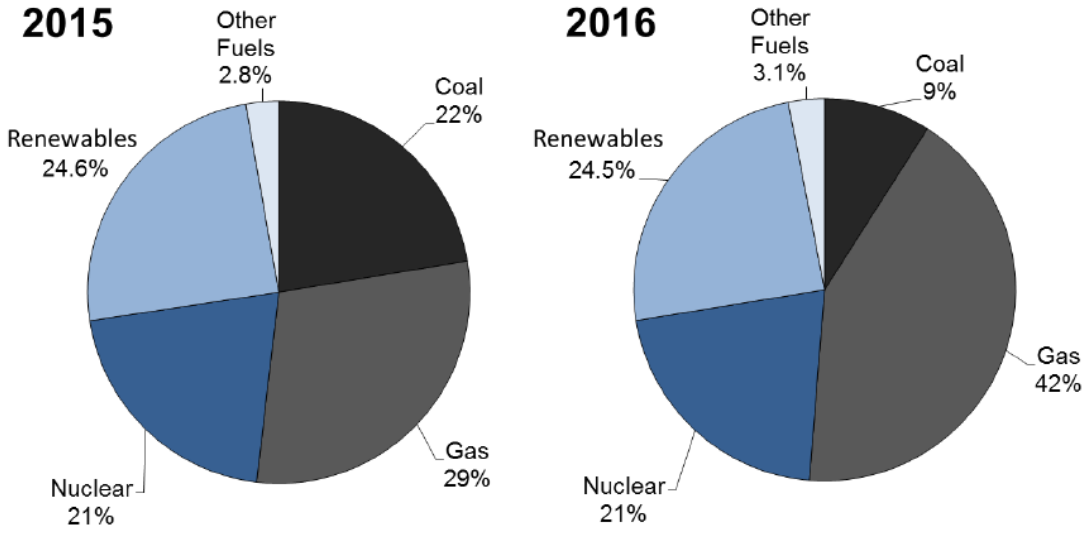
Figure 1: Wholesale Prices



Generation Mix

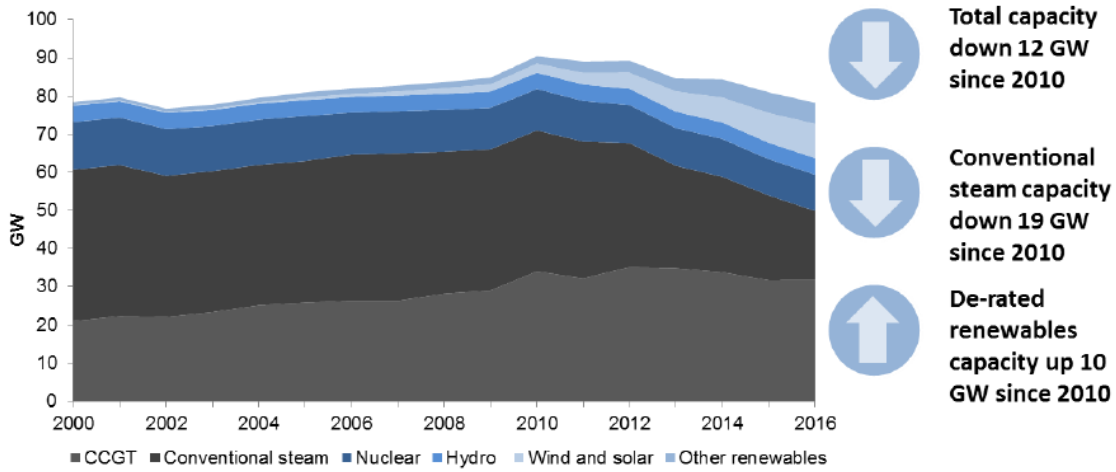
10. The main technologies used to generate electricity in the UK are gas, coal, nuclear plants and renewables (onshore and offshore wind, solar, hydro). In 2016, the biggest single source of electricity generation was by gas plants (42 per cent), followed by renewables (25 per cent), nuclear (21 per cent) and coal (9 per cent). Figure 2 and 3 show power generation by fuel and generation capacity in the UK, respectively.

Figure 2: Share of UK electricity generation, by fuel



Source: DUKES 2017

Figure 3: UK generating capacity



1. 'Conventional steam' includes a small proportion of non-CCGT plants, gas turbines and plants that can be fuelled by a combination of gas, coal and oil.
2. 'Hydro' includes natural flow and pumped storage.
3. 'Other renewables' includes biofuels.
4. Wind included from 2007

Source: DUKES 2017

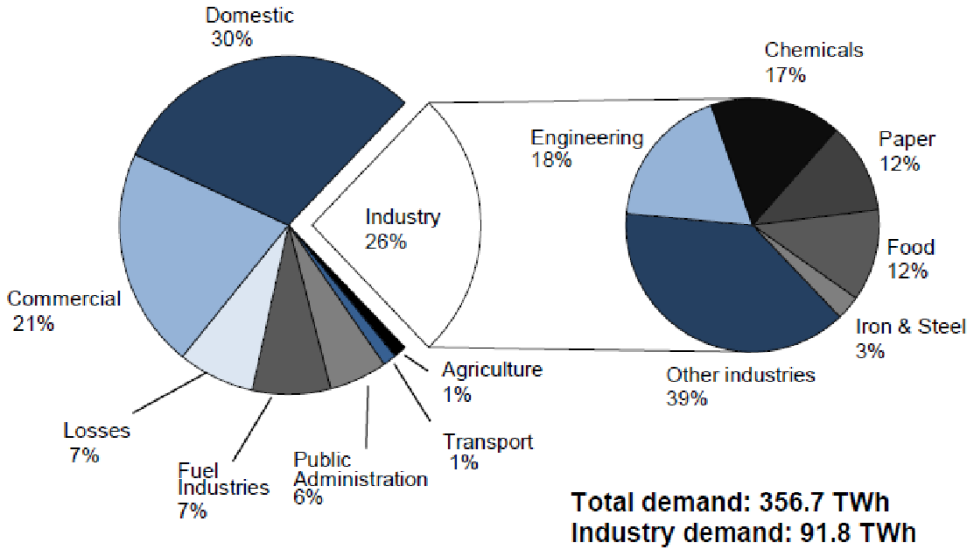
11. There is considerable uncertainty about what future electricity demand and the generation mix to meet it will look like. These uncertainties include (but are not limited to) economic growth; government policies, including those to promote renewables; other low carbon generation (including nuclear) and energy efficiency; the future cost of generation and other technologies including storage; the level of interconnection; and the take up and use of electric vehicles. Given these uncertainties, estimates of the future mix are difficult to predict with accuracy. The Government's Clean Growth Strategy[3] suggested that there could be 10GW of new offshore wind capacity with the opportunity for additional deployment, built in the 2020s. In addition, new nuclear capacity will be delivered through Hinkley Point C and the Government will progress discussions with developers to secure a competitive price for future projects in the pipeline.

Electricity Demand

12. Total electricity supply in 2016 was 357 terawatt hours (TWh)[4]. Most of the demand for electricity came from the domestic (30 per cent), industrial (26 per cent) and commercial (21 per cent) sectors (see figure 4). Most demand is met by UK generation. A small part is currently met by imports through interconnectors (see below) but this is set to grow, and expected to reduce consumer costs and increase security of supply.

[3] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651916/BEIS_The_Clean_Growth_online_12.10.17.pdf
[4] When talking about electricity we tend to use two sets of units: the watt (W) or watt hour (Wh). Watts are the unit of capacity, for example the size of a power station is measured in watts. Watt hours are the units for energy, so would be used to measure the amount of electricity generated over a time period. An 800 MW (megawatt or 1 million watts) capacity power station would generate 800 MWh of electricity in an hour. When talking about different factors it might be more appropriate to use one or the other.

Figure 4: UK electricity Demand by Sector



Source: DUKES 2017

Market players

13. Generation in the GB market tends to be dominated by six vertically integrated energy companies (EDF Energy, Centrica, SSE, E.ON, Scottish Power, RWE) that operate both on the generation and supply side of the market. The Big 6, as they are typically called, generated approximately 65 per cent of output in 2016[5].

14. Ofgem's 2017 report on The State of The Energy Market[6] suggests that the GB market has relatively low levels of concentration compared to EU markets. When considering official metrics, Ofgem reports that the market is somewhat concentrated, but concentration fell to its lowest level in a decade, with a Herfindahl-Hirschman Index (HHI) of 1117, when considering generation output[7]. The HHI is a measure of market concentration ranging between 0 and 10,000. A low HHI indicates a high number of firms operating in the market, which in turn represents a higher level of competition in the market.

Interconnectors

15. There are currently four interconnectors from GB (see figure 5 below). The UK currently sources about 5 per cent of its electricity through interconnectors with France and Netherlands. Interconnectors currently make a relatively small but significant contribution to our security of supply – the current 4GW of interconnection

[5] https://www.ofgem.gov.uk/data-portal/wholesale-market-indicators#thumbchart-c3398018863517791-n95205
[6] Ofgem, https://www.ofgem.gov.uk/system/files/docs/2017/10/state_of_the_market_report_2017_web_1.pdf
[7] Ofgem, https://www.ofgem.gov.uk/system/files/docs/2017/10/state_of_the_market_report_2017_web_1.pdf

capacity compares with a peak demand of around 52GW[8]. However, this contribution is expected to increase significantly over the next decade[9].

16. The UK has a strong pipeline of projects coming forward under the current regulatory approvals. Those with regulatory approval could add an additional 7.7GW[10] of capacity by the early 2020s and deliver over £12 billion of consumer benefits over 25 years[11], which is forecast to be the single largest increase in capacity from any technology over this period. The vast majority of these benefits are associated with a reduction in the wholesale price of energy, which consumers benefit from through lower energy bills.

17. An additional four projects are in the process of applying for regulatory approvals, which could add 6.2GW to the pipeline[12].

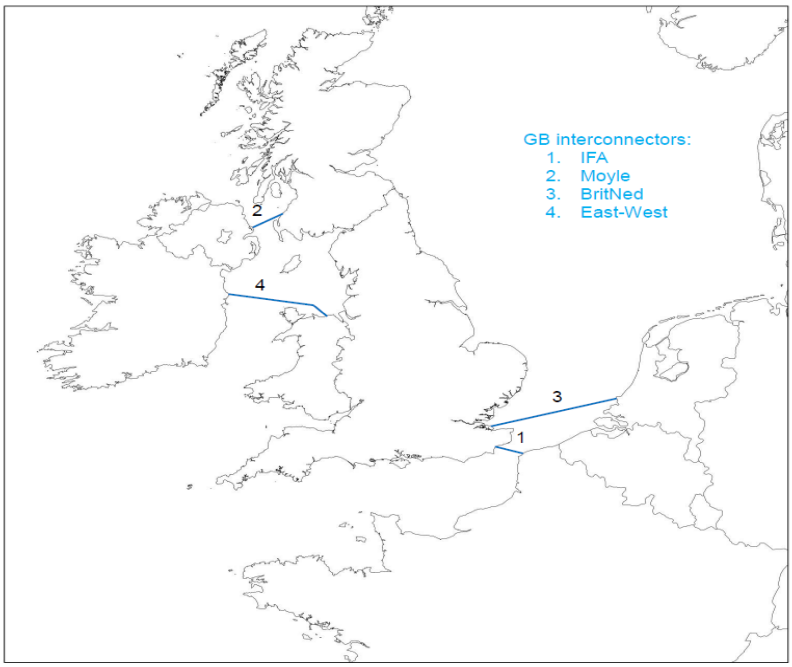
18. This could mean a total of ~20GW of interconnection capacity by the mid to late 2020s and over £13 billion[13] of unsubsidised private sector investment. ~20GW would be capable of providing around a third of forecast peak demand.

19. It is important to note that all of the UK's interconnectors can import and export, and do, at different times of the day, month and year. The direction of flow is determined by the difference in wholesale electricity prices in the connecting countries. The France-GB and Netherlands-GB interconnectors are net importers as prices tend to be higher in the UK; historically we have exported to Ireland, although recently the balance has shifted and flows are more balanced. This has been driven by increased generation from wind in Ireland.

20. However, interconnectors also bring benefits to the interconnected markets by helping them diversify their supply stack, thereby helping their energy security. Such benefits were realised during winter 16/17, when GB exports helped to alleviate some of the supply tightness in France due to unscheduled nuclear outages there.

[8] http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Winter-Outlook/
[9] Government projections of future energy sources can be found in the BEIS energy and emissions projections document:https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/599539/Updated_energy_and_emissions_projections_2016.pdf
Figure 5.1 on p 32 shows that future interconnector imports are expected to make up a greater proportion of energy usage in the future.
[10] https://www.ofgem.gov.uk/sites/default/files/docs/2015/03/ipa_march_2015_consultation_-_final_0.pdf
[11] https://www.gov.uk/government/speeches/amber-rudds-speech-on-energy-benefits-of-staying-in-eu
[12] https://www.ofgem.gov.uk/system/files/docs/2017/06/ofgem_window2_ipaconsultation_june_2017.pdf
[13] BEIS estimate based on market intelligence

Figure: 5: UK operational interconnectors



Source: BEIS
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/266460/More_interconnection_-_improving_energy_security_and_lowering_bills.pdf

21. In 2016, the total UK electricity supply was 357 TWh, broadly similar to 2015 (figure 4). Of this total supply, just over 95 per cent[14] was domestically produced with the rest imported. The imported capacity, which is delivered via the interconnectors, is a particularly important source of electricity during times of system stress (e.g. during winter peak demand; power station failures) where it provides additional capacity / capability to respond to stress events over and above our domestic generation capacity. In 2016, the UK imported around 20 TWh and exported around 2 TWh through its interconnectors[15].

Figure 6: Net imports via interconnectors 2014-2016

GWh

	France - UK[1]	Ireland - N. Ireland[2]	Netherlands - UK[1]	Ireland - Wales[1]	Total
2014	14,951	121	7,856	-2,408	20,520
2015	13,838	167	7,999	-1,065	20,938
2016	9,728	199	7,306	313	17,546

1. Figures taken from the demand data available on the National Grid website at www2.nationalgrid.com/UK/Industry-information/Electricity-transmission-operational-data/Data-Explorer/.

2. Figures taken from data available on the SEMO website at www.semo.com/marketdata/pages/energysettlement.aspx.

Source: DUKES 2017

22. 'Market Coupling' is a particularly important component of the International Energy Market (IEM). It is the EU system for allocating capacity on interconnectors. It

[14] DUKES table 5.1 https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes
[15] DUKES table 5.1 https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes

involves the capacity of all interconnectors in the EU being auctioned at the same time each day for trading on the following day, plus arrangements for trading intraday capacity.

23. In addition, the Capacity Market assumes a contribution from interconnectors at times of system stress, which reduces the amount of other capacity required to maintain security of supply.

Renewable Electricity

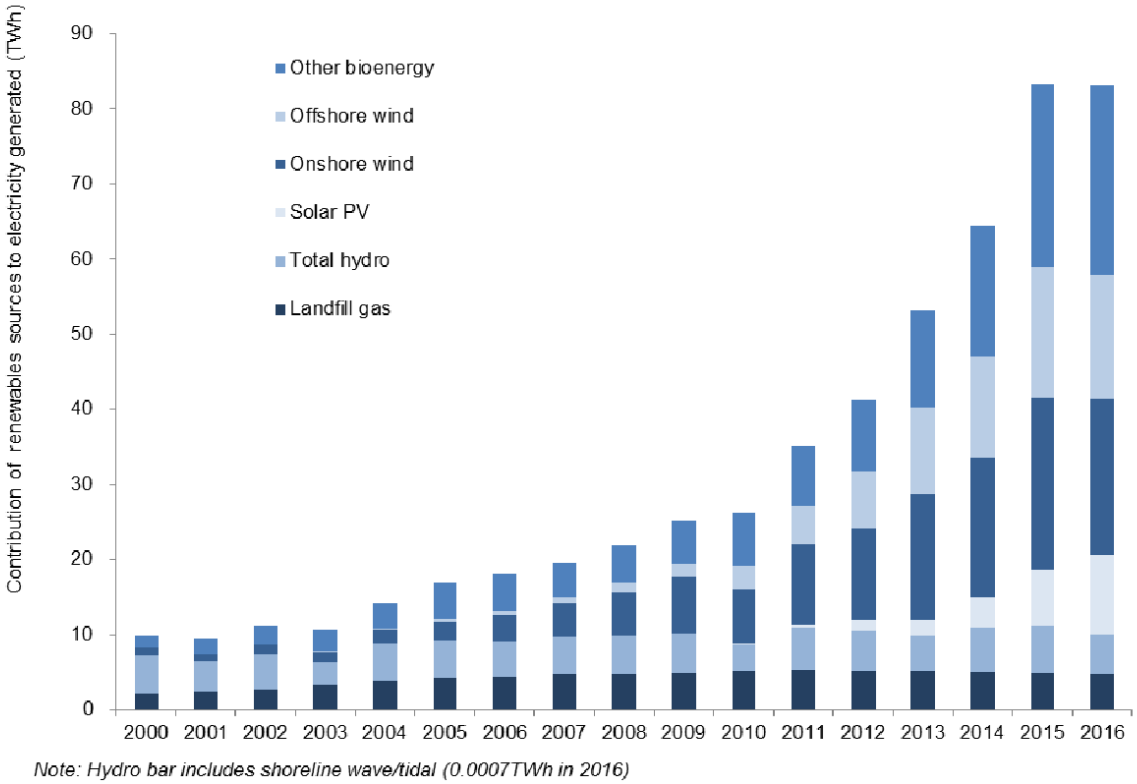
24. Renewable sources provided 24.5 per cent of the electricity generated in the UK in 2016[16], around the same as 2015 (24.6 per cent), despite unfavourable weather conditions, which is the equivalent of just over 83 TWh.

25. Figure 9 shows the breakdown of total generation by renewable sources since 2000, while Figure 10 shows generating capacity of renewable energy plants since 2000. By renewable sources we mean power generated from wind generation, solar PV, hydro, and bioenergy[17].

26. Total electricity generation from renewables in 2016 amounted to 83.2 TWh, a slight fall (of 0.2 TWh) (-0.2%) on 2015[18]. The largest absolute increase in generation came from solar PV (2.9 TWh)[19].

[16] Digest of UK Energy Statistics 2017 (Tables 5.5 and 6.4), available at: https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2017-main-report
[17] Bioenergy is renewable energy made from material of recent biological origin derived from plant or animal matter, known as biomass.
[18] Digest of UK Energy Statistics 2017 (Table 6.4), availableat: https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2017-main-report
[19] DUKES 2017

Figure 7: Electricity generation by main renewable source since 2000



Note: Hydro bar includes shoreline wave/tidal (0.0007TWh in 2016)

Source: Digest of UK Energy Statistics, 2017

27. Renewable technologies receive support from the UK Government in different forms, such as Contracts for Difference (CfDs), the Renewables Obligation (ROs), and Feed-in Tariffs (FITs).

28. In 2010 the Coalition Government introduced the Electricity Market Reform (EMR), a programme of reforms aimed at ensuring security of electricity supply while helping the UK achieve its decarbonisation goals affordably. EMR introduced Contracts for Difference (CfDs) as a new financial support mechanism whose aim was to lower the cost of funding low-carbon generation by providing certainty about the revenues that generators can expect to receive for their output. Two CfD auctions have been held since the launch of the scheme[20] where the Government allocated 2.1 GW of renewable capacity. The Government has announced that up to £557 million will be made available for future CfD allocation rounds for new generation projects using less established renewable technologies, with the next allocation round planned for spring 2019. It is not possible at this stage to say how much capacity will be commissioned under the CfD, as the amount of capacity awarded is dependent on the clearing price achieved in the auction.

29. The Renewables Obligation (RO) came into force in 2002 in England and Wales, and Scotland, followed by Northern Ireland in 2005. It places an obligation on UK

[20] The first CfD auction opened in October 2014 and closed in February 2015. The second CfD auction opened in April and closed in September 2017.

electricity suppliers to produce a certain number of Renewables Obligation Certificates (ROCs) to Ofgem, the administrator of the RO scheme, in respect of each megawatt hour (MWh) of electricity supplied each year. The RO closed to new applicants on 31 March 2017 (with exceptions that extend the deadline for certain projects to January 2019 in GB, and March 2019 in Northern Ireland).

30. The Feed-in Tariffs (FITs) scheme was introduced on 1 April 2010 to encourage deployment of small-scale (less than 5 megawatts (MW)), low-carbon electricity generation. As of the end of September 2017, around 900,000 FIT-scale installations have been deployed, with a total installed capacity of 6.2 GW[21]. The Government has agreed to fund new installations under FITs until March 2019 and is currently considering options for its approach to small scale low carbon generation beyond 2019. State aid approval was required to launch FITs in 2010 and changes that the Government has made to the scheme have in part been constrained by these requirements (for example, setting tariffs within certain levels and taking a technology neutral approach).

Northern Ireland

31. In the past the electricity sector in Northern Ireland (NI) and Ireland operated as two separate markets. In 2007 a single wholesale market across the whole of the island of Ireland, the Single Electricity Market (SEM), was established. The aim was to increase competition and efficiency and improve security of supply.

32. This means that all electricity across the island is bought and sold through a single market known as the "pool". The operation of this single wholesale market requires the physical connection of the NI grid to that in Ireland. The existing connections are proposed to be enhanced by a new North-South transmission connection which will enable greater flexibility in the flows of electricity. This is expected to be in place by end 2019 at the earliest. There are also two interconnectors to GB, one from NI and one from Ireland. The SEM is a market of approximately 2.9 million customers; 2.0 million in Ireland[22] and 0.9 million in NI[23].

33. Industrial & Commercial (I&C) and domestic consumers in NI are able to choose their electricity supplier. There are currently five suppliers operating in the domestic market and eight operating in the I&C sector.

Transmission and Distribution Networks

34. The GB transmission system is made up of high voltage electricity wires (400kV and 275kV, although 132kv is also classed as transmission in Scotland) from generating stations to distribution companies and to a small number of large industrial customers. It is owned and maintained by three regional transmission companies - National Grid Electricity Transmission plc (NGET) for England and Wales, Scottish

[21] https://www.gov.uk/government/statistics/monthly-small-scale-renewable-deployment
[22] Utility Regulator Northern Ireland - https://www.uregni.gov.uk/market-overview
[23] Commission for Energy Regulation (CER) Electricity and Gas Retail Market Report 2017 Q1 https://www.cru.ie/wp-content/uploads/2017/02/CER17247-Q1-Gas-and-Electricity-Retail-Report.pdf

Power Transmission Limited for southern Scotland, and Scottish Hydro Electric Transmission plc for northern Scotland and the Scottish islands.

35. The system as a whole is operated by a single System Operator (SO), which is responsible for ensuring the stable and secure operation of the whole transmission system and manages the connection process for generators across GB. The SO is also responsible for ensuring that the system is balanced in real time.

36. The distribution system carries electricity to the majority of customers through lower voltage, more localised networks (from 132kV to 230V). There are 14 licensed Distribution Network Operators (DNOs) in GB and each is responsible for a regional distribution services area. There are currently 14 DNOs who are owned by six different groups[24].

37. In addition, there are also a number of smaller networks owned and operated by Independent Distribution Network Operators (IDNOs). These are located within the areas covered by the DNOs.

38. The GB regulator Ofgem regulates the activities of these natural monopolies through a price control regime in order to protect consumers' interests, where they set the maximum amount of revenue that they can recover from users. These arrangements also set targets for reliability, customer service and environmental performance.

39. Users of the transmission system are subject to three types of transmission charges:
    - Connection charges – to recover the cost of providing and maintaining connection assets.
    - Transmission Network Use of System (TNUoS) charges – to recover the cost of providing and maintaining shared (or potentially shared) electricity transmission assets. These are recovered from all generation and demand users of GB's electricity transmission system and vary by location, reflecting the costs that users impose on the transmission network to transport their electricity.
    - Balancing Services Use of System (BSUoS) charges – relating primarily to the balancing of Britain's electricity system, including the costs of constraining generation.

Retail Electricity Market

40. In March 2016, there were around 28 million domestic electricity customers in GB. The great majority of these customers were supplied by one of the six large suppliers (Big 6)[25]. Independent suppliers have been growing in number (there are now over 50) and taking an increasing share of the market. The majority of suppliers supply both gas and electricity. Ten companies now have over 250,000 customer accounts (this includes both gas and electricity)[26].

[24] A map of the DNOs is available on the ENA website at the following link: http://www.energynetworks.org/info/faqs/electricity-distribution-map.html
[25] https://www.ofgem.gov.uk/system/files/docs/2016/08/retail_energy_markets_in_2016.pdf
[26] https://www.gov.uk/government/statistical-data-sets/quarterly-domestic-energy-price-stastics

41. Nearly all customers are currently on one of two types of tariffs: standard variable tariffs (SVTs) and fixed term, fixed price tariffs. Disengaged customers, i.e. those who do not look to switch their supplier, are more likely to be on SVTs and tend to remain with the same supplier for several years. The latest information from Ofgem shows that 15 million households are on dual fuel standard variable tariffs. This includes 3 million households on prepayment meters whose prices have been capped since April 2017[27].

42. In September 2017, the average standard variable tariff with a Big 6 company was £1,135. The cheapest available tariff on the market was £827, a difference of £308[28].

Energy Efficiency Sector

43. The energy efficiency sector covers a wide range of activities that reduce energy demand across the whole economy. Energy efficiency improvements come through a range of different technologies in different parts of the economy:

44. Existing buildings – improving the energy efficiency of existing buildings through "retrofit" of improved insulation, windows, or improved controls that can reduce wasted energy.

45. New buildings – improving the energy efficiency of new buildings through using high performance building materials.

46. Appliances – reducing energy demand through appliances that use less energy to deliver the same 'energy service', for example the shift from incandescent light bulbs to LEDs, more efficient washing machines and motors for industrial uses.

47. Industrial processes – through using more efficient equipment and reconfiguring production lines, it is possible to reduce energy demand while maintaining production levels.

48. Delivery of these energy efficiency improvements is supported by specialist advisory services through undertaking energy audits, providing advice on how to install energy efficient materials and financing energy efficiency projects.

49. The energy efficiency sector is enabling the UK to become less energy intensive as the economy grows. This delivers benefits to the UK economy as it reduces energy consumers' bills, supports energy security and reduces carbon emissions.

Sector's Contribution to Gross Value Added (GVA)

50. Total GVA for the electricity generation, transmission and distribution sector is estimated to be £18 billion, representing 1.2 per cent of total UK GVA[29]. ONS statistics show that all sectors of the economy have positive intermediate consumption of goods and services produced by the electricity sector and therefore

[27] https://www.ofgem.gov.uk/system/files/docs/2017/10/state_of_the_market_report_2017_web_1.pdf plus internal Ofgem analysis showing 3m SVT households covered by PPM cap
[28] Data from the Ofgem Data Portal
[29] ONS Business Registers and Employment Data

depend on its effective functioning[30]. In particular 3.7 per cent of total intermediate demand is spent on the electricity distribution and transmission sector.[31]

51. In addition to generation and supply of electricity, considerable economic activity is associated with the construction of electricity generation plants, including supply chains. The table below provides detail on GVA in 2013 for the low carbon electricity sector, including supply chains.

Table 1: Gross Value Added

2013	£ (current price)*
Onshore wind	£1.7 billion
Offshore wind	£1.0 billion
Nuclear	£3.5 billion
Hydro	£0.6 billion
Marine	£0.1 billion
Solar PV	£3.3 billion
Carbon Capture and Storage	£0.2 billion
Total low carbon electricity	**£10.4 billion**

Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416240/bis-15-206-size-and-performance-of-uk-low-carbon-economy.pdf

52. Total employment in the electricity generation, transmission and distribution sector was 102,000 in 2015, 0.3 per cent of total UK workforce.

53. Employment in the low carbon electricity sector was 47,000 in 2014.

Table 2: Total employment in low carbon electricity

2014	UK	England	Wales	Scotland	Northern Ireland
Low Carbon Electricity	47,000	30,500	1,000	15,500	500

Source: ONS. The figures are rounded[32]

54. The Low Carbon and Renewable Energy Economy Survey in 2015[33] indicates that the energy efficiency sector in total includes around 53,000 firms employing 144,000 FTE. In addition there are around 5,500 firms in the low carbon services sector, employing around 15,000 FTE. Turnover in the energy efficiency sector was almost £20.2 billion with a further £0.7 billion turnover in the low carbon services sector.

[30] See Table 2 - Int Con 2014 at: https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/inputoutputsupplyandusetables
[31] (Sector 35.1 in official ONS labelling)
[32] https://www.ons.gov.uk/economy/environmentalaccounts/datasets/lowcarbonandrenewableenergyeconomyfirstestimatesdataset
[33] https://www.ons.gov.uk/releases/lowcarbonandrenewableenergyeconomysurvey2015

Table 3: Businesses in the low carbon sector

	Number of businesses	Turnover (£ thousands)	Employees (full-time equivalents)
Energy efficient products	53,000	20,262,500	144,000
Energy efficient lighting	15,500	2,637,000	25,000
Other energy efficient products	34,000	13,901,500	102,500
Energy monitoring, saving or control systems	15,000	3,724,000	16,000
Low carbon services	5,500	656,000	15,000

Source: BEIS analysis[34]

55. Four of the Big 6 energy companies have owners from countries in mainland EU and move their staff around the Member States in which they have business interests.

Pattern of Trade

56. All international trading takes place with the EU, with the UK being a net importer of electricity. This is due to the fact that a physical interconnector is needed to trade electricity and all UK interconnectors are to EU countries. Interconnectors to EEA countries (i.e. Norway, Iceland) are proposed but not yet built and there are no proposals to build interconnectors to non-EU/EEA countries.

57. Employment in the Electricity Sector is set out in table 4:

[34]BEIS analysis on ONS Business Registers and Employment Data

Table 4: Employment in Electricity Sector

	Employees (1000s)	***Percentage of total***
North East	7000	7%
North West	6700	7%
Yorkshire & Humber	7000	7%
East Midlands	8800	9%
West Midlands	8800	9%
East	7000	7%
London	8700	9%
South East	12600	12%
South West	9500	9%
England (total)	76000	*74%*
Wales	7400	*7%*
Scotland	16700	*16%*
Northern Ireland	2000	*2%*
UK	***102,000***	***100%***

Source: ONS Business Registers and Employment Data, BEIS analysis

Historical Trends and Future Prospects

Electricity Sector

58. The electricity sector has undergone considerable change over the past decades. The market was liberalised in the late 1980s and early 1990s. Since the early 2000s, between 40 and 50 per cent of generation capacity has been shared roughly equally by coal and gas plants. Although since 2009, capacity from gas plants has increased and capacity from coal has decreased. Gas plants in particular have historically been the price-setting plant for wholesale prices, which means that wholesale prices have been determined by gas prices and by the incidence of carbon prices on gas-fuelled production. However, recent changes in fossil fuel prices have led to changes in the merit order curve so that coal plants can now also operate at the margin. As wholesale prices represent the largest proportion of retail prices, their changes have implications for consumer prices.

59. Going forward, changes in wholesale prices will be driven by changes in fossil fuel prices and carbon prices as well as the generation mix. The price of EU ETS allowances currently contributes to setting the wholesale electricity price. However, carbon prices in the UK tend to be higher than in the rest of the EU because the UK charges an additional rate on CO2 emissions from the power sector, the Carbon Price Support. Changes in wholesale prices will also be affected by the share of renewable generation on the system, as renewable technologies dispatch before fossil fuel generators, so that a higher level of renewables can lead to lower wholesale prices.

Energy Efficiency Sector

60. The development of the energy efficiency sector has been driven by a mix of economic drivers (reducing energy bills and exposure to energy price risks over time) and policy. Periods of higher energy prices have led companies and householders to pay more attention to how energy bills can be reduced through energy efficiency measures.

61. In the domestic sector, the key policy driver has been supplier obligations to install energy efficiency measures (CERT, CESP, ECO). The energy efficiency of buildings has been driven by building regulations. The energy efficiency of products is largely driven by EU energy-using product regulations, but some progress has also been made through voluntary agreements and international commitments.

EU Funding of the Sector

62. As of May 2017, EU projects that benefit the UK have been awarded Connecting Europe Facility funding, with €176 million for UK electricity projects (including €105 million for NI).

The current EU regulatory regime

Main Sector-Specific Rules Governing the Provision of this Activity in the EU

63. The IEM provides a technical framework for the transmission, distribution and efficient trading of electricity and gas; transparency to ensure fair access to others' networks; a regulatory co-operation mechanism; and measures to ensure security of supply and deal with energy shocks. It is a long-term project to liberalise and integrate the energy markets of individual EU Member States. The IEM also facilitates the fair trading of electricity and gas across the EU, enabling new gas and electricity suppliers to enter EU Member States' markets, and allowing domestic and industrial consumers to select their own suppliers. It is being reformed (through the European Commission's proposals on a new electricity market design) to better facilitate the integration of low carbon energy sources. The UK has been a leading advocate for the development of the IEM and has heavily influenced the EU-wide rules, which draw on UK practice.

64. The legal basis of the IEM is Article 194 TFEU. EU energy policy is predominantly set out through Regulations, which are directly-applicable; and through Directives, which require domestic transposition. There is a significant amount of technically-detailed tertiary legislation, known as network codes and guidelines, which take the form of Commission Regulations.

65. Competence under the energy legal base (Art 194 TFEU) is shared, as stipulated in Article 4(2)(i) TFEU, although the EU has exercised its competence in many areas of energy policy. The relevant legal framework recognises some areas where Member States continue to be able to adopt domestic measures. For example, both the

Electricity Regulation (714/2009) and the Gas Regulation (715/2009) provide that the requirements to develop network codes (Commission Regulations), to address cross-border network and market integration issues, are without prejudice to Member States' right to establish national network codes which do not affect cross-border trade.

66. EU legislation has an impact on the energy sector which means that much of UK electricity (and gas) policy is driven by policy agreed at EU level. The UK has played an important role in EU energy negotiations and much of the EU energy legislation, especially on the internal energy market, is modelled on UK arrangements. There are, however, important areas where the UK and other Member States have freedom to decide their own national policy, notably on security of supply, choice of fuel mix and the use of indigenous energy sources.

Areas of Devolved Responsibility or Any Issues Relating to Gibraltar, the Crown Dependencies or Overseas Territories

67. Energy policy is largely devolved to Northern Ireland, but largely reserved for Scotland and Wales. The internal energy market legislation does not apply to Gibraltar or the Crown Dependencies.

68. The EU ETS Regulations extend to the whole of the UK. However, greenhouse gas emissions trading is a devolved matter in Scotland, a transferred matter in Northern Ireland, and in Wales is an area where the Welsh Ministers exercise a wide range of executive functions. The Regulations accordingly provide for distinct "regulators" or "authorities" in relation to those different parts of the UK. The "regulator" may be the Environment Agency, Natural Resources Body for Wales, the Scottish Environment Protection Agency, or the chief inspector in Northern Ireland; and the corresponding "authority" will be the Secretary of State, the Welsh Ministers, the Scottish Ministers, or the Northern Ireland Environment Agency (NIEA) which is an executive agency within the Department of Agriculture, Environment and Rural Affairs. In the case of certain offshore installations, including those on the United Kingdom Continental Shelf, the Secretary of State is the regulator as well as the authority. However, relations with the European Union (other than assisting, or otherwise observing and implementing, EU obligations in devolved areas) are the responsibility of the UK Government. The UK Government therefore takes part in negotiations at the EU level on the future of the EU ETS, although there is a political commitment to work closely with the DAs to develop the UK negotiating position. The working arrangements between the UK Government and the DAs are set out in a Memorandum of Understanding, and the Concordat on Coordination of European Union Policy (Annex B to the MOU).

69. Energy efficiency is devolved to Northern Ireland. The encouragement of energy efficiency otherwise than by prohibition or regulation is devolved to Scotland and Wales. For some implementing measures, different parts of the UK have agreed to adopt the same measures.

70. Northern Ireland and Ireland have integrated their wholesale electricity markets so there is now a SEM on the island of Ireland. This is being reformed to bring it into

compliance with the EU internal market rules, including market coupling, and is planned to go live in May 2018. NI and Ireland have indicated that they are committed to this reform and want a SEM to continue to operate efficiently after EU withdrawal[35]. The UK position paper on Northern Ireland and Ireland, published in August 2017, sets out the importance of the continuation of a single electricity market covering Northern Ireland and Ireland.[36]

71. In the case of the SEM, stakeholders view the preservation of a SEM as a top priority as it is important to keep down costs for consumers in the market and help to maintain security of supply (e.g. Eurelectric, Centrica, SSE, Energy UK)[37].

72. The Scottish Government has stated in discussions with UK officials, that it would like to see the maintenance of full access to the benefits of the Internal Energy Market for Scottish businesses. Namely, the UK remaining part of EU-wide solidarity mechanisms including the greater security alternatives offered by interconnection and the continued integration and interconnection of gas, electricity and hydrocarbon markets and infrastructures.In their view, the continued free movement of labour is vital for energy engineering, offshore oil and gas and research collaboration. This includes maintaining access to EU funds to support R&D and energy infrastructure investment.

Existing Frameworks for How Trade is Facilitated Between Countries

73. The arrangements described in this section are examples of existing arrangements between countries. They should not be taken to represent the options being considered by the Government for the future economic relationship between the UK and the EU. The Government has been clear that it is seeking pragmatic and innovative solutions to issues related to the future deep and special partnership that we want with the European Union.

74. Globally, there are a range of existing frameworks which facilitate the interaction of electricity markets, both between the EU and non-EU Member States, but also more generally.

75. Switzerland has a series of bilateral agreements with the EU which give it access to the single market for certain sectors. The terms of a Swiss-EU electricity agreement are yet to be concluded.

76. More generally, countries which are physically connected may trade electricity, subject to the arrangements they put in place to do so. There are transnational electricity interconnectors around the globe. Arrangements for how electricity is

[35]https://www.dccae.gov.ie/en-ie/news-and-media/speeches/Pages/Speech-by-Minister-Denis-Naughten-at-the-Opening-of-the-All-Island-Brexit-Civic-Dialogue-on-Energy.aspx
[36] https://www.gov.uk/government/publications/northern-ireland-and-ireland-a-position-paper

[37] http://sse.com/media/427407/BREXIT-LETTER-TO-GREG-CLARKE.pdf; and http://www.eurelectric.org/media/333731/eurelectric_brexit_paper-june2017-2017-030-0451-01-e-1.pdf

traded over those interconnectors and brought to the respective markets differ widely, based on the particular arrangements of the countries concerned.

77. These existing arrangements provide context, but the UK has been clear that the future economic partnership between the UK and the EU should be ambitious and should not simply be based on an existing model. We will seek the best deal for energy consumers within this future framework.

Energy Efficiency

78. Non-EU countries looking to export products into the EU will need to comply with EU Ecodesign and energy labelling standard requirements. Such products may be subject to customs controls to ensure compliance. In some cases, (e.g. with the voluntary US 'energy star' labelling scheme for office equipment), the EU has existing agreements in place with non-EU countries to ensure their mutual recognition with EU standards.

79. There are also some, mostly small, tariffs in place for environmental goods imported into the EU, some of which may be relevant to the electricity sector. The EU is party to the Plurilateral WTO negotiations to agree an Environmental Goods Agreement, which aims to remove tariffs on a wide variety (around 300) of such goods.

Sector Views

[This information was provided by the Government to the Committee, but the Committee has decided not to publish this section]

Annex: Stakeholder Engagement on European Union Exit (EU Exit) in the Department for Business, Energy and Industrial Strategy

[This information was provided by the Government to the Committee, but the Committee has decided not to publish this section]