Department for Business, Energy & Industrial Strategy

ofgem

Making a positive difference for energy consumers

STATUTORY SECURITY OF SUPPLY REPORT 2016

Statutory Security of Supply Report 2016

A report produced jointly by BEIS and Ofgem.

Presented to Parliament
pursuant to section 172 of the Energy Act 2004
as amended by section 80 of the Energy Act 2011

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Introduction

1. This report discharges the Government and Ofgem's respective obligations under section 172 of the Energy Act 2004 as amended by section 80 of the Energy Act 2011, including Government's obligation to report annually to Parliament on the availability of electricity and gas for meeting the reasonable demands of consumers in Great Britain (GB) for the next four years.

2. The technical data presented here has been produced from analysis conducted by the Department for Business, Energy & Industrial Strategy (BEIS), Ofgem and National Grid (NG). The statistics relied on in this document are for GB only where possible. However, in some cases where it is not possible to split the GB data out from the United Kingdom (UK) data, UK statistics have been used. Where this is the case, they have been referred to as UK in the accompanying text.

Electricity

3. GB's electricity system has delivered secure supplies to date. While the system continues to face the challenges of decarbonisation and replacing ageing and polluting plant, the experience of past years shows that we have a plan to manage the system and provide for our domestic energy demand.

4. The Government reliability standard for security of electricity supply is expressed as a Loss of Load Expectation (LOLE) of 3 hours per year. LOLE represents the number of hours per year in which supply is expected to be lower than demand under normal operation of the system. It is important to note that the LOLE metric is not a measure of the expected number of hours in which customers may be disconnected, but represents periods where the system operator may be expected to employ mitigation actions available to it[1].

5. In light of the uncertain outlook to electricity security supply during the middle of the decade, the Department of Energy and Climate Change (precursor to BEIS), National Grid Electricity Transmission (NGET) and Ofgem worked together to explore options for additional safeguards to consumers, aimed at enabling NGET to maintain system balance.

6. Two new balancing services, Supplemental Balancing Reserve (SBR) and Demand Side Balancing Reserve (DSBR), were introduced in winter 2014/15 to assist NGET in balancing the system in the event the market is unable to provide sufficient reserves to do so during the winter period (November to February inclusive). SBR provides generating reserve while the DSBR scheme provides the opportunity for participating large energy users and

[1] Use of LOLE is a probabilistic approach – the actual amount will vary depending on the circumstances in a particular year, e.g. how cold the winter is; the number of plants experiencing unplanned outages; the power output from wind generation at peak demand; and, all the other factors which affect the balance of electricity supply and demand.

aggregators to receive payments in return for reducing their electricity use during periods of high demand. Together, SBR and DSBR form the Contingency Balancing Reserve (CBR).

7. NGET procured 1.6GW of CBR in 2014/15 and 2.4GW in 2015/16. For winter 2016/17, NGET has procured 3.5GW of SBR at a total expected cost of £121.5m including testing (approximately £1.50 per customer for one year to help ensure security of supply). Final costs will be higher if tools are used. National Grid have decided not to procure any DSBR for 2016/17.

8. NGET has utilised CBR on one occasion so far. On 4 November 2015, 21MW of DSBR was delivered.

9. National Grid's Winter Outlook Report for 2016/17 forecasts a margin of 6.6% with a LOLE of 0.5 hours. This margin includes the 3.5GW of CBR available to National Grid this winter, and is expected to deliver a high level of security.

Capacity Market

10. The Government has established a Capacity Market (CM) to bring forward new investment to ensure we have enough capacity to meet peak demand at the lowest cost to consumers. The Capacity Market secures electricity capacity, mainly power plant and Demand Side Response, through competitive auctions. Targets for the auction are set to ensure there is enough capacity available to meet peak electricity demand, including a contingency for unexpected generation losses. Electricity providers bid into a Capacity Auction, declaring that if they win a capacity agreement that they will be available to provide electricity when needed. In return, they will receive a steady payment on top of the electricity that they sell.

11. In March, the Government announced reforms to the Capacity Market including a commitment to buy more capacity, earlier, and to hold an early auction which would bring forward the first Capacity Market delivery year to 2017/18 rather than 2018/19. These measures will enhance the opportunities for new plant such as gas and increase our shorter term security by providing a potential new revenue stream to support plant which may be struggling in current market conditions.

12. Auctions are managed by the Delivery Body (National Grid) and are held four years ahead of requirement (T-4) with a further auction one year ahead (T-1) to adjust for any change in requirements against earlier projection.

13. The first two T-4 auctions contracted 49.26GW and 46.35GW of capacity for delivery in winters 2018/19 and 2019/20. Clearing prices in the auctions were £19.40/kW (2012 prices) and £18/kW (2014 prices) respectively. These results will help to ensure that enough of our existing capacity will remain open at the end of the decade as well as unlocking new investment.

14. The first of two Transitional Arrangements (TA) auctions was held in January 2016. TA auctions are designed to offer targeted support to Demand Side Response (DSR), to encourage enterprise, and increase levels of participation in the years preceding the original date of full Capacity Market delivery in 2018/19. The TA auction contracted 803MW of capacity for delivery in winter 2016/17 at a clearing price of £27.50.

15. Since the Capacity Market was introduced, global energy markets have evolved rapidly and considerably. Coal and gas prices have dropped significantly in the last two years, leading to falling GB wholesale electricity prices. This placed increased financial pressure on generators' profitability and led to increased potential of early plant closures. The Government therefore announced that it would buy more capacity, sooner, in order to send a signal to the market. It also announced that it would bring forward the start of the Capacity Market to 2017/18 and hold an early auction in January 2017 for delivery that year. Table 1.1 below shows the capacity auctioned / to be auctioned in the first three T-4 auctions, the Early Auction and the next T-A

auction. Ofgem has said that if the Early Auction procures enough capacity to meet the reliability standard, CBR will not be needed for 2017/18[2].

Table 1.1 Capacity Market auctions to March 2017

Date	Type	Capacity auctioned / to be auctioned[3]	Delivery Year
Dec 2014	T-4	49.3GW	2018/19
Dec 2015	T-4	46.4GW	2019/20
Jan 2016	TA	803MW	2016/17
Dec 2016	T-4	52GW	2020/21
Jan 2017	Early Auction	53.8GW	2017/18
Mar 2017	T-A	300MW	2017/18

16. The first phase of Ofgem's Electricity Balancing Significant Code Review (EBSCR) reforms to cash-out arrangements came into effect last winter. The objective of the reforms is to address issues with balancing arrangements which undermine efficiency in balancing and security of supply.

17. In advance of Capacity Market introduction, EBSCR reform has the potential to strengthen the provision of security of supply by the wholesale market – for instance, by incentivising suppliers to strike demand-side reduction contracts rather than risk facing the cash-out price on their imbalances. With the introduction of the CM in 2017, EBSCR will help to ensure security of supply is delivered at least cost[4].

18. The networks, both transmission and distribution, remain reliable but along with the rest of the electricity system, continue to require investment to ensure they continue to facilitate the transition to a low carbon system. Ofgem's price control settlements through its RIIO (Revenue = Incentives + Innovation + Outputs) model are ensuring this investment takes place and drives further efficiency savings.

[2] https://www.ofgem.gov.uk/system/files/docs/2016/02/ofgem_open_letter_on_future_sbr_and_dsbr_given_proposal_to_run_a_ca_auction_for_2017_18_2.pdf

[3] Figures for future auctions are provisional targets which will be adjusted in light of prequalification results.

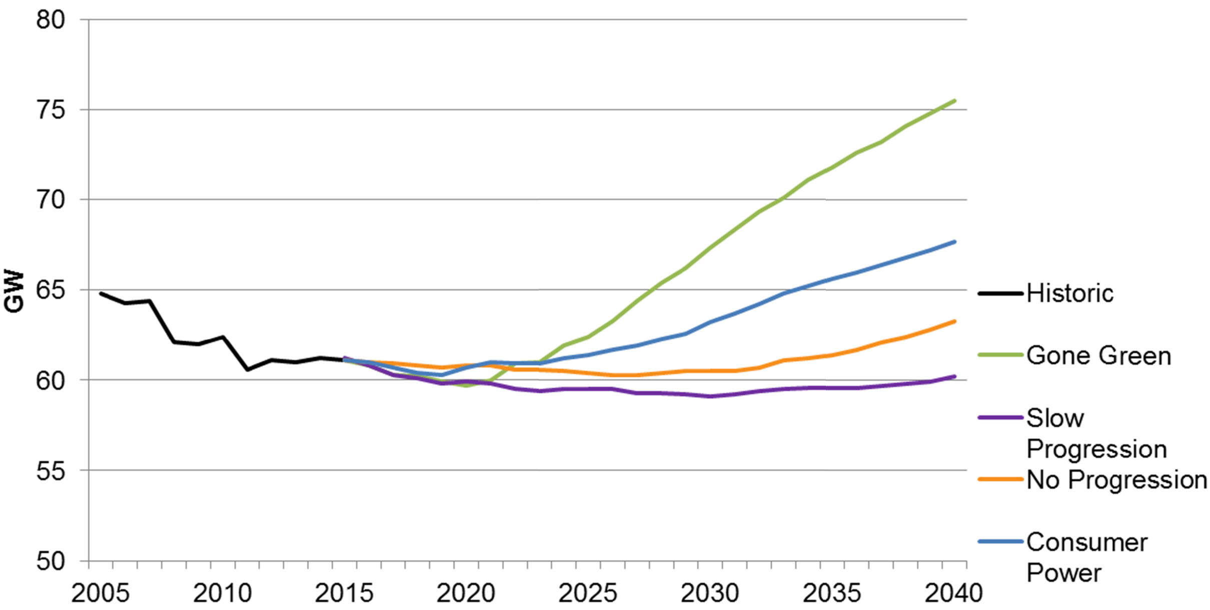
[4] The incentive will be even stronger once the basis for arriving at the cashout price (Par 50 to Par 1) comes into effect on 1 November 2018 as per the BSC

Demand

19. Chart 1.1 shows historic and forecast trends of average cold spell peak total electricity demand from National Grid. This includes demand met by generation which is connected to the transmission network as well as embedded generation (generation that is connected directly to the distribution network). Peak electricity demand has been declining in recent years; peak demand levels were around 61 GW over winter 2015/16 down from around 65 GW in 2005/06.[5]

20. National Grid has published four scenarios for electricity demand as part of the ongoing UK Future Energy Scenarios (FES) project: under their Gone Green (GG) scenario it will take until 2027 to see peak electricity demand rise to the level it was in 2005/6; whereas in the Consumer Power (CP) scenario it takes until 2033/34. In No Progression (NP) and Slow Progression (SP) scenarios, peak electricity demand does not exceed 2005/6 levels, instead reaching 63 GW and 60 GW by 2040 respectively.[6]

Chart 1.1 Future Development of ACS Peak Demand



Source: National Grid Future Energy Scenarios 2016

5 Please note that National Grid use a different type of peak demand in their security of supply assessments which calculate LOLE and de-rated margins. Please see their Winter Outlook page for more details. http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Winter-Outlook/

6 http://www2.nationalgrid.com/uk/industry-information/future-of-energy/future-energy-scenarios/

Demand Side Response (DSR)

21. In the 2015 four year ahead Capacity Market auction, 456MW of DSR (both generation derived and turn down) successfully obtained agreements, which is around 1% of all capacity procured for delivery in 2019/20. This is an increase of 282.4MW from the DSR volume procured in the T-4 auction in 2014, demonstrating an engaged and growing market. The Capacity Market's Transitional Arrangements auction in 2015 also saw an additional 475MW of DSR secure agreements for delivery in 2016/17.

22. The precise volume of wider demand side response (DSR) currently utilised in GB is unknown because DSR arrangements between businesses can be organised independently of network owners. It is also not always clear what proportion of DSR is achieved by using back up generation versus turning demand down/off.

23. In 2015, BEIS commissioned Frontier Economics and Sustainability First to undertake research[7] into the potential of demand side response in the electricity market, both near term and up to 2035. The report found that turndown DSR of Industrial & Commercial load in the near term, would most likely be derived from water pumping, industrial refrigeration and to a lesser extent hot water and may supply approximately 400MW, 600MW and 300MW of DSR at peak respectively. However, these figures would need to be adjusted to reflect technical flexibility, commercial engagement and availability, reducing the volume of DSR that can be readily commercialised.

24. Parliament has tightened the eligibility for the next Transitional Arrangements auction so that it focuses on genuine turn-down DSR rather than the more mature generation-derived DSR.

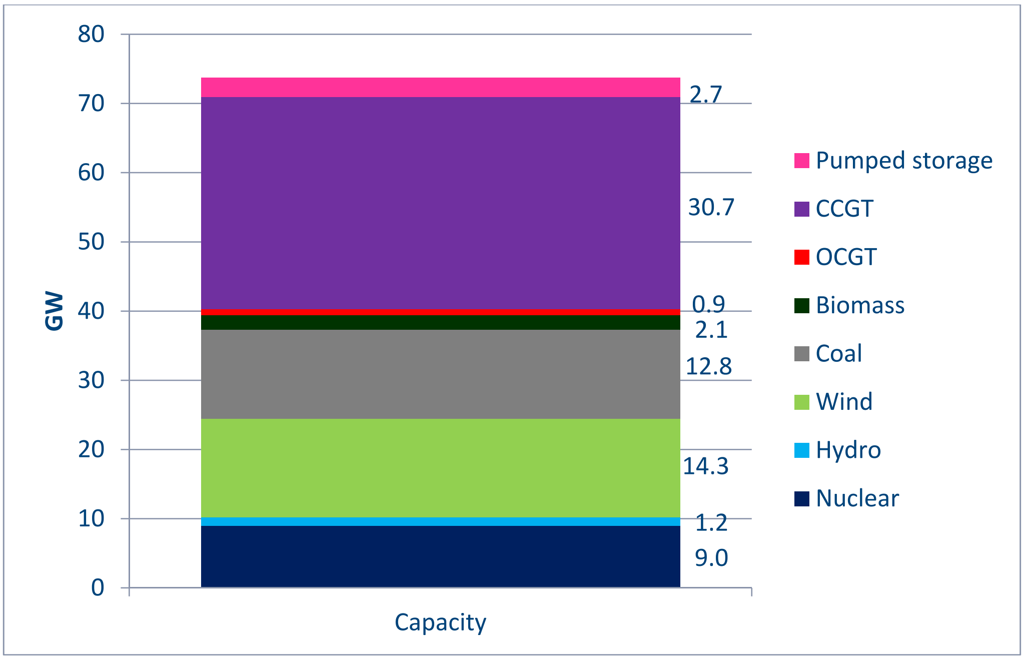
7 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/467024/rpt-frontier-DECC_DSR_phase_2_report-rev3-PDF-021015.pdf

Supply

Present Capacity

25. National Grid's FES and Winter Outlook Report assume a total of approximately 73 GW of generation capacity[8] to be available this winter (2016/17) for our base case and Chart 1.2 shows the breakdown[9].

Chart 1.2 Generation Capacity (winter 2016/17)

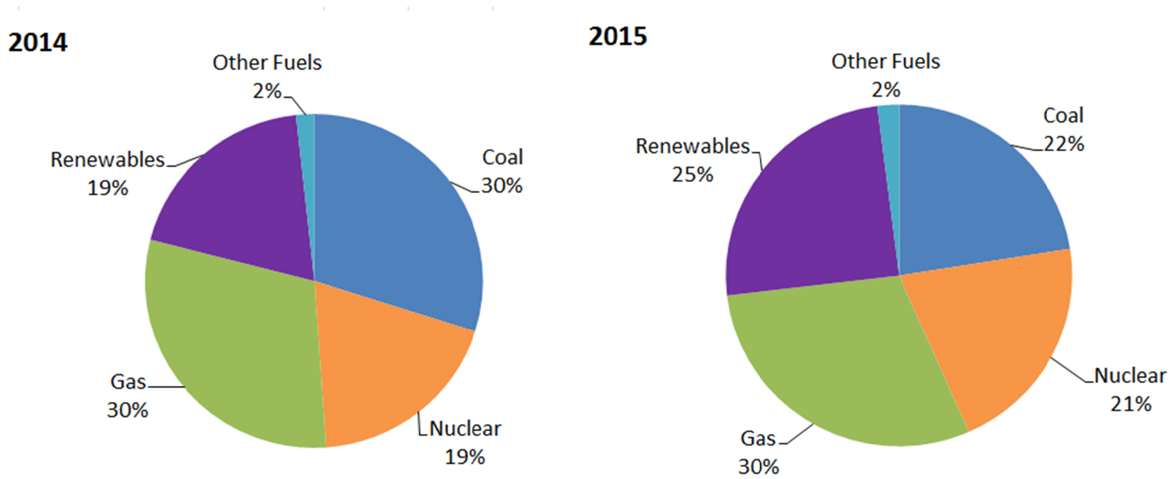


Source: National Grid Winter Outlook Report 2016

8 This includes 3.5 GW of de-rated contingency balancing reserve that will be held outside the market

9 Solar power is not relevant to security of electricity supply during winter peak.

Chart 1.3 Shares of Electricity generation, by fuel, in 2014 and 2015



Source: DUKES 2016

Pumped Storage

26. In GB there is around 2.8GW of pumped storage capacity. This technology can be operated flexibly, meaning it can come on and off the electricity system within seconds, and is widely used, alongside other technologies, by National Grid to balance and maintain the integrity of the electricity system.

27. New pumped storage projects are also being explored, with one pumped storage company currently seeking planning consent for 100MW, while other developers have made proposals for over 1GW of additional pumped storage capacity.

Electricity Networks

Current network reliability

28. Onshore Transmission Owners face statutory obligations and regulatory incentives to create an operating environment designed to reduce unsupplied electricity. The historic overall reliability of supply has been impressive. For instance, during the financial year 2015/16, overall reliability for the network stood at 99.999998%[10].

29. Offshore Transmission Owners are incentivised to maintain availability of their offshore transmission systems. This ensures offshore generators are able to export energy with minimal disruption. For the financial year 2014/15, the average availability of offshore transmission systems was over 95.52%[11].

30. As part of the price control process, Ofgem set target and incentive rates for the number of customer interruptions and customer minutes lost for each Distribution Network Operator (DNO). The 'Interruptions Incentive Scheme' (IIS) incentivises DNOs to invest in and operate their networks to manage and reduce the frequency and duration of power cuts experienced by their customers, whilst maintaining focus on minimising network costs and securing optimal value for consumers.

31. There are standards to encourage DNOs to meet certain expected levels of service and to provide payments to end customers in the event of individual standards not being met. The standards cover a range of activities, including restoring supply during an unplanned interruption and providing notice periods for planned interruptions. The Electricity (Standards of Performance) Regulations 2015 were introduced on 1 April 2015 increasing the compensation payable to those who suffer an interruption and reducing the time needed to be eligible for this payment from 18 to 12 hours.

Future development of electricity networks

32. The 2013 to 2021 transmission price control (RIIO-T1) started on 1 April 2013. Ofgem has approved funding of up to £21.50bn (2009-2010 prices) for expanding, replacing and maintaining the GB transmission network for RIIO-T1.

33. In addition, the transmission owners provide quarterly updates on their major projects to the Electricity Networks Strategy Group (ENSG – a high level industry group chaired by BEIS and Ofgem) [12]. The latest update shows that

10 http://www2.nationalgrid.com/responsibility/how-were-doing/grid-data-centre/Customer-service-and-network-reliability/

11 National Electricity Transmission System Performance Report 2014-2015

12 https://www.gov.uk/government/groups/electricity-networks-strategy-group

5.75GW of network capacity is under construction for delivery by mid-2018, with 8.35GW delivered since February 2012.

34. As part of the first price control for the 14 regional electricity DNOs under the RIIO process Ofgem has approved overall funding of £24.60b across GB for the period 1 April 2015 to 31 March 2023. This represents a major investment in the distribution network.

Interconnection

35. GB currently has 4 GW of electricity interconnector capacity with mainland Europe and Ireland. This consists of a 2 GW link to France (IFA), a 500 MW link between Wales and Ireland (East-West)[13], a 1 GW interconnector with the Netherlands (BritNed), and a nominally rated 500 MW link between Scotland and Northern Ireland (Moyle). [14]

36. In August 2014, Ofgem extended its cap and floor regulatory regime, initially developed for NEMO Link interconnector between GB and Belgium, to other near-term interconnectors. The regime aims to incentivise investment in projects that will benefit consumers by providing a minimum return for project developers (the floor) whilst protecting consumers from excess revenues accruing to developers by limiting the maximum return (the cap).

37. The cap and floor regime has supported investment decisions on new interconnectors linking the GB market to Belgium (1GW Nemo Link project planned for 2019) and Norway (1.4 GW NSL project planned for 2021). Ofgem has also made decisions to grant a cap and floor regulatory regime, in principle, to another two interconnectors to France (1.4 GW FAB Link and 1 GW IFA2), one interconnector to Denmark (1-1.4GW Viking Link project) and one to Ireland (500 MW Greenlink project). These four projects are yet to make investment decisions but each is aiming to be operational by the early 2020s.

38. An additional 1 GW project to France, ElecLink, is proceeding under the “merchant-exempt” route according to the approvals by GB’s and France’s respective National Regulatory Authorities and is scheduled for delivery in 2020/21.

39. In addition, there are further projects in development. In 2016 two projects have been granted interconnection licences by Ofgem – NorthConnect, a 1.4GW project to Norway and Aquind, a 2 GW project to France. These projects can now decide whether to apply for a cap and floor regime or the merchant ‘exempt’ regime. Ofgem will assess any such applications. The window for cap and floor applications is currently open and other applications may still come forward before the it closes on 31 October 2016.

[13] The East West interconnector is on outage until the beginning of March 2017.

[14] Moyle’s transmission entry capacity is currently limited to 295MW in Scotland, with export capacity at 450MW.

Market Functioning

40. Energy market firms buy and sell their electricity in the wholesale market. The wholesale market allows participants to trade in a range of products that enable them to meet their obligation to supply energy whilst also enabling them to mitigate risk. The degree of access to these products relates to the liquidity of the market: low levels of market liquidity can be indicative of an uncompetitive market.

41. Poor liquidity in the wholesale market can prevent consumers from fully realising the benefits that competition can deliver in terms of downward pressure on bills, better service and greater choice. It can also obscure or weaken price signals, inhibiting long term investment decisions in new generating plant with negative consequences for security of electricity supply.

42. Ofgem and industry had concerns about the lack of liquidity of the wholesale electricity market. Ofgem's liquidity project has examined poor liquidity in the electricity wholesale market and the potential barriers that this poses to competition and entry in the market. After extensive consultation, Ofgem activated the 'Secure and Promote' licence condition on 31 March 2014, with the aim of ensuring that all parties can access the wholesale market effectively and that robust reference prices are available from the wholesale market. The project is now monitoring the success of the licence condition and Ofgem published its first annual report on 9 September 2015.[15] Ofgem recently published its second annual report on 3 August 2016[16].

43. Ofgem's monitoring shows an improvement in liquidity in the wholesale market since the start of the licence condition, albeit with a deterioration in the middle two quarters of 2015 that reflected a low-price, low-volatility market. The monitoring also shows that access to the wholesale market has improved for small suppliers. The improvement in liquidity is due to many factors, of which Secure and Promote is likely just one, For this reason, it is difficult to draw definitive conclusions and Ofgem continues to monitor the effect of the reforms. It will complete a formal review of the policy in 2017.

[15] The 2015 annual report may be found on Ofgem's site here: https://www.ofgem.gov.uk/publications-and-updates/wholesale-power-market-liquidity-annual-report-2015
[16] The 2016 annual report may be found on Ofgem's site here: https://www.ofgem.gov.uk/publications-and-updates/wholesale-power-market-liquidity-annual-report-2016

Gas

Introduction

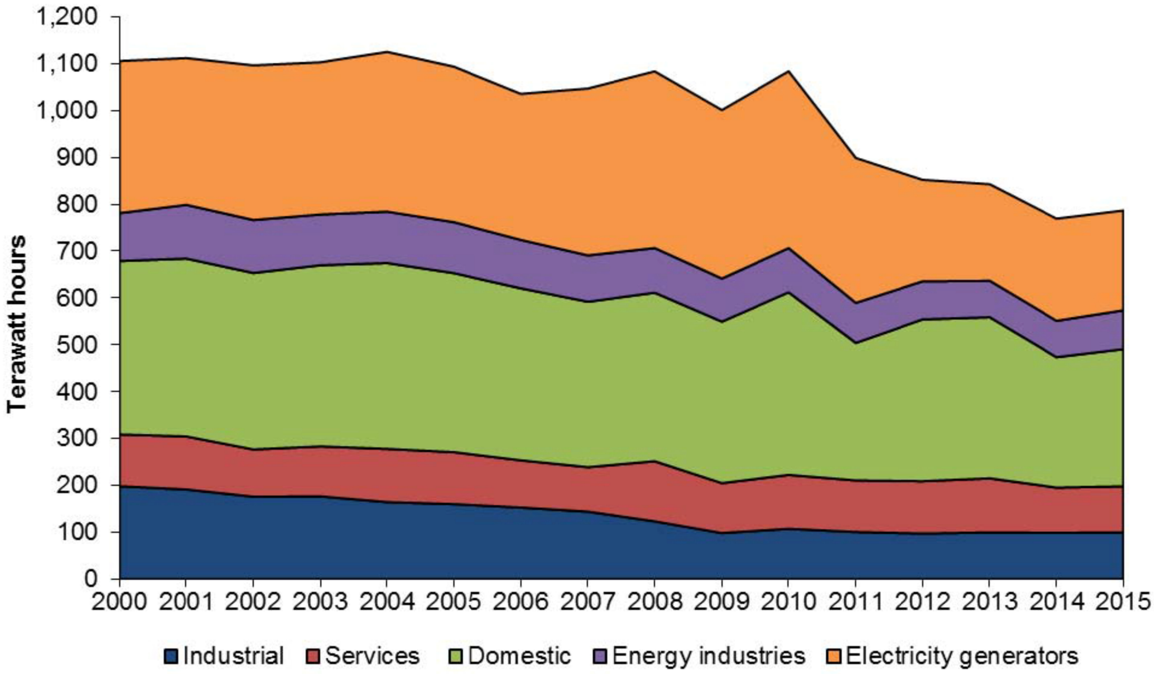
44. GB's gas system has delivered security to date and is expected to continue to function well, with sufficient capacity to deliver to meet demand. The UK Continental Shelf (UKCS) remains a major source of gas in the GB market, with supplies also coming from a variety of international partners via pipelines and LNG cargoes. There are a range of future supply outlooks, but all show sufficient gas available from the combination of domestic, regional and global markets.

45. Gas is a central part of the GB energy system and gas security is of importance to all parts of society and the economy, both directly (i.e. through its use as a fuel source for domestic heating and cooking) and indirectly (i.e. because of its role in electricity generation). Past analysis by BEIS and by Ofgem has provided valuable insight into the nature of the risks to our gas security, building an evidence base that the UK gas supply infrastructure is resilient to all but the most extreme and unlikely combinations of severe infrastructure and supply shocks. Nonetheless there is always future uncertainty – for gas this includes wider energy system changes required to deliver lower carbon energy and the range of possible future sources of gas (domestic and international).

Demand

46. Chart 2.1 shows annual gas usage by sector since 2000, with overall gas consumption continuing to fall in 2014 although with a slight uptick in 2015. Over the period significant reductions in gas used for power generation were notable but there was also an increase in gas use by the services sector and modest increases by domestic users.

Chart 2.1 Annual gas usage by sector since 2000



Source: DUKES 2016

47. Gas demand in Q2 2016 was 16% higher compared to Q2 2015[17]. An increase in gas use versus 2015 was seen across many sectors, with domestic and other final use showing increases ranging between approximately 2% and 5%. This was driven primarily by the cooler average temperatures.

48. Demand for natural gas from the industrial sector as a whole also increased in Q2 2016 versus Q2 2015, being 30% lower for the iron and steel industry and 4% higher for other industries. Similar to domestic demand, these increases were driven primarily by the cooler average temperatures. Though the smaller increases compared to that seen in the domestic sector reflects the industrial sector relying less on gas for space heating than other sectors.

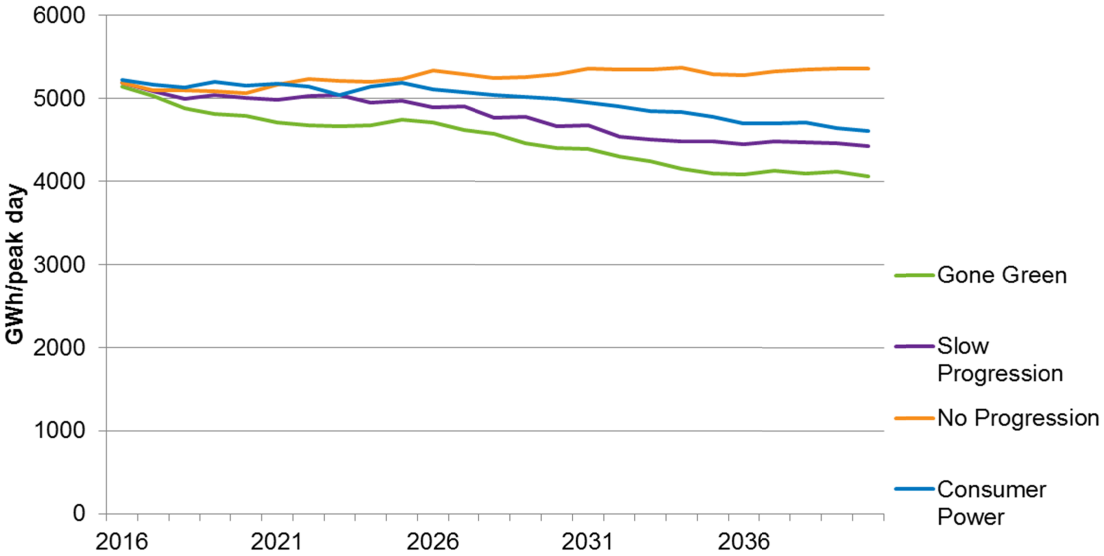
49. As with electricity, National Grid has published four scenarios for gas demand as part of the UK FES work. These show a range of possible futures to 2040. Generally gas demand reduces over the scenario period, as reflected in the Gone Green, Slow Progression and Consumer Power scenarios, but remains broadly constant in the No Progression scenario. In addition to meeting annual demand, the gas market's ability to meet demand on a peak day is important for security of supply. In general, a peak day demand is over double the average daily gas demand. Gas market participants build redundancy into their supply arrangements, above the minimum amount to meet peaks, to manage the risk that other capacity may not be available.

[17] https://www.gov.uk/government/statistics/gas-section-4-energy-trends

50. The peak winter day demand for 2015/16 was 369mcm[18], which was 96mcm lower than the record winter peak day demand in January 2010. For the coming winter seasonally normal peak demand is forecast to be 310mcm/d. The 1-in-20 peak demand for this coming winter is 472mcm/d with a peak deliverability of 602mcm/d.

51. Looking further forwards, National Grid scenarios also cover gas peak demand: under their No Progression scenarios peak gas demand will remain broadly steady out to 2035 while under the Consumer Power and Slow Progression scenarios peak gas demand would slightly decrease by around 8.5% and 13.5% respectively. There will be a more substantial decline (20.6%) under Gone Green.

Chart 2.2 Gas 1-in-20 peak day demand



Source: National Grid Future Energy Scenarios 2016

Demand Side Response (DSR)

52. The conclusions of Ofgem's Gas Significant Code Review (SCR)[19] placed an obligation on National Grid to develop a centralised demand side response mechanism to encourage greater demand-side participation from industrial and commercial users. National Grid's proposed DSR methodology has been approved by Ofgem and went live in October 2016.

53. This service allows large gas consumers to offer, via a centralised mechanism, to reduce the amount of gas they use during times of system stress in exchange for a payment.

[18] http://media.nationalgrid.com/media/1293/ng-winter-review-2016.pdf
[19] https://www.ofgem.gov.uk/publications-and-updates/gas-security-supply-significant-code-review-conclusions

Supply

54. To date, the GB gas system has reliably delivered secure supply. Security of supply reports by Ofgem and by BEIS[20] have concluded that the GB market is generally secure. Most recently, BEIS's Risk Assessment on Security of Gas Supply, submitted to the European Commission in September 2016, found that, in the short to medium term, UK gas supply infrastructure is resilient to all but the most extreme and unlikely combinations of severe infrastructure and supply shocks[21]. The UK N-1 calculation exceeds the target of 100% with a score of 127% and 123% including exports to Ireland. This Risk Assessment is repeated biennially.

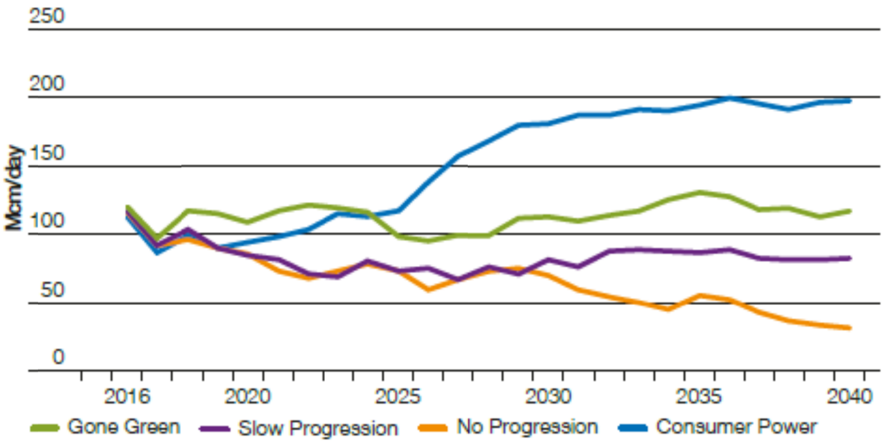
55. National Grid FES also examines the adequacy of supply to meet demand. As set out above, the greatest system challenge is meeting peak demand. Chart 2.3 shows that in all scenarios, maximum deliverability of gas infrastructure exceeds projected peak demand. This is lowest in the 'No Progression' scenario at 30mcm/d in 2040 and in the other scenarios the margin is considerably greater. This supply capacity is after an N-1 test i.e. even after the loss of the largest single piece of infrastructure (both LNG terminals at Milford Haven – a loss of 86mcm/d). It does include other existing infrastructure (pipelines, LNG, peak storage deliverability and projected capacity of the UKCS) at 100% availability but also assumes that no new infrastructure is built.

[20] By DECC:
The Impact of Gas Market Interventions on Energy Security (for DECC by Redpoint, July 2013)
Gas Security of Supply Report (Ofgem requested by DECC, November 2012)
GB Gas Security of Supply and Options for Improvement (for DECC by Pöyry, March 2010).

By Ofgem:
Gas SCR (for Ofgem by Pöyry , January 2014)
Gas Security of Supply Report: Further Measures Modelling (for Ofgem by Redpoint, November 2012)
GB Gas Security of Supply and Future Market Arrangements (Report to the Gas Forum by Pöyry, October 2010)

[21] Based on a 1 in 50 winter as opposed to the required standard of a 1 in 20 winter.

Chart 2.3 Gas margins



Source: National Grid Future Energy Scenarios 2016

Import Capacity and outlook

56. The UK has a diverse range of sources of gas supply, including domestic production, pipeline imports from Norway and mainland EU, LNG from global markets and storage. GB's gas supply infrastructure is able to deliver approximately 602-mcm/d.

57. Currently, the UK has an import deliverability of ~54 bcm/y from Norway, ~46 bcm/y from capacity connected to the Continent, and ~53 bcm/y from LNG import terminals.[22]

58. Capacity is not itself a measure of utilisation. To date, GB has always brought the gas required; and BEIS, Ofgem and National Grid analysis all concluded that it will remain well positioned to bring the gas needed. National Grid FES notes that there are a wide range of possible supply patterns but that the gas market provides enough gas from Europe and beyond to make up the difference between GB's indigenous supply and demand. A key factor in GB's ability to bring the necessary gas it is an appropriately incentivised, flexible and accessible market. This is discussed under *Market Functioning* below.

Storage

59. Storage does not itself produce gas, but allows gas from other sources (whether domestic or imports) to be held until times of high demand.

60. Last winter the total storage capacity was 4.2 bcm. This was 86% full at the start of winter and this dropped to 23% full at the lowest point on 25th March 2016.This is an aggregate figure, and short range storage may cycle between empty and full over the course of a winter. Long range storage typically fills

[22] https://www.gov.uk/government/publications/statutory-security-of-supply-report-2015

over summer and empties over winter, but even long range storage may inject new gas during the winter at times of low demand.

61. GB gas storage is expected to provide a smaller amount of gas over the coming winter compared to previous winters, this figure being somewhat below the capacity of recent years due to a reduction in deliverability at the Rough storage facility. Based on assessments of current storage sites, National Grid estimate deliverability for this winter is approximately 137mcm/d. Given the diverse nature of the GB gas market National Grid expect sufficient flexibility and diversity across all sources to cope with the reduction in storage space for the coming winter.

62. Centrica Storage Limited has issued a remit notification to say that the Rough storage facility will be available for withdrawal only, as of 1st November 2016 subject to normal operating conditions.

Market Functioning

63. The UK gas market is one of the most liquid and developed markets in the world. The National Balancing Point (NBP) is by far one of Europe's largest traded gas markets, with only the Netherlands' comparable in size, a position which has developed over recent years. In 2015, total traded volumes were approximately 19,000 TWh in the GB market. There is a diverse range of products and platforms available for those looking to trade at the NBP. This includes a wide range of forward and spot contracts with significant trading volumes throughout. Furthermore, market concentration is at healthy levels, indicating competition between participants: the 10 largest shippers were responsible for around 60% of market activity[23].

64. This liquidity is evidenced by high churn rates at the NBP, the number of times a unit of gas is traded between extraction and consumption (one indicator of liquidity). Although churn rates vary with seasonality, GB continues to perform well on this indicator, with churn steadily increasing to an average of around 22 over the 12 months to March 2016; a number in excess of 10 is taken by industry commentators to indicate gas hub maturity. This churn rate was notably higher than gas hubs on Continental Europe with the exception of the Dutch TTF. High liquidity benefits security of supply as it provides international gas producers with effective markets where they can bring gas, and also the means by which gas consumers can indicate their willingness to buy.

65. Overall, the UK gas market has the characteristics of a developed and competitive market. This assessment was supported by the Competition and Markets Authority (CMA) Energy Market Investigation; the CMA considered the wholesale gas market in the early stages of their investigation and confirmed in their updated issues statement that they did not find any causes for concern[24].

[23] Wholesale Energy Markets in 2015, Ofgem September 2016
[24] https://assets.digital.cabinet-office.gov.uk/media/54e378a3ed915d0cf7000001/Updated_Issues_Statement.pdf

Network Reliability

66. The UK gas transmission network achieved 100% reliability in 2015/16. System reliability is assessed as no supply losses to firm supply points. During winter 2015/16, there was no requirement to interrupt any customers supplied directly from the National Transmission System (NTS) on any occasion. No other transporter or emergency interruption to customers supplied directly from the NTS was required.

67. The distribution network that carries gas directly to consumers is equally robust, with a reliability rating of 99.999%.

Oil

Introduction and Summary

68. This chapter sets out a summary of key facts and figures on UK oil demand and supply, production and imports. Historic data is provided as well as, where possible, forecasts out to 2030 and has been compiled using BEIS data. As with all scenarios, a wide margin of uncertainty is inherent in the projections and future supply and demand will depend on a range of factors.

69. Oil currently meets around a third of primary energy demand and is the main energy source for transport, meeting virtually all of the UK's needs, including electricity generation, industrial processes, domestic heating and as feedstock for petrochemical, industrial and construction products and processes.

Demand

70. After several years where demand contracted, 2015 saw an increase of 2.9%, which was largely driven by demand for transport fuels. Non-energy use at petrochemical plants also increased whereas demand in other sectors fell. Demand for oil in the UK is set to decrease further in the long term in order for the UK to meet its 2050 climate change objectives and rebalance the economy towards more sustainable and secure energy supplies.

Chart 3.1: Production and consumption of key petroleum products 2015

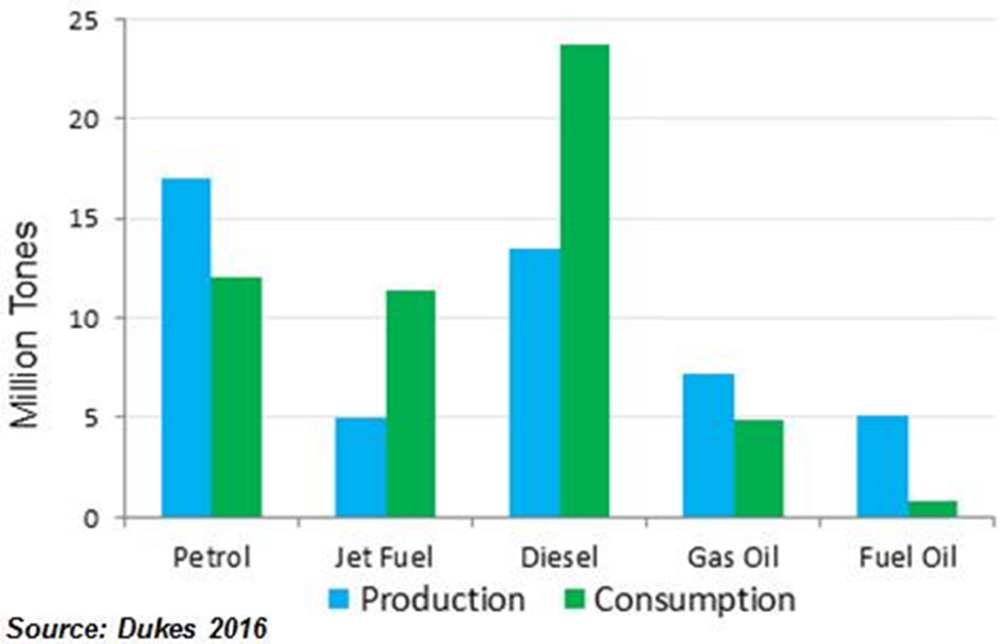
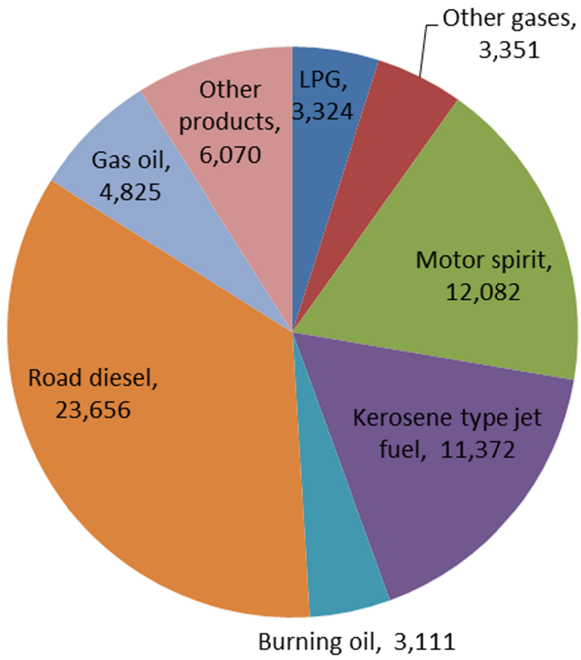
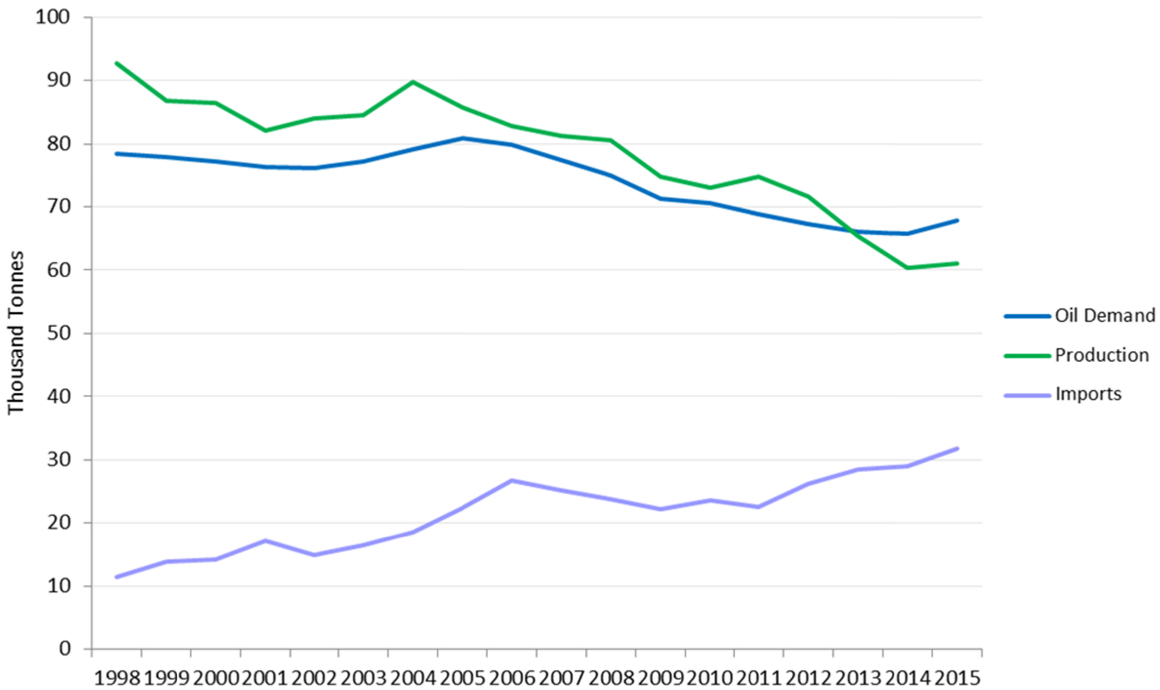


Chart 3.2: UK 2015 oil demand by petroleum product type



Source: DUKES 2016

Chart 3.3: UK Petroleum product demand, production and imports



Source: DUKES 2016

Supply

UK Oil Production

71. Oil production from the UK Continental Shelf (UKCS) peaked in 1999 and declined at an average rate of around 7% per year until 2010. However, in the year between 2014 and 2015 production rose for the first time since 1999 by 13.4%, thanks to the opening of new fields such as Golden Eagle. These new fields along with the Buzzard field returning to normal production following issues in 2014 have boosted production in the short term, but the long-term future will depend on the level of investment and the success of further exploration.

72. The current estimate of remaining recoverable hydrocarbon resources from the UK's offshore resources is in the range 10 to 20 billion barrels of oil equivalent. The founding of the Oil and Gas Authority as an Executive Agency of BEIS represented a critical step in implementing the recommendations contained in Sir Ian Wood's 2014 report ("Wood Review") into maximizing economic recovery from the United Kingdom's Continental Shelf ("UKCS").

Crude Oil

73. The UK both imports and exports crude oil, and the direction of this trade is dependent on the prevailing market conditions. Historically around two-thirds of the UK's crude imports have come from Norway, although this has decreased in recent years and stands at 50% in 2015. Imports from the OPEC countries have increased significantly and now consist of 39% of imports, in particular from Algeria.

74. The UK's own production of crude oil would be sufficient to meet roughly two-thirds of UK refinery demand, but the increase in the diversity of sources coming into the UK would reduce the impact of a disruption to any one source of supply on the UK. In 2015, less than 20% of UK crude oil production was used by UK refineries.

Refined product

75. UK oil refineries have continued to rationalise and optimise their operations and 2015 saw a stabilisation of the refinery thoughput on favourable market conditions (an increase of 1 per cent on last year) after falls in recent years. The market will continue to drive changes in the supply sector and HMG recognises the benefit of ensuring that a mix of domestic refining and imports remains viable in the UK, so far as market conditions allow.

76. In 2015, UK refinery production was 28% petrol, 22% diesel and 8% aviation fuel, with the remaining 42% primarily being other light and heavy distillates. This is significantly different from the demand pattern.

77. Petroleum products are all traded internationally with the UK both importing and exporting all major categories of fuel. Approximately 37% of fuel produced by UK refineries in 2015 was exported, of which 45% was petrol and 15% fuel oil.

78. Imports of diesel road fuel and jet fuel to the UK are increasing. In 2013, the UK became a net importer of petroleum product for first time since 1984. In 2015, the UK was a net importer by 8.9 million tonnes, 40 per cent up on 2014.

79. The UK has a well-developed infrastructure for the trade of both crude oil and petroleum products and sources its petroleum products from a diverse range of countries. In the main, Russia and European countries export large volumes of diesel to the UK, but Kuwait, Saudi Arabia and Korea are major trading partners for jet fuel.

Resilience

80. The UK remains well supplied by a combination of domestic refining and imported fuels and there were no significant disruptions to the end supply of oil products and fuels during 2015. Continued efforts by the industry and National Crime Agency coordinated through the Pipeline Security Forum have contributed to a fall in the number of illegal pipeline tapping incidents causing short-term interruptions.

Emergency oil stocks

81. The UK holds emergency stocks of oil to respond to major disruptions to the global oil market as part of its membership of the European Union and International Energy Agency. In order to meet its international obligations the UK directs oil companies that are substantial suppliers of oil products to the UK to hold stocks that can be released in an emergency. In 2015, the UK's obligation was approximately 12 million tonnes of crude oil and petroleum products, similar to levels in 2014.

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