Department for Business, Energy & Industrial Strategy

ENERGY TRENDS DECEMBER 2017

December 2017

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This is a National Statistics publication

The United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the UK Statistics Authority: Code of Practice for Official Statistics.

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- meet identified user needs
- are well explained and readily accessible
- are produced according to sound methods, and
- are managed impartially and objectively in the public interest

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed

Any enquiries regarding this publication should be sent to us at energy.stats@beis.gov.uk.

This publication is available for download at www.gov.uk/government/statistics/energy-trends-december-2017.

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Introduction

Energy Trends and Energy Prices are produced by the Department for Business, Energy and Industrial Strategy (BEIS) on a quarterly basis. Both periodicals are published concurrently in June, September, December and March. The December editions cover the third quarter of the current year.

Energy Trends includes information on energy as a whole and by individual fuels. The text and charts provide an analysis of the data in the tables. The tables are mainly in commodity balance format, as used in the annual Digest of UK Energy Statistics. The 2017 edition of the Digest was published on 27 July 2017 and is available on the BEIS section of the GOV.UK website at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

The balance format shows the flow of a commodity from its sources of supply, through to its final use. The articles provide in-depth information on current issues within the energy sector.

The text and tables included in this publication represent a snapshot of the information available at the time of publication. However, the data collection systems operated by BEIS, which produce this information, are in constant operation. New data are continually received and revisions to historic data made. To ensure that those who use the statistics have access to the most up-to-date information, revised data will be made available as soon as possible. The tables are available free of charge from the BEIS section of the GOV.UK website. In addition to quarterly tables, the main monthly tables continue to be updated and are also available on the BEIS section of the GOV.UK website. Both sets of tables can be accessed at:
www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy/about/statistics

Energy Trends does not contain information on Foreign Trade, Weather (temperature, wind speed, sun hours and rainfall) and Prices. Foreign Trade and Weather tables are, however, available on the BEIS section of the GOV.UK website at:
www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy/about/statistics.
Information on Prices can be found in the Energy Prices publication and on the BEIS section of the GOV.UK website at: www.gov.uk/government/collections/quarterly-energy-prices

Please note that the hyperlinks to tables within this document will open the most recently published version of a table. If you require a previously published version of a table please contact Kevin Harris (see details below).

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The main points for the third quarter of 2017:

- Total energy production was 2.8 per cent lower than in the third quarter of 2016. This fall in output was driven by low gas production levels in August and September 2017 due to maintenance activity.
- Oil production fell by 0.4 per cent when compared with the third quarter of 2016. Refinery production in the third quarter of 2017 was up by 1.6 per cent on the same quarter of last year.
- Natural gas production was 10.7 per cent lower than the third quarter of 2016. Gas imports rose by 9.9 per cent, driven by strong growth in pipeline imports, whilst exports rose by 1.9 per cent. Gas consumption was up 11.3 per cent, driven by cooler weather, particularly in September 2017.
- Coal production in the third quarter of 2017 was 30 per cent lower than the third quarter of 2016, due to falling demand. Coal imports were 9.9 per cent higher. Generators' demand for coal fell by 28 per cent.
- Total primary energy consumption for energy uses rose by 1.3 per cent. However, when adjusted to take account of weather differences between the third quarter of 2016 and the third quarter of 2017, primary energy consumption rose by 0.7 per cent.
- Temperatures in the quarter were on average 1.2 degrees cooler than a year earlier, with average temperatures in September 2017 being 2.3 degrees cooler than a year earlier.
- Final energy consumption (excluding non-energy use) rose by 1.7 per cent compared to the third quarter of 2016. Domestic consumption rose by 8.5 per cent reflecting the cooler weather in the quarter, service consumption rose by 2.7 per cent, transport consumption rose by 0.3 per cent, whilst industrial consumption fell by 0.9 per cent. On a seasonally and temperature adjusted basis, final energy consumption rose by 0.9 per cent.
- Gas demand was 1.2 per cent higher than the third quarter of 2016, despite a 6.7 per cent fall in use by electricity generators. Overall electricity consumption was 1.9 per cent lower than in the third quarter of 2016.
- Total deliveries of the key transport fuels were up 0.5 per cent when compared to the same period last year. DERV deliveries were up 0.8 per cent, motor spirit deliveries were down 0.5 per cent, whilst aviation turbine fuel deliveries were up 0.1 per cent.
- Electricity generated in the third quarter of 2017 fell by 2.2 per cent, from 76.1 TWh a year earlier to 74.4 TWh.
- Of electricity generated in the third quarter of 2017, gas accounted for 39.1 per cent, down from 42.9 per cent in the third quarter of 2016, whilst coal accounted for 2.9 per cent, down from 3.6 per cent in the third quarter of 2016. Nuclear generation accounted for 24.4 per cent of total electricity generated in the third quarter of 2017, down from 24.8 per cent in the third quarter of 2016.
- Low carbon electricity's share of generation increased from 50.2 per cent in the third quarter of 2016 to a record high of 54.4 per cent in the third quarter of 2017, due to increased renewables generation.
- Renewables' share of electricity generation increased to 30.0 per cent, up from the 25.4 per cent share in the third quarter of 2016. Renewable electricity capacity was 38.9 GW at the end of the third quarter of 2017, a 12.6 per cent increase (4.4 GW) on a year earlier. Overall renewable electricity generation was up 15.4 per cent compared to the same quarter in 2016.

Section 1 - Total Energy

Key results show:

Total energy production was 2.8 per cent lower than in the third quarter of 2016, driven by low gas production due to maintenance activity. (**Charts 1.1 & 1.2**)

Total primary energy consumption for energy uses rose by 1.3 per cent. However, when adjusted to take account of weather differences between the third quarter of 2016 and the third quarter of 2017, primary energy consumption rose by 0.7 per cent. (**Chart 1.3**)

Final energy consumption (excluding non-energy use) rose by 1.7 per cent compared to the third quarter of 2016. Domestic consumption rose by 8.5 per cent reflecting the colder weather in the quarter, service consumption rose by 2.7 per cent, transport consumption rose by 0.3 per cent, whilst industrial consumption fell by 0.9 per cent. (**Charts 1.4 & 1.5**)

On a temperature adjusted basis, final energy consumption rose by 0.9 per cent. (**Chart 1.5**)

Net import dependency was 32.7 per cent, up 2.3 percentage points from the third quarter of 2016, reflecting the increases in crude oil and gas imports. (**Chart 1.6**)

Fossil fuel dependency fell to 78.2 per cent in the third quarter of 2017, a record low level. (**Chart 1.7**)

Relevant tables

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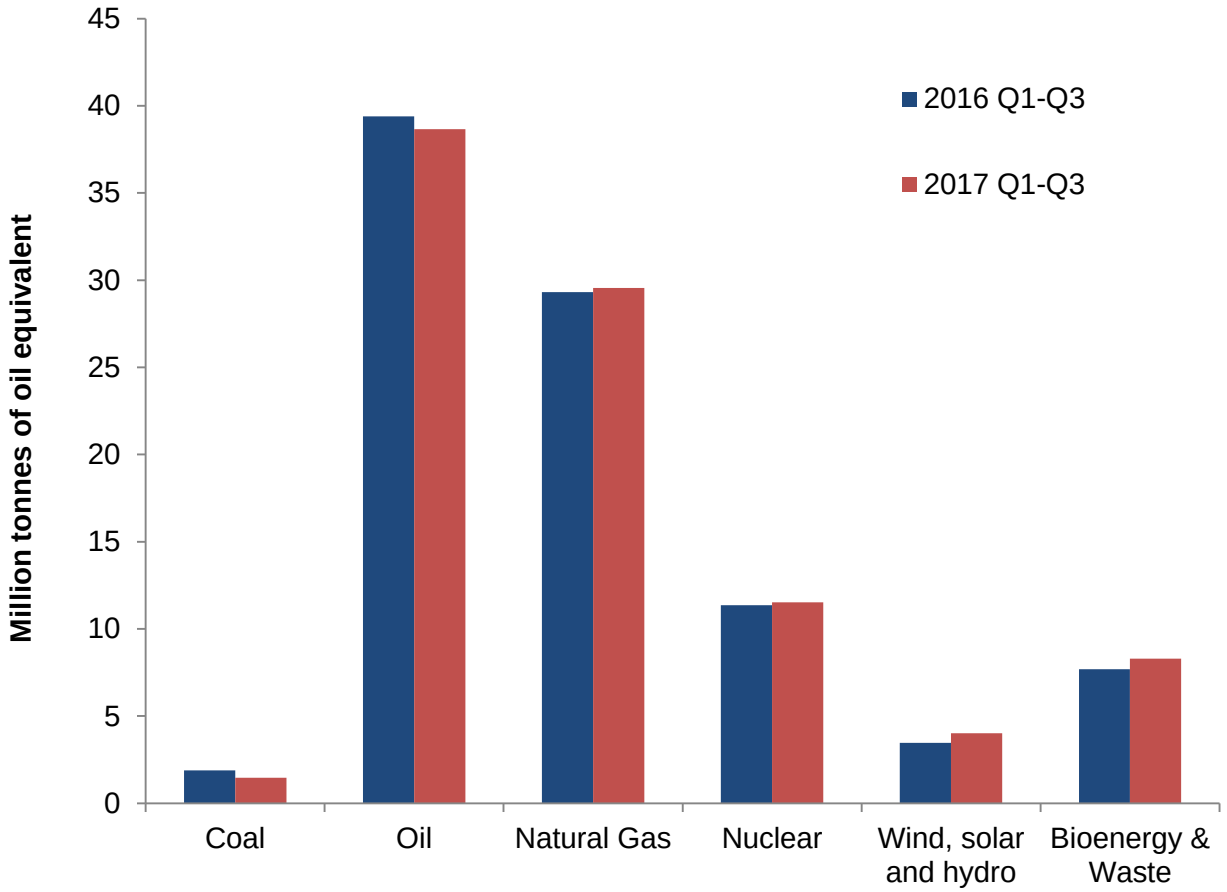
Chart 1.1 Production of indigenous primary fuels (Table 1.1)



Total production in the third quarter of 2017 at 28.6 million tonnes of oil equivalent was 2.8 per cent lower than in the third quarter of 2016.

Production of oil fell by 0.4 per cent compared to the third quarter of 2016.

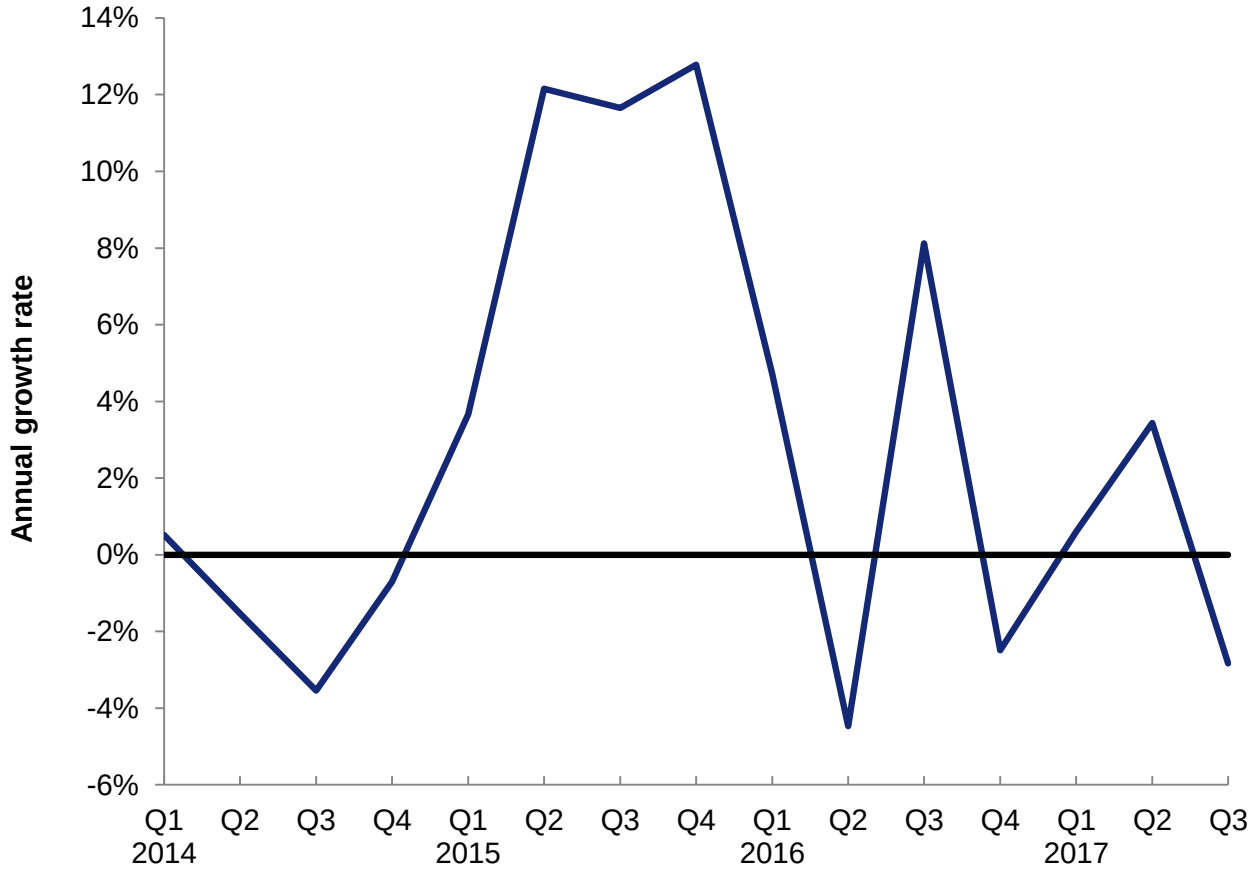
Production of gas fell by 10.7 per cent compared to the third quarter of 2016, as a result of low production levels in August and September 2017 due to maintenance activity.

Primary electricity output in the third quarter of 2017 was 0.3 per cent lower than in the third quarter of 2016, within which nuclear electricity output was 3.6 per cent lower, whilst output from wind, solar and natural flow hydro was 11.9 per cent higher than the same period in 2016, due to increased renewable capacity (see section 6).

Production of bioenergy and waste was 24 per cent higher compared to the third quarter in 2016.

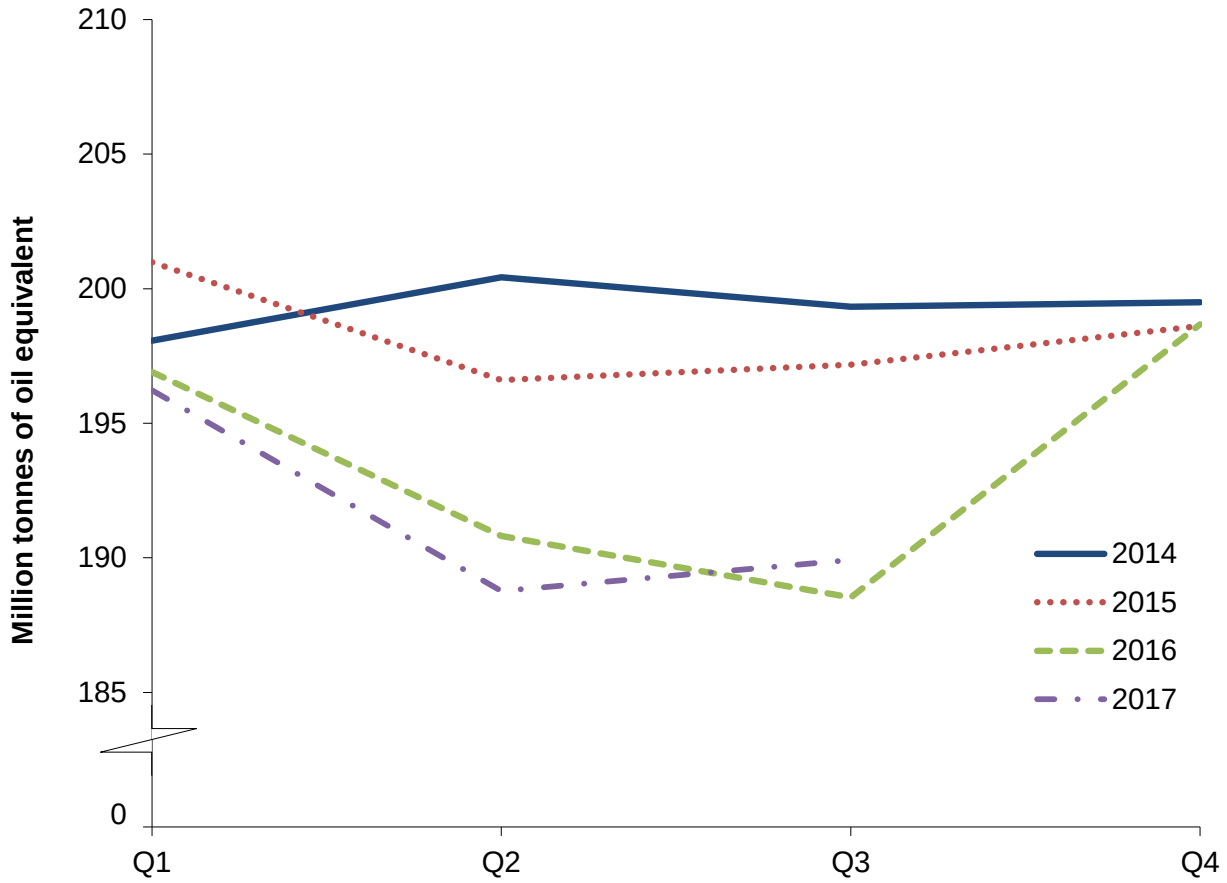
In the third quarter of 2017 production of coal and other solid fuels was 30 per cent lower than the corresponding period of 2016.

Chart 1.2 UK production (annual growth rate) (Table 1.1)



In the third quarter of 2017, the annual growth rate of UK production was -2.8 per cent, with the growth in bioenergy and renewables (wind, solar and natural flow hydro) production more than offset by the reductions in coal, oil, gas and nuclear production.

Chart 1.3 Total inland consumption (primary fuel input basis) [(1)] (Table 1.2)



(1) Seasonally adjusted and temperature corrected annual rates

Total inland consumption on a primary fuel input basis (temperature corrected, seasonally adjusted annualised rate), was 189.9 million tonnes of oil equivalent in the third quarter of 2017, 0.7 per cent higher than in the third quarter of 2016.

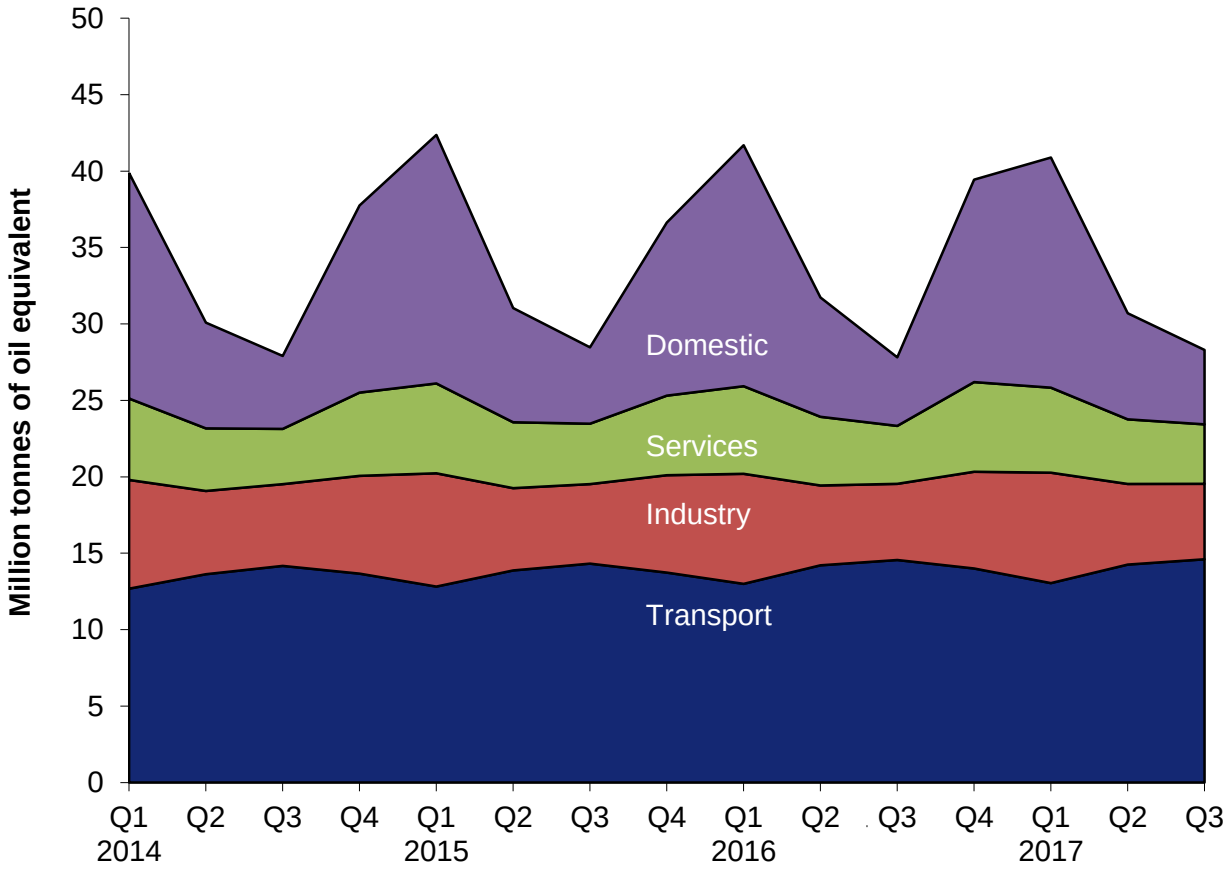
The average temperature in the third quarter of 2017 was 1.2 degrees Celsius cooler than the same period a year earlier.

Between the third quarter of 2016 and the third quarter of 2017 (on a seasonally adjusted and temperature corrected basis) coal consumption fell by 21 per cent driven by decreased coal use in electricity generation.

On the same basis, oil consumption rose by 1.1 per cent, and gas consumption rose by 1.2 per cent.

Also on a seasonally adjusted and temperature corrected basis, there were rises in bioenergy and waste consumption of 15.7 per cent and in wind, solar and hydro consumption of 13.0 per cent, whilst nuclear consumption fell by 4.0 per cent.

Chart 1.4 Final energy consumption by user (Table 1.3a)



Total final energy consumption rose by 1.4 per cent between the third quarter of 2016 and the third quarter of 2017.

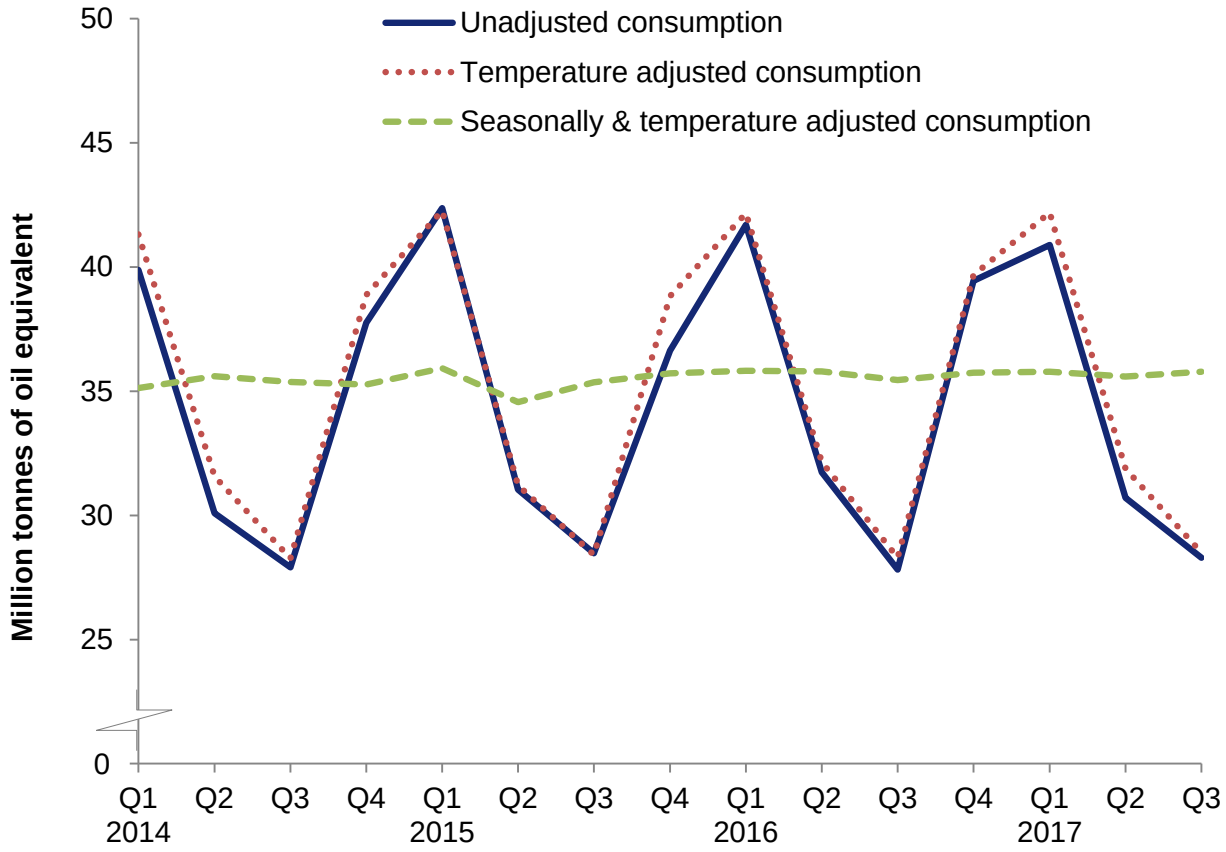
Domestic sector energy consumption rose by 8.5 per cent, reflecting the cooler weather compared to a year earlier. Average temperatures in the third quarter of 2017 were 1.2 degrees Celsius cooler than a year earlier, with average temperatures in September 2017 being 2.3 degrees Celsius cooler than in September 2016.

Service sector energy consumption rose by 2.7 per cent.

Transport sector energy consumption rose by 0.3 per cent.

Industrial sector energy consumption fell by 0.9 per cent.

Chart 1.5 Seasonally adjusted and temperature corrected final energy consumption (Table 1.3c)



Total unadjusted final energy consumption (excluding non-energy use) rose by 1.7 per cent between the third quarter of 2016 and the third quarter of 2017.

On a seasonally and temperature adjusted basis final energy consumption (excluding non-energy use) rose by 0.9 per cent between the third quarter of 2016 and the third quarter of 2017.

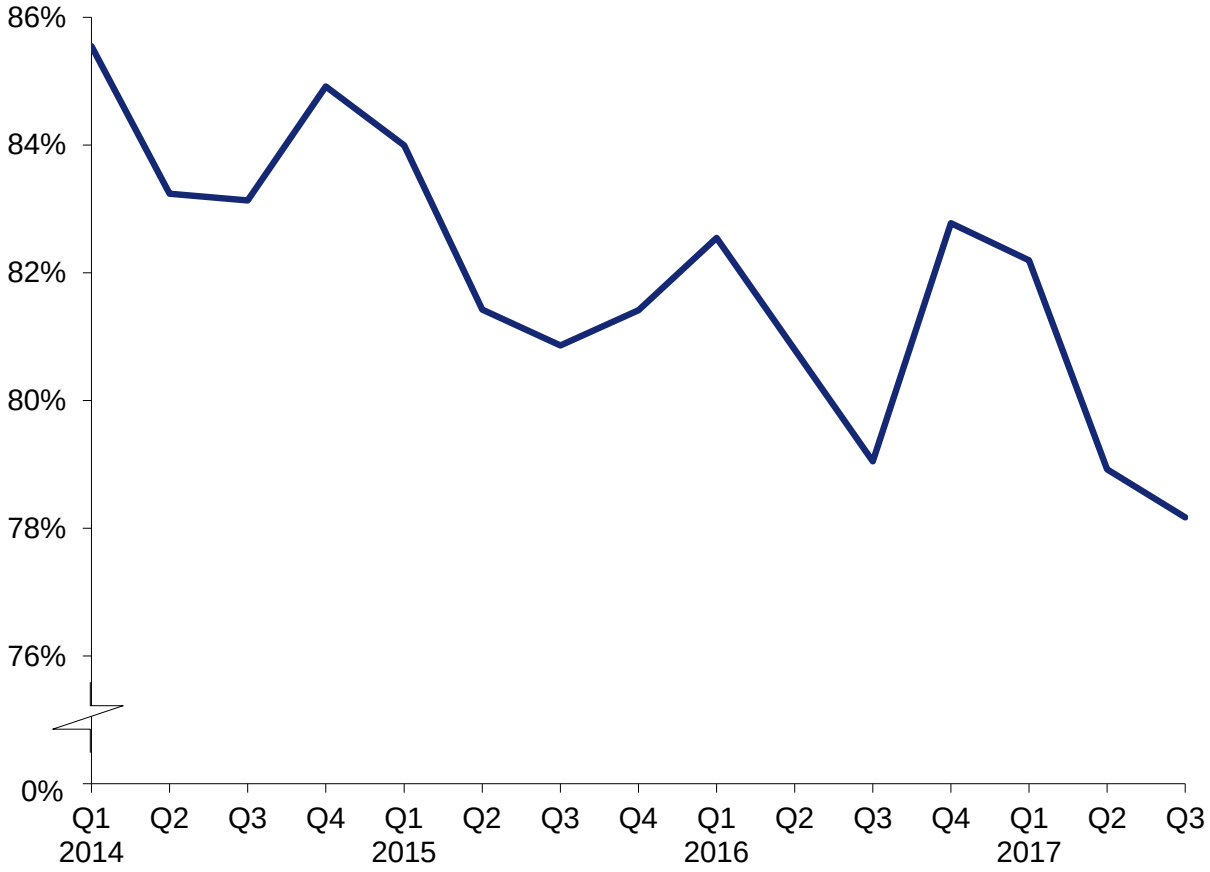
Unadjusted domestic consumption rose by 8.5 per cent over this same period, and was up 3.0 per cent on a seasonally and temperature adjusted basis.

Consumption data by fuel and sector is available in table ET 1.3c which is now included within this publication as well as on the BEIS section of the GOV.UK website at:
www.gov.uk/government/statistics/total-energy-section-1-energy-trends

Chart 1.6 Net import dependency (Table 1.3a)

In the third quarter of 2017 net import dependency was 32.7 per cent, up 2.3 percentage points from the third quarter of 2016, driven by increases in crude oil and gas imports.

Chart 1.7 Fossil fuel dependency (Table 1.3a)



In the third quarter of 2017 dependency on fossil fuels was 78.2 per cent, down 0.9 percentage points from the third quarter of 2016, and at a record low level.

1 TOTAL ENERGY

TABLE 1.1. Indigenous production of primary fuels

Million tonnes of oil equivalent

							Primary electricity	
		Total	Coal[1]	Petroleum[2]	Natural gas[3]	Bioenergy & waste[4,5]	Nuclear	Wind, solar and hydro[6]
2012		121.3	10.6	48.8	37.4	7.0	15.2	2.28
2013		113.9	8.0	44.5	35.3	7.7	15.4	3.02
2014		112.5	7.3	43.7	35.8	8.3	13.9	3.60
2015		123.7	5.4	49.5	38.8	9.8	15.5	4.66
2016		125.1	2.6	52.0	39.8	10.8	15.4	4.57
Per cent change		*+1.2*	*-51.1*	*+4.9*	*+2.4*	*+10.4*	*-0.4*	*-1.8*
2016	Quarter 3	29.5	0.6	12.3	9.5	1.8	4.1	1.13
	Quarter 4	32.0	0.7	12.6	10.5	3.1	4.1	1.11
2017	Quarter 1	33.4r	0.6r	13.3r	10.7r	3.6r	3.8	1.41r
	Quarter 2	31.5r	0.4r	13.1r	10.3r	2.5r	3.8	1.34r
	Quarter 3 p	28.6r	0.5	12.3r	8.5r	2.2r	3.9	1.26r
Per cent change[7]		*-2.8*	*-29.8*	*-0.4*	*-10.7*	*+24.4*	*-3.6*	*+11.9*

1. Includes an estimate of slurry.
2. Crude oil, offshore and land, plus condensates and petroleum gases derived at onshore treatment plants.
3. Includes colliery methane, excludes gas flared or re-injected.
4. Includes solid renewable sources (wood, straw and waste), a small amount of renewable primary heat sources (solar, geothermal etc), liquid biofuels and sewage gas and landfill gas.
5. Bioenergy & waste introduced as a separate category from March 2014 - see special feature article in the March 2014 edition of Energy Trends at: www.gov.uk/government/collections/energy-trends-articles
6. Includes solar PV and natural flow hydro.
7. Percentage change between the most recent quarter and the same quarter a year earlier.

1 TOTAL ENERGY

TABLE 1.2 Inland energy consumption: primary fuel input basis

Million tonnes of oil equivalent

		Total	Coal[1]	Petroleum[2]	Natural gas[3]	Bioenergy & waste[4, 5]	Primary electricity: Nuclear	Primary electricity: Wind, solar and hydro[6]	Net imports	Total	Coal	Petroleum	Natural gas	Bioenergy & waste	Primary electricity: Nuclear	Primary electricity: Wind, solar and hydro	Net imports
		Unadjusted[7]								*Seasonally adjusted and temperature corrected*[8,9] *(annualised rates)*							
2012		208.1	40.9	67.0	73.3	8.4	15.2	2.28	1.02	208.2	41.0	67.0	73.3	8.4	15.2	2.28	1.02
2013		206.8	39.0	65.8	72.6	9.6	15.4	3.02	1.24	204.0	38.3	65.8	70.5	9.6	15.4	3.03	1.24
2014		194.0	31.5	66.0	66.1	11.2	13.9	3.60	1.76	199.3	33.1	66.0	69.9	11.2	13.9	3.61	1.76
2015		195.5	25.1	67.3	68.1	13.1	15.5	4.66	1.80	198.3	25.6	67.3	70.5	13.1	15.5	4.66	1.80
2016		192.8	12.4	68.0	76.7	14.2	15.4	4.57	1.51	193.7	12.6	68.0	77.4	14.2	15.4	4.57	1.51
Per cent change		*-1.4*	*-50.5*	*+1.1*	*+12.6*	*+8.2*	*-0.4*	*-1.8*	*-16.2*	*-2.3*	*-50.7*	*+1.1*	*+9.9*	*+8.2*	*-0.4*	*-1.8*	*-16.2*
2016	Quarter 3	39.5	1.9	17.2	12.1	2.7	4.1	1.13	0.40	188.5	10.7	68.9	74.8	10.7	16.3	5.43	1.61
	Quarter 4	53.2	3.3	17.3	23.4	3.9	4.1	1.11	0.13	198.7	11.7	69.4	81.6	15.5	16.1	3.90	0.52
2017	Quarter 1	55.0r	3.7r	16.5r	24.9r	4.4r	3.8	1.41r	0.22r	196.2r	12.4r	66.1r	79.5r	17.5r	15.0	4.88r	0.89r
	Quarter 2	42.6r	1.6r	17.1r	14.9r	3.3r	3.8	1.34r	0.45	188.8r	8.6r	68.4r	74.9r	13.4r	15.6	6.14r	1.80
	Quarter 3 p	40.0r	1.6r	17.4r	12.2r	3.1r	3.9	1.26r	0.46	189.9r	8.4r	69.7r	75.7r	12.4r	15.7	6.14r	1.83
Per cent change[10]		*+1.3*	*-15.4*	*+1.1*	*+1.4*	*+15.7*	*-3.6*	*+11.9*	*+13.7*	*+0.7*	*-20.8*	*+1.1*	*+1.2*	*+15.7*	*-4.0*	*+13.0*	*+13.7*

1. Includes net foreign trade and stock changes in other solid fuels.
2. Inland deliveries for energy use, plus refinery fuel and losses, minus the differences between deliveries and actual consumption at power stations
3. Includes gas used during production and colliery methane. Excludes gas flared or re-injected and non-energy use of gas.
4. Includes solid renewable sources (wood, straw and waste), a small amount of renewable primary heat sources (solar, geothermal, etc.), liquid biofuels, landfill gas and sewage gas.
5. Bioenergy & waste introduced as a separate category from March 2014 - see special feature article in the March 2014 edition of Energy Trends at:
www.gov.uk/government/collections/energy-trends-articles
6. Includes natural flow hydro, but excludes generation from pumped storage stations.
7. Not seasonally adjusted or temperature corrected.
8. Coal and natural gas are temperature corrected; petroleum, bioenergy and waste, and primary electricity are not temperature corrected.
9. For details of temperature correction see the June and September 2011 editions of Energy Trends; Seasonal and temperature adjustment factors were reassessed in June 2013
www.gov.uk/government/collections/energy-trends
10. Percentage change between the most recent quarter and the same quarter a year earlier.

1 TOTAL ENERGY

Table 1.3a Supply and use of fuels

Thousand tonnes of oil equivalent

	2015	2016	*per cent change*	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	*per cent change*[1]
SUPPLY													
Indigenous production	123,673	125,135	*+1.2*	27,244	32,859	33,204	30,435	29,456	32,039	33,404r	31,481r	28,623	*-2.8*
Imports	155,134	149,687	*-3.5*	36,326	40,183	39,606	35,487	33,359	41,236	39,557r	34,477r	35,716	*+7.1*
Exports	-76,644	-75,763	*-1.1*	-20,225	-19,924	-19,510	-18,174	-20,473	-17,606	-18,191r	-20,843r	-21,705	*+6.0*
Marine bunkers	-2,684	-2,840	*+5.8*	-734	-611	-574	-777	-816	-674	-545r	-639r	-779	*-4.4*
Stock change[2]	+3,907	+4,907	*+25.6*	+534	+819	+5,649	-1,028	+37	+250	+2,735r	+71r	+177	*(+)*
Primary supply	203,387	201,125	*-1.1*	43,146	53,327	58,375	45,943	41,563	55,244	56,959r	44,546r	42,032	*+1.1*
Statistical difference[3]	113	32		-66	43	128	-28	-47	-21	-70r	86r	41	
Primary demand	203,274	201,093	*-1.1*	43,212	53,283	58,248	45,971	41,611	55,265	57,029r	44,461r	41,991	*+0.9*
Transfers[4]	32	-14		35	-4	-5	-1	-2	-7	-9	35	-15	
TRANSFORMATION	-41,329	-37,404	*-9.5*	-9,117	-10,492	-10,531	-8,497	-8,242	-10,134	-10,180r	-8,147r	-8,033	*-2.5*
Electricity generation	-37,543	-34,214	*-8.9*	-8,326	-9,648	-9,687	-7,736	-7,483	-9,309	-9,301r	-7,416r	-7,381	*-1.4*
Heat generation	-1,088	-1,152	*+5.9*	-209	-287	-357	-256	-215	-324	-357	-256	-215	*+0.0*
Petroleum refineries	-152	-155	*+2.2*	-29	-20	-27	-39	-70	-20	-52	-6r	-35	*-49.7*
Coke manufacture	-156	-81	*-48.0*	-38	-24	-20	-20	-21	-20	-23	-20	-21	*-2.2*
Blast furnaces	-2,277	-1,692	*-25.7*	-485	-480	-407	-425	-432	-428	-418	-419	-363	*-16.2*
Patent fuel manufacture	-68	-64	*-6.8*	-18	-21	-21	-11	-10	-22	-19r	-19r	-9	*-13.5*
Other[5]	-44	-46	*+3.5*	-12	-12	-12	-11	-11	-11	-11	-11	-9	*-13.2*
Energy industry use	12,485	11,881	*-4.8*	3,030	3,179	3,131	2,947	2,853	2,950	3,089r	3,046r	3,001	*+5.2*
Losses	3,133	2,823	*-9.9*	656	852	870	666	595	692	868r	631r	596	*+0.1*
FINAL CONSUMPTION	146,360	148,971	*+1.8*	30,441	38,755	43,714	33,861	29,914	41,482	42,884r	32,673r	30,343	*+1.4*
Iron & steel	1,262	946	*-25.0*	294	261	246	238	229	234	252r	230r	216	*-5.3*
Other industries	23,099	22,784	*-1.4*	4,907	6,107	6,952	4,984	4,754	6,094	6,971r	5,046r	4,722	*-0.7*
Transport	54,749	55,767	*+1.9*	14,321	13,734	12,998	14,210	14,558	14,002	13,045r	14,256r	14,603	*+0.3*
Domestic	40,046	41,295	*+3.1*	4,996	11,321	15,765	7,804	4,483	13,242	15,054r	6,939r	4,864	*+8.5*
Other Final Users	19,344	19,875	*+2.7*	3,950	5,207	5,729	4,493	3,789	5,864	5,562r	4,226r	3,890	*+2.7*
Non energy use	7,859	8,303	*+5.7*	1,973	2,125	2,024	2,132	2,102	2,045	2,001r	1,975r	2,047	*-2.6*
DEPENDENCY[6]													
Net import dependency	38.1%	36.2%		36.7%	37.6%	34.1%	37.1%	30.4%	42.3%	37.2%r	30.2%r	32.7%	
Fossil fuel dependency	82.1%	81.5%		80.9%	81.4%	82.5%	80.8%	79.1%	82.8%	82.2%r	78.9%r	78.2%	
Low carbon share	16.5%	17.0%		17.3%	17.3%	16.0%	17.4%	19.1%	16.4%	16.8%r	19.3%r	19.9%	

1. Percentage change between the most recent quarter and the same quarter a year earlier; (+) represents a positive percentage change greater than 100%.
2. Stock change + = stock draw, - = stock build.
3. Primary supply minus primary demand.
4. Annual transfers should ideally be zero. For manufactured fuels differences occur in the rescreening of coke to breeze.
   For oil and petroleum products differences arise due to small variations in the calorific values used.
5. Back-flows from the petrochemical industry - see article in the June 2016 edition of Energy Trends.
6. See article in the December 2010 edition of Energy Trends.

1 TOTAL ENERGY

Table 1.3b Supply and use of fuels

Thousand tonnes of oil equivalent

	2016 Quarter 3									2017 Quarter 3 p								
	Coal	Manufactured fuels[4]	Primary oil	Petroleum Products	Natural gas[5]	Bioenergy & waste[6]	Primary electricity	Electricity	Heat sold	Coal	Manufactured fuels[4]	Primary oil	Petroleum Products	Natural gas[5]	Bioenergy & waste[6]	Primary electricity	Electricity	Heat sold
SUPPLY																		
Indigenous production	647	-	12,346	-	9,501	1,781	5,181	-	-	454	-	12,300	-	8,487	2,215	5,167	-	-
Imports	1,146	202	13,481	9,378	7,734	992	-	426	-	1,293	184	15,364	8,916	8,500	986	-	472	-
Exports	-103	-4	-9,013	-6,770	-4,470	-90	-	-23	-	-106	-3	-10,594	-6,336	-4,554	-97	-	-14	-
Marine bunkers	-	-	-	-816	-	-	-	-	-	-	-	-	-779	-	-	-	-	-
Stock change[1]	+23	-10	+105	+504	-584	-	-	-	-	-197	-18	+207	+274	-88	-	-	-	-
Primary supply	1,713	187	16,919	2,297	12,181	2,684	5,181	403	-	1,445	163	17,276	2,074	12,346	3,104	5,167	458	-
Statistical difference[2]	-52	+1	+1	-9	+2	+0	-	+10	-	-9	+1	+1	+0	+35	-	-	+13	-
Primary demand	1,765	186	16,918	2,306	12,179	2,684	5,181	392	-	1,454	162	17,275	2,074	12,310	3,104	5,167	445	-
Transfers[3]	-	5	-277	+275	+39	-45	-1,128	+1,128	-	-	+2	-528	+514	58	-61	-1,262	+1,262	-
TRANSFORMATION	-1,414	64	-16,641	16,401	-6,308	-1,908	-4,053	5,353	263	-1,147	82	-16,747	16,551	-5,915	-2,297	-3,905	5,083	263
Electricity generation	-741	-129	-	-129	-5,882	-1,902	-4,053	5,353	-	-538	-121	-	-119	-5,489	-2,291	-3,905	5,083	-
Heat generation	-18	-13	-	-15	-426	-6	-	-	263	-18	-13	-	-15	-426	-6	-	-	263
Petroleum refineries	-	-	-16,751	16,681	-	-	-	-	-	-	-	-16,857	16,822	-	-	-	-	-
Coke manufacture	-353	332	-	-	-	-	-	-	-	-360	340	-	-	-	-	-	-	-
Blast furnaces	-263	-169	-	-	-	-	-	-	-	-206	-157	-	-	-	-	-	-	-
Patent fuel manufacture	-39	44	-	-15	-	-	-	-	-	-25	33	-	-17	-	-	-	-	-
Other[7]	-	-	110	-120	-	-	-	-	-	-	-	110	-119	-	-	-	-	-
Energy industry use	-	99	-	1,010	1,196	-	-	480	68	-	100	-	1,103	1,252	-	-	478	68
Losses	-	27	-	-	141	-	-	427	-	-	29	-	-	112	-	-	456	-
FINAL CONSUMPTION	351	129	-	17,973	4,574	730	-	5,966	192	307	118	-	18,036	5,089	747	-	5,855	192
Iron & steel	5	79	-	0	84	-	-	61	-	6	74	-	0	77	-	-	59	-
Other industries	261	-	-	924	1,304	220	-	1,892	153	217	-	-	924	1,360	228	-	1,841	153
Transport	3	-	-	14,187	-	268	-	100	-	3	-	-	14,261	-	239	-	100	-
Domestic	77	39	-	346	1,986	154	-	1,877	4	77	33	-	383	2,289	180	-	1,898	4
Other final users	6	-	-	534	1,090	88	-	2,036	35	5	-	-	542	1,253	100	-	1,957	35
Non energy use	-	11	-	1,981	110	-	-	-	-	-	10	-	1,926	110	-	-	-	-

1. Stock fall +, stock rise -.
2. Primary supply minus primary demand.
3. Annual transfers should ideally be zero. For manufactured fuels differences occur in the rescreening of coke to breeze. For oil and petroleum products differences arise due to small variations in the calorific values used.
4. Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.
5. Inludes colliery methane.
6. Includes geothermal, solar heat and biofuels for transport; wind and wave electricity included in primary electricity figures.
7. Back-flows from the petrochemical industry - see article in the June 2016 edition of Energy Trends.

1 Total Energy

Table 1.3c Seasonally adjusted and temperature corrected final energy consumption data[1]

Thousand tonnes of oil equivalent

	2015	2016	per cent change	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	per cent change[2]
By consuming sector													
Final Consumption (unadjusted)													
Industry	24,362	23,730	-2.6	5,202	6,368	7,198	5,221	4,982	6,329	7,223r	5,276r	4,938	-0.9
Transport	54,749	55,767	+1.9	14,321	13,734	12,998	14,210	14,558	14,002	13,045r	14,256r	14,603	+0.3
Domestic	40,046	41,295	+3.1	4,996	11,321	15,765	7,804	4,483	13,242	15,054r	6,939r	4,864	+8.5
Other final users	19,344	19,875	+2.7	3,950	5,207	5,729	4,493	3,789	5,864	5,562r	4,226r	3,890	+2.7
Total	138,501	140,668	+1.6	28,468	36,630	41,690	31,729	27,812	39,437	40,883r	30,698r	28,296	+1.7
Final Consumption (Seasonally and temperature adjusted) [3]													
Industry	24,597	23,964	-2.6	6,012	6,223	6,066r	5,931r	5,983r	5,983r	6,117r	6,012r	5,886	-1.6
Transport	54,787	55,579	+1.4	13,737	13,664	13,887r	13,909r	13,861r	13,922r	13,835r	14,000r	14,000	+1.0
Domestic	42,233	42,827	+1.4	10,605	10,793	10,813r	10,831r	10,458r	10,724r	10,719r	10,531r	10,776	+3.0
Other final users	19,954	20,437	+2.4	5,007	5,042	5,053r	5,120r	5,148r	5,115r	5,105r	5,044r	5,117	-0.6
Total	141,571	142,807	+0.9	35,361	35,723	35,820r	35,791r	35,451r	35,745r	35,776r	35,586r	35,778	+0.9
By fuel													
Final Consumption (unadjusted)													
Gas	42,023	43,379	+3.2	5,131	11,813	16,717	8,137	4,464	14,061	16,107r	7,251r	4,979	+11.5
Electricity	26,092	26,122	+0.1	6,052	6,705	7,108	6,095	5,966	6,952	6,902r	5,919r	5,855	-1.9
Other	70,385	71,167	+1.1	17,285	18,112	17,864	17,497	17,383	18,423	17,874r	17,527r	17,462	+0.5
Total	138,501	140,668	+1.6	28,468	36,630	41,690	31,729	27,812	39,437	40,883r	30,698r	28,296	+1.7
Final Consumption (Seasonally and temperature adjusted) [3]													
Gas	44,320	45,175	+1.9	11,175	11,247	11,339r	11,378r	11,082r	11,376r	11,349r	11,191r	11,454	+3.4
Electricity	26,377	26,315	-0.2	6,574	6,554	6,592r	6,566r	6,596r	6,561r	6,514r	6,382r	6,430	-2.5
Other	70,874	71,317	+0.6	17,612	17,921	17,889r	17,847r	17,773r	17,808r	17,914r	18,014r	17,894	+0.7
Total	141,571	142,807	+0.9	35,361	35,723	35,820r	35,791r	35,451r	35,745r	35,776r	35,586r	35,778	+0.9

1. For methodology see articles in Energy Trends (June 2011 and September 2011 editions)
2. Percentage change between the most recent quarter and the same quarter a year earlier.
3. Seasonally and temperature adjusted series revised back to 2016 Q1 in December 2017.

Section 2 – Solid Fuels and Derived Gases

Key results show:

The demand for coal by electricity generators in the third quarter of 2017 was 28 per cent lower than demand in the third quarter of 2016. Whilst fuel costs for coal-fired generation are lower for gas, emissions from coal are higher so generators must pay a greater carbon price per GWh produced. **(Chart 2.3)**

Coal supply fell 18 per cent in the third quarter of 2017 in response to reduced demand. Overall, coal production fell 30 per cent whilst net coal imports rose 10 per cent on levels shown in the third quarter of 2016. **(Charts 2.1 and 2.2)**

Total stock levels were down 29 per cent (-2.7 million tonnes) to 6.6 million tonnes compared to a year earlier. With the reduction in electricity generation from coal, generators do not need to hold as much fuel in stock to meet expected demand. **(Chart 2.4)**

Relevant tables

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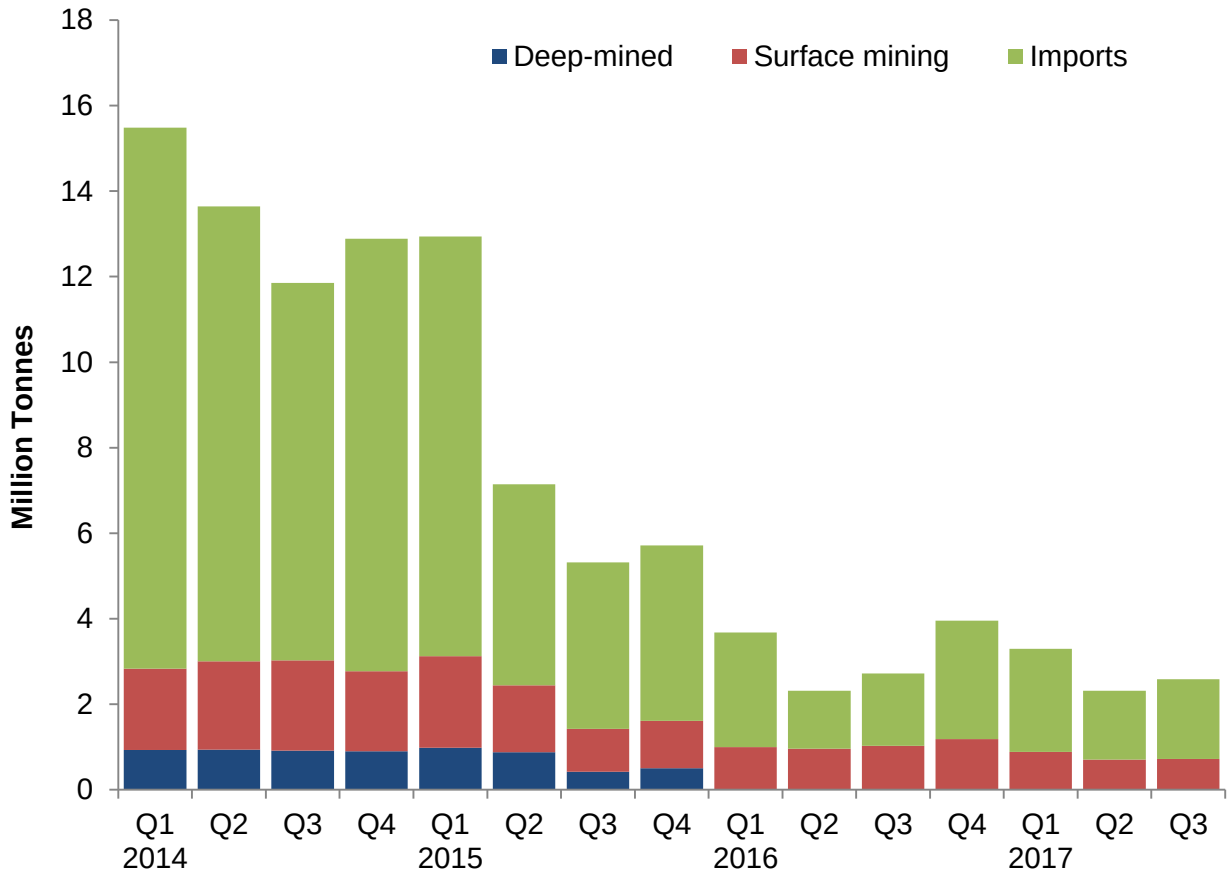
Chart 2.1 Coal supply (Table 2.1)



Coal production in the third quarter of 2017 fell to 0.7 million tonnes, 30 per cent down compared to the third quarter of 2016. The falls were due to decreased demand, particularly for electricity generation.

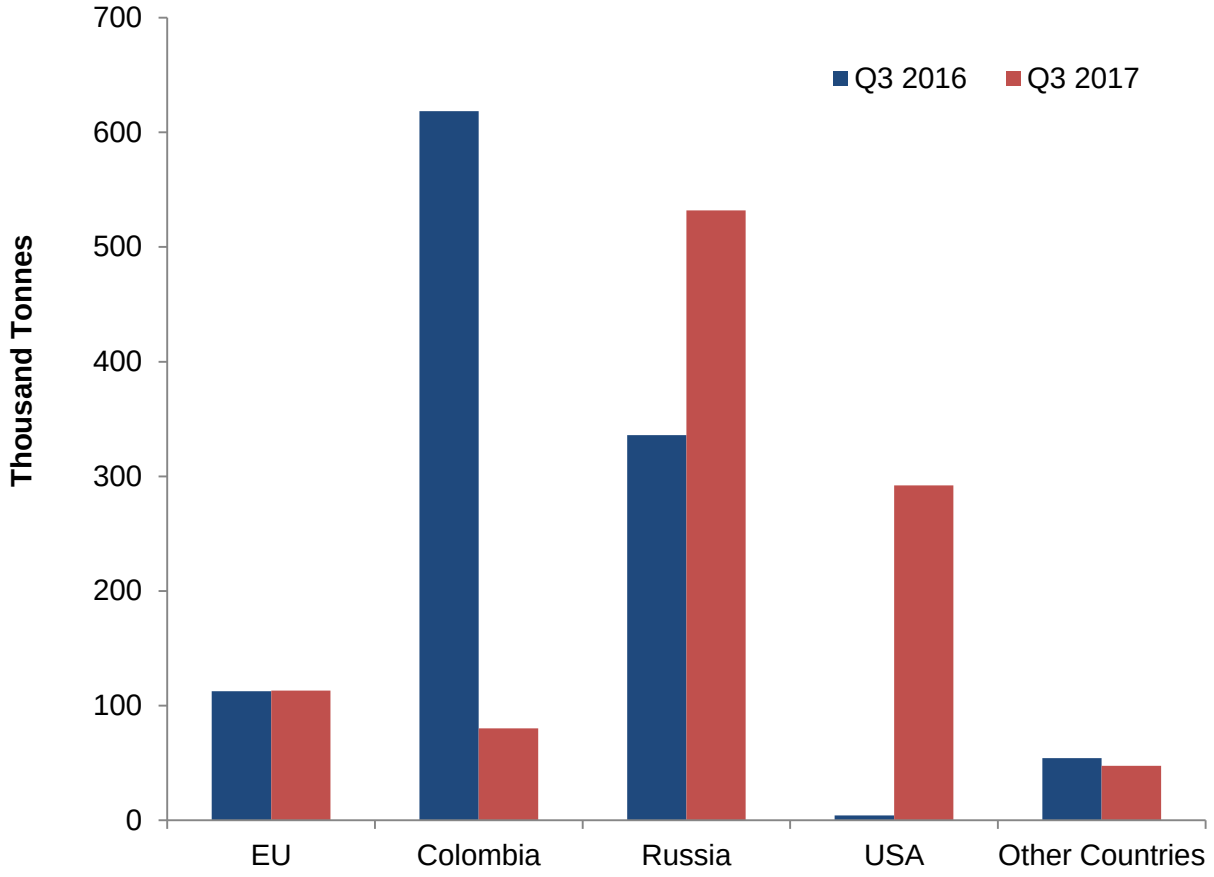
Table 2A Coal imports by origin

Thousand Tonnes

	2015	2016	2016 Q3	2017 Q3p
European Union	614	439	135	128
Russia	8,380	2,292	482	781
Colombia	6,553	2,667	619	80
USA	5,018	1,420	190	546
Australia	910	778	125	249
Other Countries	1,042	898	143	77
Total Imports	**22,518**	**8,494**	**1,694**	**1,862**

Imports of coal in the third quarter of 2017 were 9.9 per cent higher than in the second quarter of 2016 at 1.9 million tonnes.

Chart 2.2 Steam coal imports (Table 2.4)

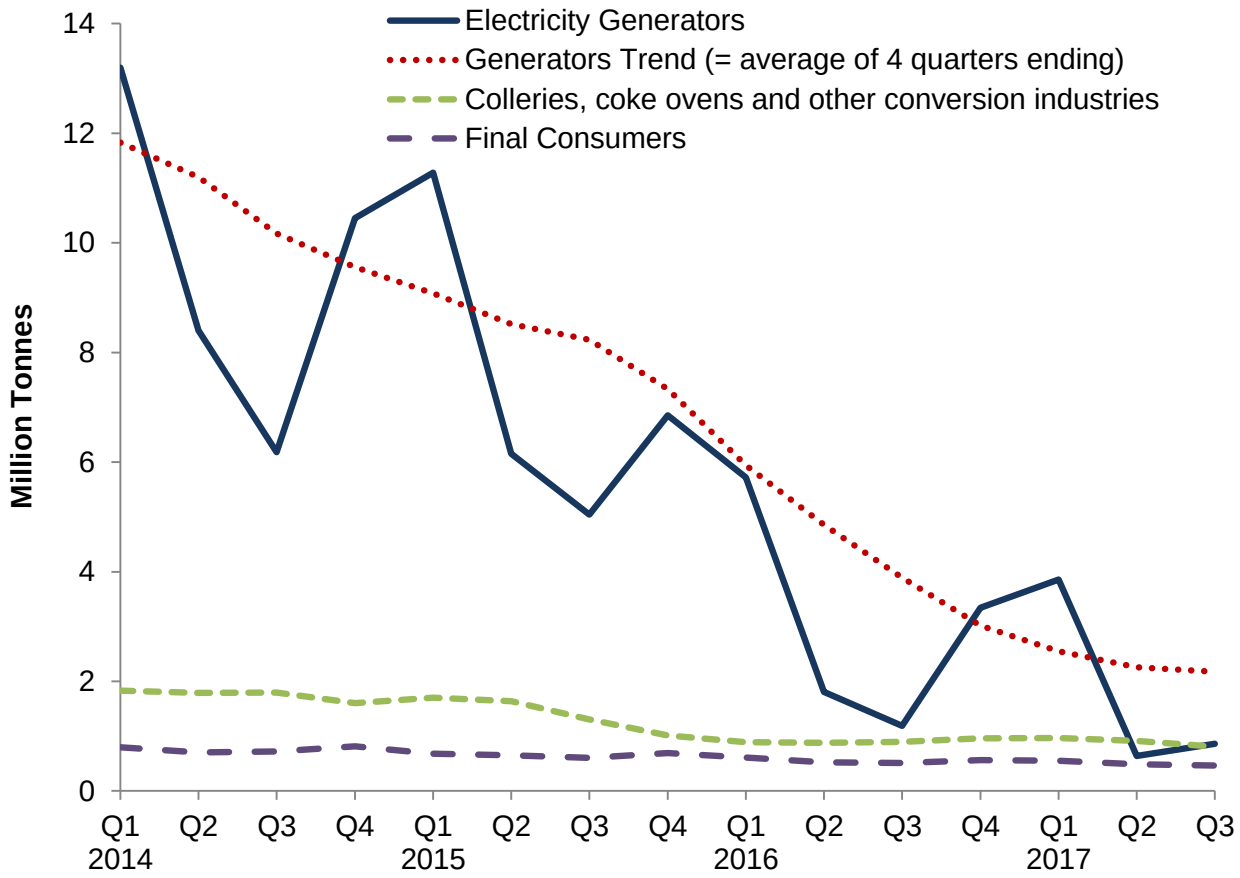


Steam coal imports in the third quarter of 2017 fell by 5.4 per cent to 1.1 million tonnes and accounted for 57 per cent of total coal imports.

In the third quarter of 2017, 50 per cent of total UK steam coal imports were from Russia, the USA (27 per cent) and Colombia (8 per cent). Steam coal imports from Russia rose by 53 per cent from 336 million tonnes in the third quarter of 2016 to 532 million tonnes in the third quarter of 2017. Steam coal imports from USA rose from 4 thousand tonnes in the third quarter of 2016 to 292 thousand tonnes in the third quarter of 2017. Steam coal imports from Colombia fell by 87 per cent from 619 thousand tonnes in the third quarter of 2016 to 80 thousand tonnes in the third quarter of 2017.

Coking coal imports in the third quarter of 2017 rose by 42 per cent to 0.8 million tonnes and accounted for 42 per cent of total coal imports. Coking coal imports had overtaken steam coal imports in the second quarter of 2017 as steam coal imports fell. However, steam coal imports rose 44 per cent compared to the second quarter of 2017 due to increased demand for electricity generation, while coking coal imports fell by 7.0 per cent.

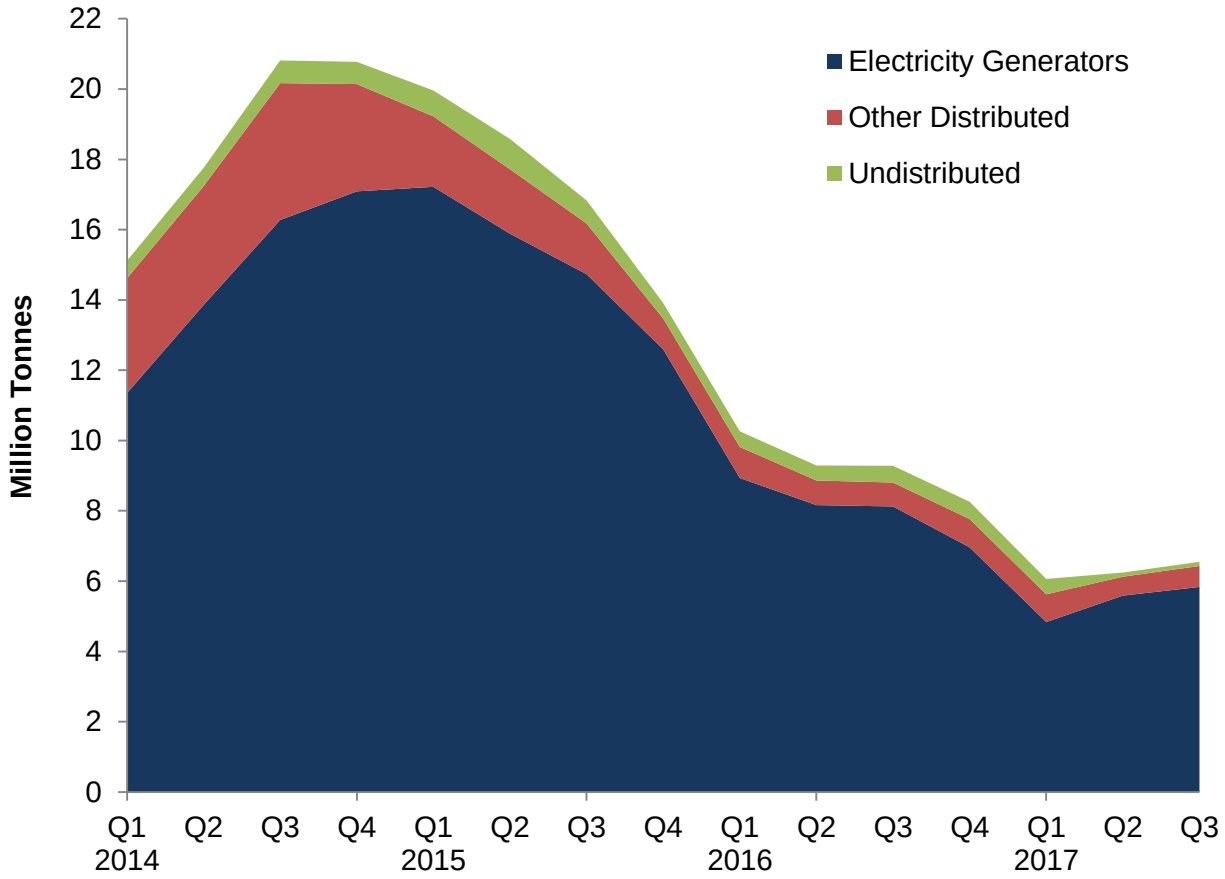
Chart 2.3 Coal consumption (Table 2.1)



Total demand for coal in the third quarter of 2017, at 2.1 million tonnes, was 18 per cent lower than in the third quarter of 2016. Consumption by electricity generators was down by 28 per cent to 0.9 million tonnes. Electricity generators accounted for 40 per cent of total coal use in the second quarter of 2017 compared with 46 per cent a year earlier.

In the third quarter of 2017, sales to industrial users fell by 12 per cent to 0.4 million tonnes whilst sales to other final consumers (including domestic) increased by 0.2 per cent to 0.1 million tonnes. Coal used in blast furnaces was down 22 per cent compared to the third quarter of 2016, to 0.3 million tonnes.

Chart 2.4 Coal stocks (Table 2.1)



Coal stocks rose by 0.3 million tonnes during the third quarter of 2017 and at the end of September stood at 6.6 million tonnes. This was 2.7 million tonnes lower than at the end of September 2016.

The level of coal stocks at power stations at the end of the third quarter of 2017 was 5.8 million tonnes, 2.3 million tonnes lower than at the end of September 2016. This reflected lower anticipated electricity generation from coal, reducing the need to hold as much fuel in stock.

Stocks held by coke ovens were 0.5 million tonnes at the end of the third quarter of 2017, this was 0.1 million tonnes higher than stock levels at the end of September 2016.

Stocks held by producers (undistributed stocks) at the end of the third quarter of 2017 were 0.1 million tonnes, 0.4 million tonnes lower than at the end of September 2016.

2 SOLID FUEL AND DERIVED GASES

Table 2.1 Supply and consumption of coal

Thousand tonnes

	2015	2016	*per cent change*	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	*per cent change* [1]
SUPPLY													
Indigenous production	8,598	4,178	*-51.4*	1,424	1,612	1,001	962	1,027	1,188	888r	708r	721	*-29.8*
Deep mined	2,784	22	*-99.2*	420	504	7	6	5	5	5	5	5	*+0.6*
Surface mining [2]	5,814	4,156	*-28.5*	1,004	1,108	994	957	1,022	1,183	883r	702r	716	*-29.9*
Imports [4]	22,518	8,494	*-62.3*	3,891	4,103	2,675	1,356	1,694	2,768	2,412r	1,611r	1,862	*+9.9*
Exports [5]	385	443	*+15.1*	104	96	103	76	137	128	120r	100	142	*+3.5*
Stock change [6]	+6,862	+5,655	*-17.6*	+1,749	+2,920	+3,651	+971	+9	+1,023	+2,191r	-181r	-306	
Total supply	37,593	17,883	*-52.4*	6,960	8,539	7,225	3,213	2,594	4,851	5,372r	2,038r	2,135	*-17.7*
Statistical difference	-18	-6		+6	-16	+2	+4	-1	-11	-7r	-3r	+2	
Total demand	37,612	17,889	*-52.4*	6,954	8,555	7,223	3,209	2,595	4,863	5,378r	2,041r	2,134	*-17.8*
TRANSFORMATION	34,988	15,678	*-55.2*	6,349	7,865	6,611	2,685	2,081	4,301	4,826r	1,552r	1,670	*-19.8*
Electricity generation	29,330	12,058	*-58.9*	5,041	6,851	5,722	1,808	1,187	3,341	3,858r	637r	860	*-27.5*
Heat generation [7]	213	213	-	32	58	76	43	29	65	76	43	29	-
Coke manufacture	3,673	1,821	*-50.4*	880	545	443	438	464	475	482	469	474	*+2.1*
Blast furnaces	1,544	1,364	*-11.7*	330	344	316	345	346	357	350	354r	270	*-21.9*
Patent fuel manufacture	228	223	*-2.5*	65	66	55	51	55	62	59	48	36	*-34.3*
Energy industry use	-	-		-	-	-	-	-	-	-	-	-	
FINAL CONSUMPTION	2,624	2,211	*-15.7*	605	691	612	524	514	562	553	488	464	*-9.7*
Iron & steel	44	35	*-21.7*	11	10	10	10	7	7	9	9	8	*+14.9*
Other industries	1,999	1,580	*-20.9*	474	519	431	381	393	376	373	358	342	*-12.9*
Domestic	552	550	*-0.4*	113	154	156	123	101	171	156r	112	103	*+1.7*
Other final users	29	47	*+60.5*	7	8	15	11	12	9	14	10	10	*-15.8*
Stocks at end of period													
Distributed stocks	13,471	7,766	*-42.4*	16,176	13,471	9,817	8,863	8,805	7,766	5,626r	6,125r	6,431	*-27.0*
Of which:													
Major power producers [8]	12,595	6,962	*-44.7*	14,733	12,595	8,933	8,163	8,125	6,962	4,837r	5,588r	5,834	*-28.2*
Coke ovens	547	605	*+10.6*	742	547	457	488	322	605	445r	464r	454	*+41.0*
Undistributed stocks	441	492	*+11.4*	656	441	444	427	476	492	436	119	119	*-75.0*
Total stocks [9]	13,913	8,258	*-40.6*	16,832	13,913	10,261	9,291	9,281	8,258	6,062r	6,244r	6,550	*-29.4*

1. Percentage change between the most recent quarter and the same quarter a year earlier.

2. The term 'surface mining' has now replaced opencast production. Opencast production is a surface mining technique.

3. Not produced since 2013 as the only mine producing slurry has ceased trading

4. For a detailed breakdown of UK Imports by country and grade of coal refer to Table 2.4 Coal imports (internet table only).

5. Trade is counted as an export under three conditions, when it is recorded as an import and is subsequently exported; it enters the UK port with the intention of being imported but due to a change of ownership at the port it is exported without having cleared the port; and when items leave the warehouse and are exported. Trade is not classified as exports when it is resting at a UK port and the UK is not the intended final destination.

6. Stock change + = stock draw, - = stock build.

7. Heat generation is based on an annual figure and is then split over a quarterly period. The 2017 heat generation figures currently shown are the 2016 figures carried forward - these will be updated in June 2018.

8. This includes stocks held at ports.

9. For some quarters, closing stocks may not be consistent with stock changes, due to additional stock adjustments

2 SOLID FUEL AND DERIVED GASES

Table 2.2 Supply and consumption of coke oven coke, coke breeze and other manufactured solid fuels

Thousand tonnes

	2015	2016	*per cent change*	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	*per cent change* [3]
SUPPLY													
Indigenous production	2,965	1,593	*-46.3*	727	474	376	385	409	424	408	384	395	*-3.4*
Coke Oven Coke	2,716	1,332	*-51.0*	658	404	320	319	344	348	346	337	343	*-0.1*
Coke Breeze	18	16	*-10.6*	4	5	4	4	4	4	4	4	5	*+20.0*
Other MSF	231	245	*+6.2*	65	66	51	61	61	71	57	42	47	*-23.4*
Imports	1,132	1,251	*+10.5*	215	325	287	284	284	397	187	233	258	*-8.9*
Exports	111	22	*-79.9*	7	8	6	4	6	6	7	1	4	*-30.7*
Stock change[1]	64	-126	*(-)*	-50	+4	-2	+21	-15	-130	+65	+17	-25	*+73.0*
Transfers	-3	-4		-	-	-1	-1	-0	-2	-1	-1	-1	
Total supply	4,047	2,691	*-33.5*	885	796	654	685	671	682	652	632	622	*-7.3*
Statistical difference	0	0		0	-0	-0	-	0	-0	-0	-	-0	
Total demand	4,047	2,691	*-33.5*	885	796	654	685	671	682	652	632	622	*-7.2*
TRANSFORMATION	3,257	2,140	*-34.3*	705	635	525	548	533	535	508	507	502	*-5.7*
Coke manufacture	-	-		-	-	-	-	-	-	-	-	-	
Blast furnaces	3,257	2,140	*-34.3*	705	635	525	548	533	535	508	507	502	*-5.7*
Energy industry use	-	-		-	-	-	-	-	-	-	-	-	
FINAL CONSUMPTION	790	551	*-30.2*	179	161	130	137	138	146	144	126	120	*-13.0*
Iron & steel	539	316	*-41.4*	125	98	75	79	84	78	76	70	74	*-11.3*
Other industries	17	-	*-100.0*	-	-	-	-	-	-	0r	0	0	
Domestic	235	236	*+0.4*	54	63	55	58	55	68	68	56	46	*-15.5*
Stocks at end of period[2]	1,124	1,249	*+11.2*	1,038	1,124	1,126	1,108	1,142	1,249	1,187	1,170	1,200	*+5.0*

1. Stock change + = stock draw, - = stock build.

2. For some quarters, closing stocks may not be consistent with stock changes, due to additional stock adjustments

3. Percentage change between the most recent quarter and the same quarter a year earlier; (+) represents a positive percentage change greater than 100%.

2 SOLID FUEL AND DERIVED GASES

Table 2.3 Supply and consumption of coke oven gas, blast furnace gas, benzole and tars

GWh

	2015	2016	*per cent change*	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	*per cent change* [1]
SUPPLY													
Indigenous production	22,156	14,089	*-36.4*	4,972	3,874	3,406	3,603	3,424	3,656	3,541	3,543	3,403	*-0.6*
Coke oven gas	6,890	3,468	*-49.7*	1,595	1,000	870	836	855	907	960	946	949	*+10.9*
Blast furnace gas	14,131	10,090	*-28.6*	3,117	2,713	2,403	2,645	2,439	2,603	2,444	2,451	2,332	*-4.4*
Benzole & tars	1,136	531	*-53.2*	260	161	134	123	129	145	138	146	122	*-5.6*
Transfers	420	344	*-18.2*	99	132	127	106	64	47	56	24	29	*-54.6*
Total supply	22,576	14,433	*-36.1*	5,071	4,006	3,534	3,709	3,487	3,703	3,597	3,568	3,431	*-1.6*
Statistical difference	+41	+9		+5	+17	-6	+10	+10	-5	+5	+3	+10	
Total demand	22,535	14,424	*-36.0*	5,066	3,989	3,540	3,699	3,477	3,708	3,592	3,565	3,421	*-1.6*
TRANSFORMATION	9,704	6,875	*-29.2*	2,053	1,880	1,669	1,682	1,653	1,871	1,716	1,651	1,560	*-5.7*
Electricity generation	9,107	6,278	*-31.1*	1,904	1,731	1,520	1,533	1,504	1,721	1,566	1,502	1,410	*-6.2*
Heat generation[2]	598	598	-	149	149	149	149	149	149	149	149	149	-
Energy industry use	8,330	4,846	*-41.8*	1,894	1,497	1,236	1,235	1,150	1,226	1,200	1,185	1,158	*+0.7*
Losses	2,646	1,116	*-57.8*	737	323	248	337	318	213	272	301	332	*+4.4*
FINAL CONSUMPTION	1,855	1,587	*-14.5*	383	289	387	445	356	399	404	428	372	*+4.4*
Iron & steel	719	1,056	*+46.8*	123	128	254	322	227	254	267	282	250	*+10.1*
Other industries[3]	-	-		-	-	-	-	-	-	-	-	-	
Non-Energy Use[4]	1,136	531	*-53.2*	260	161	134	123	129	145	138	146	122	*-5.6*

1. Percentage change between the most recent quarter and the same quarter a year earlier; (+) represents a positive percentage change greater than 100%.

2. Heat generation is based on an annual figure and is then split over a quarterly period. The 2017 heat generation figures currently shown are the 2016 figures carried forward - these will be updated in June 2018.

3. The main industrial consumer of derived gases Monckton coke-works (also a producer of them) closed in December 2014.

4. From 2009, unclassified final consumption for benzole and tars has been recorded under non energy use

Section 3 – Oil and Oil Products

Key results show:

Total indigenous UK production of crude oil and Natural Gas Liquids (NGL) in Q3 2017 decreased by 0.4 per cent compared to a year ago. (**Chart 3.1**)

Net imports of primary oils (crude oil, NGLs and process oils) in Q3 2017 were 4.3 million tonnes (up from 4.1 million tonnes last year). This is equivalent to 28 per cent of the UK's refinery demand. **(Chart 3.3)**

Refinery production in Q3 2017 was up 1.6 per cent on the same quarter of last year. Production in the year to date increased compared to last year (up 1.5 per cent in year to Q3). (**Chart 3.2**)

Trade in petroleum products was down in Q3 2017 compared to the same period a year earlier, with imports down by 4.6 per cent and exports down 6.7 per cent. The UK was a net importer of petroleum products in Q3 2017 by 2.4 million tonnes and remains short in middle distillates such as road diesel and jet fuel. **(Chart 3.2)**

Total deliveries of the key transport fuels were up 0.5 per cent. Excluding the biofuel component, diesel deliveries increased by 1.1 per cent in line with the long term trend and motor spirit deliveries decreased by 0.6 per cent. The diesel share of road fuels is now 68 per cent as more drivers move towards diesel vehicles. **(Chart 3.5)**

Overall stocks of crude oil and petroleum products stood at 14.2 million tonnes. This quarter has seen a move towards companies preferring petroleum product to primary oil stocks. **(Chart 3.6)**

Relevant tables

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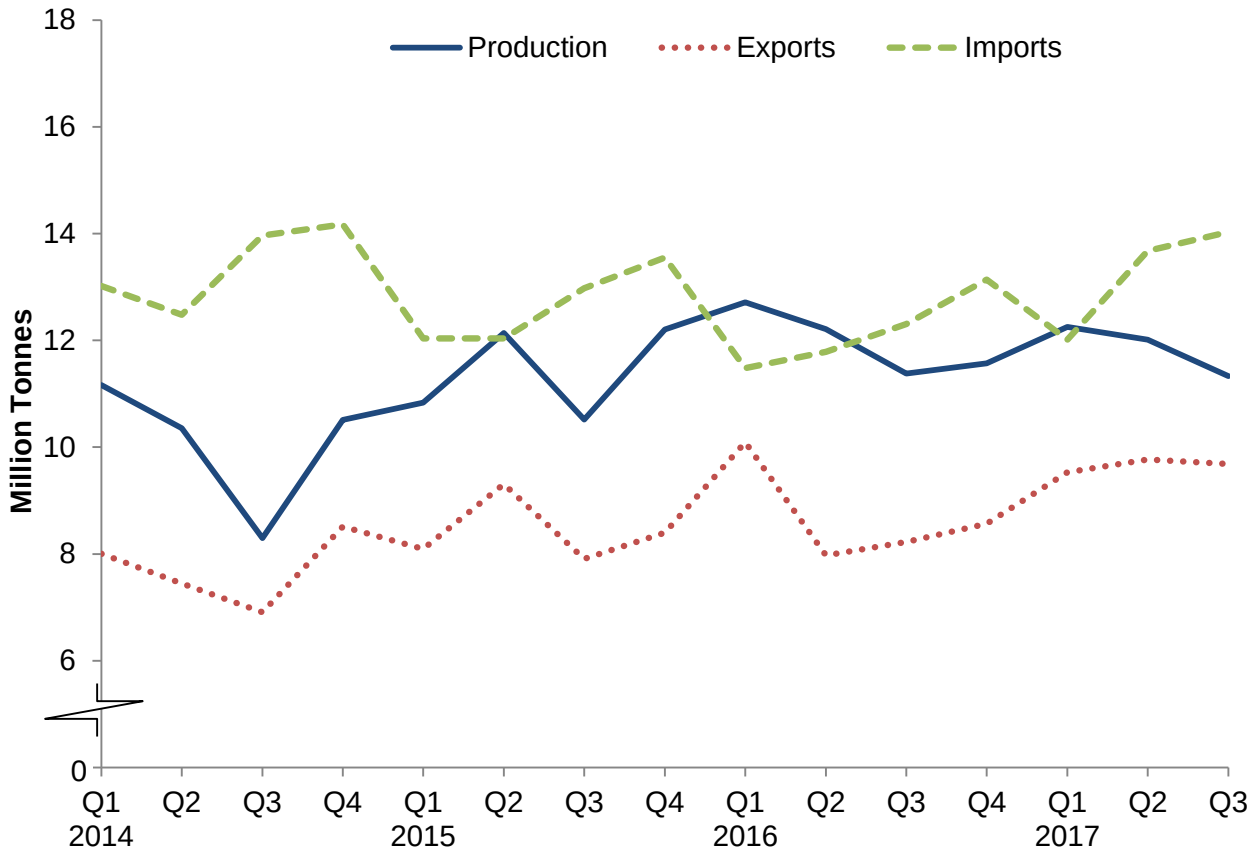
Chart 3.1 Production and trade of crude oil and NGLs (Table 3.1)

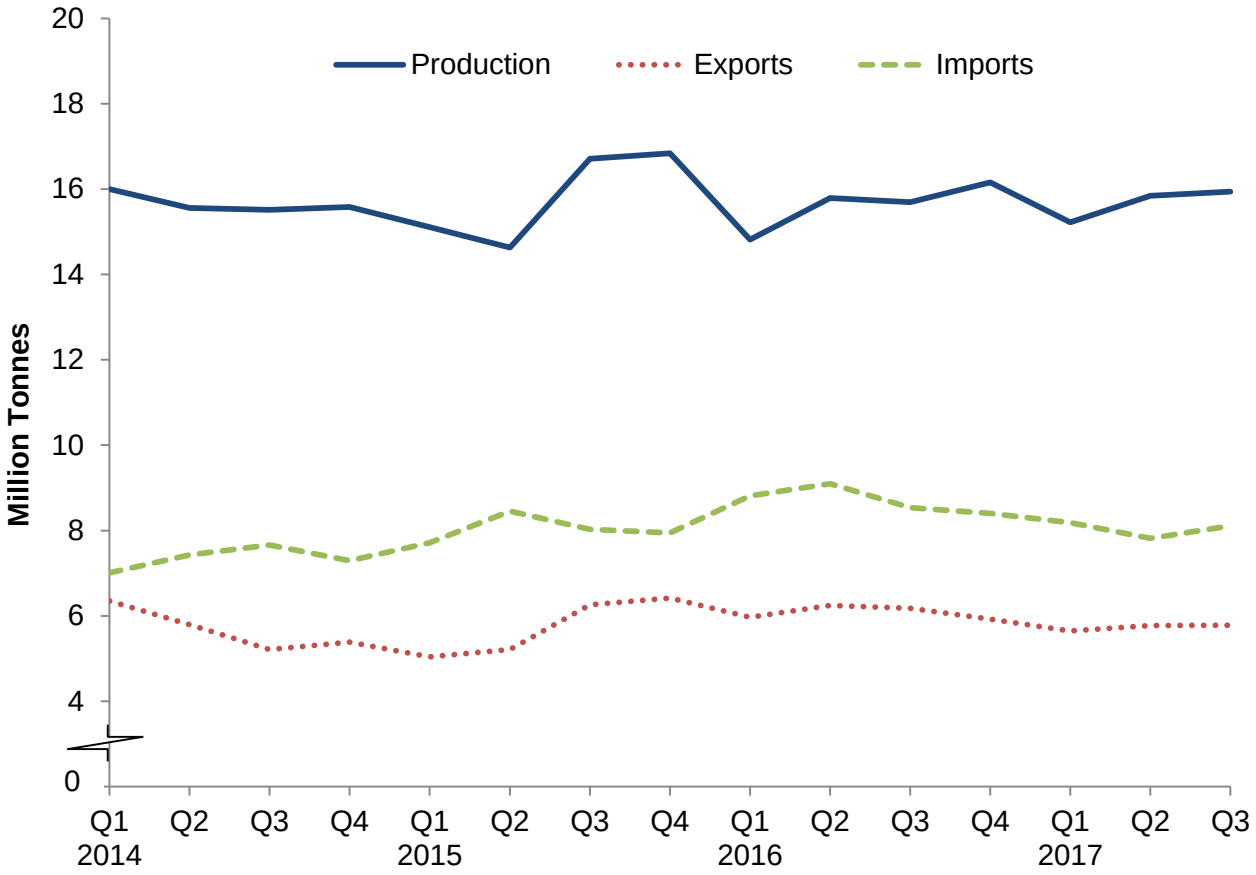


Indigenous UK crude oil production was 0.9 per cent lower in Q3 of 2017 compared with Q3 2016. Production of NGLs increased by 6.7 per cent compared to last year, partly due to increased production from the St Fergus FLAGS terminal. Overall indigenous production was down 0.4 per cent.

The 17 per cent increase in exports of crude and NGLs was likely driven by global economic factors including the OPEC production cuts, which have made it comparatively cheaper for Asian refineries to use UKCS crude oil. These strong exports resulted in a 17 per cent increase in imports of crude and NGLs to meet UK refinery demand.

Net imports of primary oils (crude, NGLs and feedstocks) increased from 4.1 million tonnes in Q3 2016 to 4.3 million tonnes in Q3 2017.

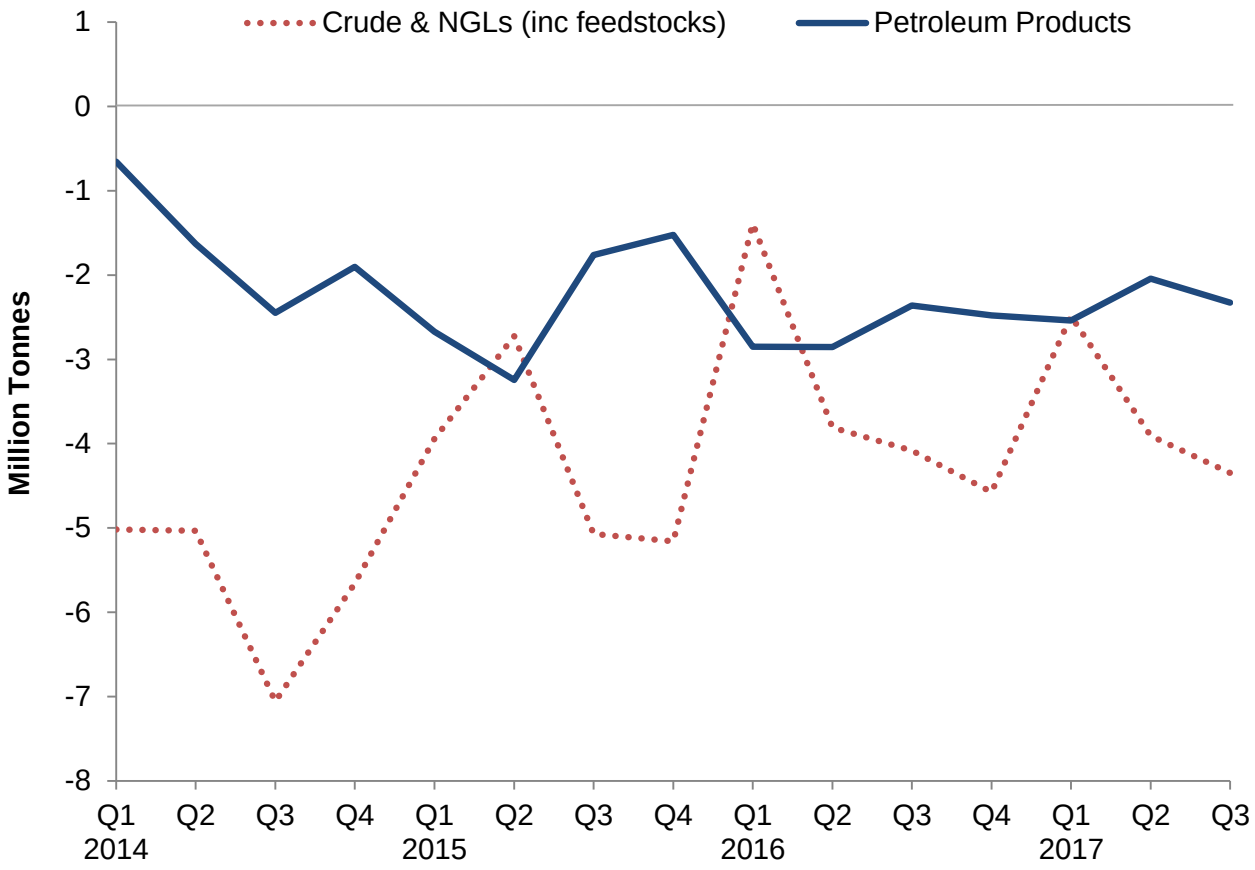
Chart 3.2 Production and trade of petroleum products (Table 3.2)



Indigenous production of petroleum products at refineries in Q3 2017 was 1.6 per cent greater compared with a year earlier, imports of petroleum products were down 4.6 per cent and exports down 6.7 per cent.

Whilst the trade balance on some products has varied slightly on the same quarter last year, the broad pattern is similar to last year with the UK reliant on imports of middle distillates (particularly road diesel and jet fuel which comprise around two-thirds of imports) and strong exports of petrol (which comprises nearly half of the UK's petroleum product exports).

Chart 3.3 Overall trade in primary oils and petroleum products (Table 3.1)

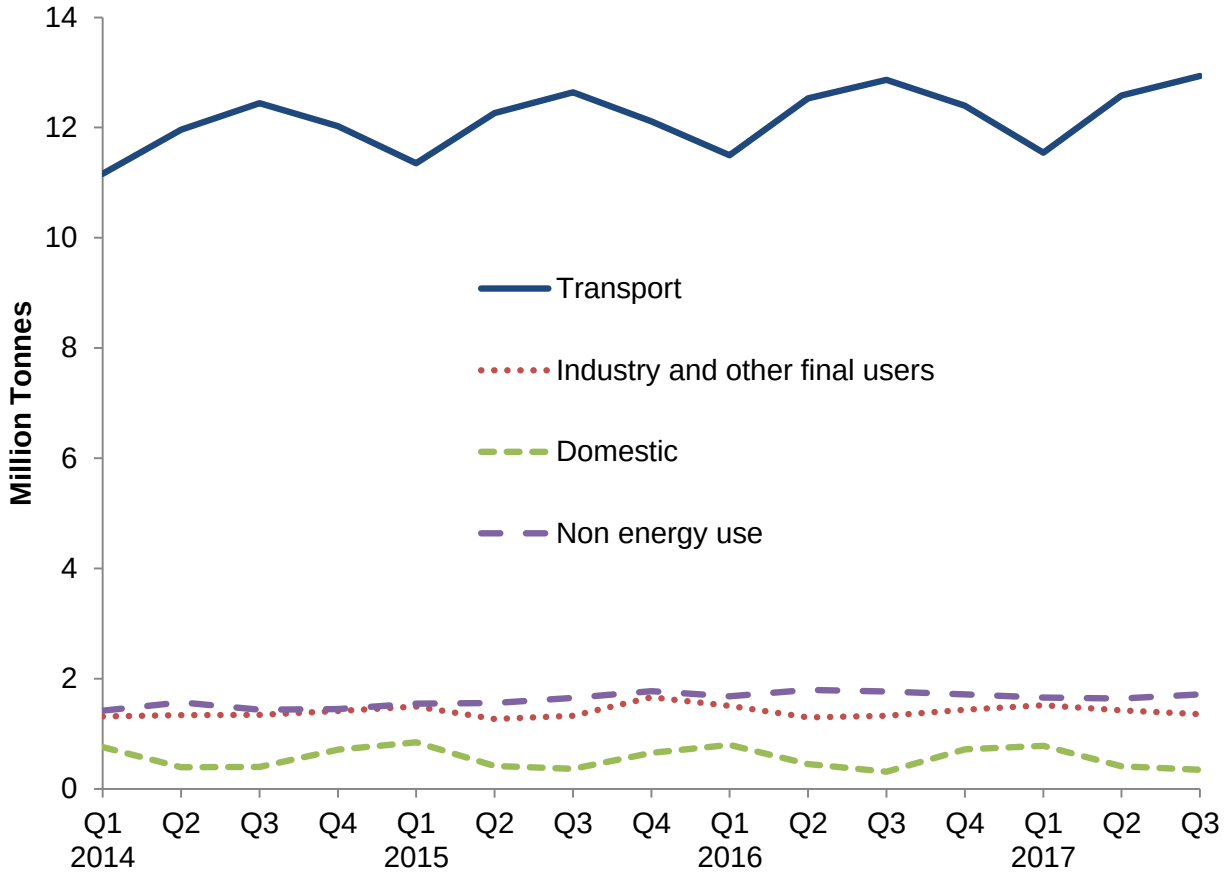


The UK's overall net import dependence for primary oils (Crude, NGL's and feedstocks) was stable at 17 per cent in Q3 2017.

Crude oil import dependence decreased in 2017 following development work on a number of UKCS assets including Schiehallion. Refinery receipts of indigenous crude have seen a sustained decrease in 2017 due to higher exports to meet refinery demand from Asia (see Chart 3.1).

In Q3 2017 the UK was a net importer of petroleum products by 2.4 million tonnes, stable on the same period last year.

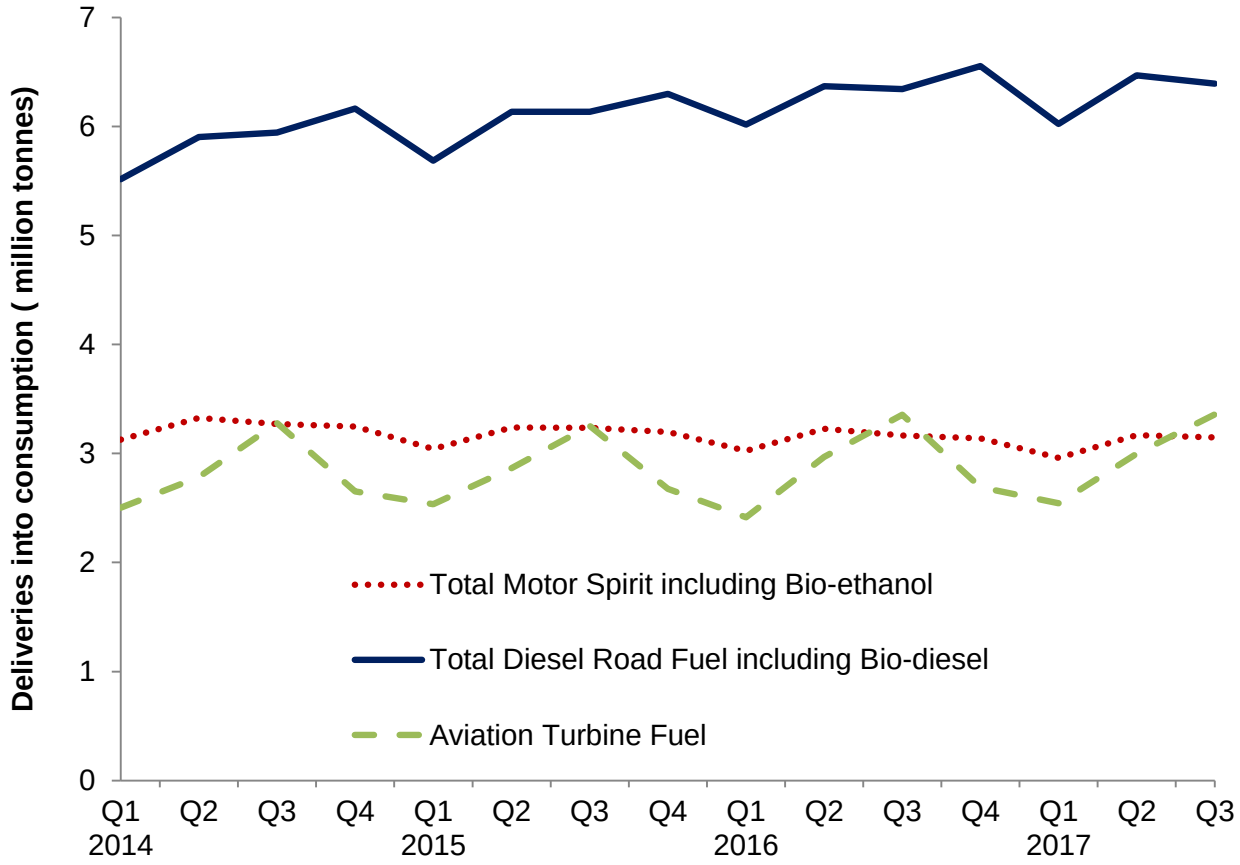
Chart 3.4 Final consumption of oil (Table 3.4)



Final consumption in the oil sector is slightly seasonal with different products peaking at different times of the year. Consumption of domestic fuels for heating peaks in Q1 and Q4 each year, and consumption of aviation fuels is higher in Q2 and Q3.

Overall, final consumption of petroleum products in Q3 2017 was relatively stable on the same period last year with the exception of an 11 per cent increase in domestic demand for heating fuels compared to lower demand last year when September was warmer than usual.

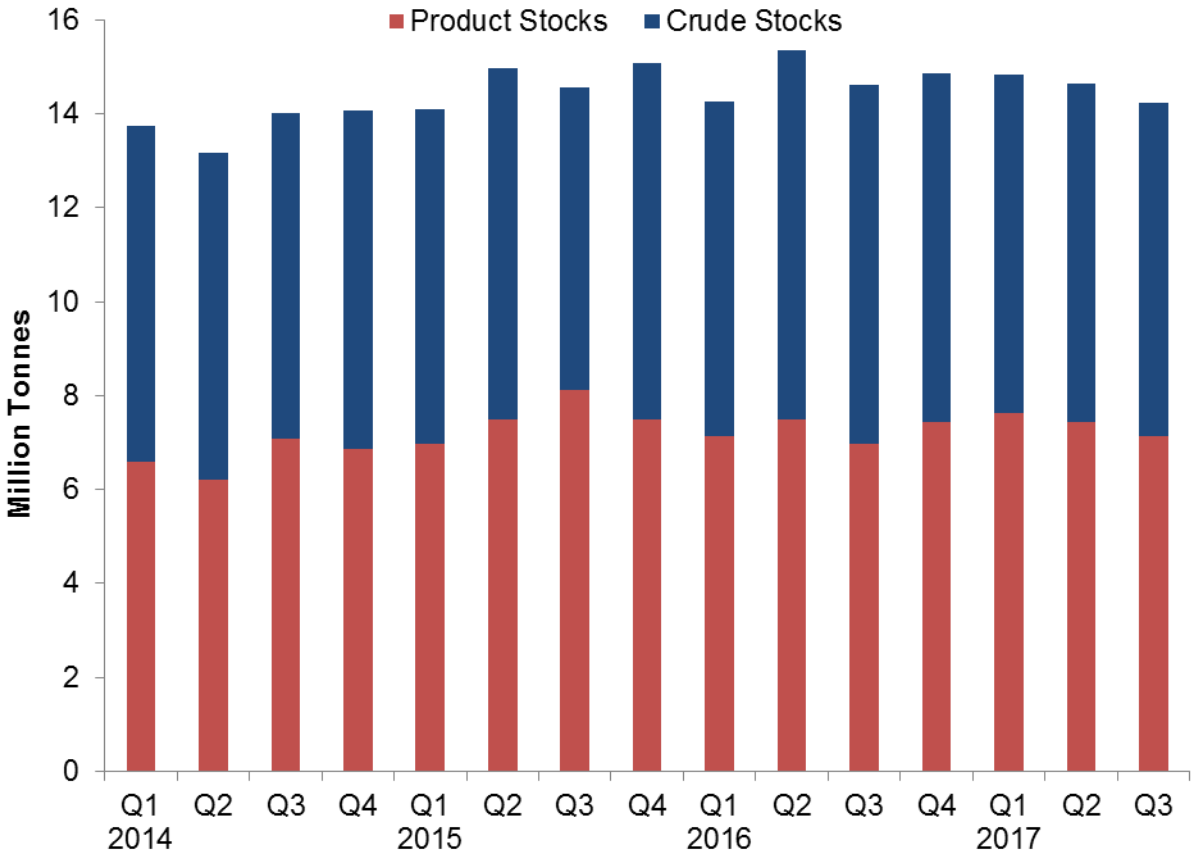
Chart 3.5 Demand for key transport fuels (Table 3.4 and Table 3.5)



Transport fuels accounted for 79 per cent of demand for petroleum products, with road fuels alone accounting for more than half of total demand.

Consumption of all transport fuels were near identical to last year. Motor spirit sales saw a decrease (down 0.6 per cent), which was countered by an increase in road diesel (up 1.1 per cent) in continuation of the long term trend as more motorists switch from petrol to diesel. Deliveries of aviation turbine fuel were similar to the same period last year, up just 0.1 per cent.

Chart 3.6 UK oil stocks (Table 3.6)



The UK holds oil stocks both for operational and commercial purposes and to meet obligations set out by the European Union (EU) and the International Energy Agency (IEA) to ensure the continuity of oil supply in times of significant disruption. The UK meets these obligations by directing companies to hold stocks of oil over and above what they would need for operational purposes. The UK is required to hold stock equivalent to 61 days of consumption to meet the EU requirements and stock equivalent to 90 days of net imports to meet IEA requirements.

At the end of Q3 2017 the UK held 14.2 million tonnes, equivalent to just under the 61 days of consumption with an additional 10 days of commercial stocks available on top of the obligation. The same volume is equivalent to around 180 days of net imports. UK total oil stocks were broadly stable (down 2.7 per cent on the same period last year), with primary oil stocks down 7.3 per cent and petroleum product stocks up 2.4 per cent.

There has been a 5.5 per cent decrease to primary oils held for the UK elsewhere in the EU whilst there has been no substantial change in petroleum products held overseas on the same period last year. The primary driver for this changes are prices as companies seek to minimise the cost of meeting their obligations by securing the best prices for oil held on their behalf. The result has been a decrease in net stock held overseas on behalf of the UK, down 3.1 per cent.

Further information on how the UK meets its oil stocking obligations are set out at:
www.gov.uk/government/publications/uk-emergency-oil-stocking-international-obligations

3 OIL AND OIL PRODUCTS

Table 3.1 Supply and use of crude oil, natural gas liquids and feedstocks[1]

Thousand tonnes

	2015	2016	*per cent change*	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	*per cent change*[8]
SUPPLY													
Indigenous production[2]	45,698	47,872	*+4.8r*	10,515	12,206	12,716	12,210	11,377	11,570	12,253r	12,016r	11,330	*-0.4*
Crude oil	42,826	44,306	*+3.5r*	9,895	11,404	11,816	11,347	10,560	10,583	11,209r	10,972r	10,465	*-0.9*
NGLs[3]	2,462	3,139	*+27.5r*	508	688	784	757	717	881	929r	940r	765	*+6.7*
Feedstocks	410	428	*+4.2*	112	114	116	105	100	106	116	103	100	*+0.3*
Imports[4]	50,604	48,708	*-3.7r*	12,979	13,553	11,480	11,785	12,305	13,138	12,016r	13,677r	14,031	*+14.0*
Crude oil & NGLs	45,286	42,415	*-6.3r*	11,396	12,006	9,842	10,171	10,681	11,721	10,567r	11,738r	12,481	*+16.9*
Feedstocks	5,318	6,293	*+18.3r*	1,583	1,547	1,638	1,614	1,624	1,417	1,449r	1,939r	1,550	*-4.6*
Exports[4]	33,709	34,856	*+3.4r*	7,908	8,396	10,090	7,976	8,225	8,565	9,528r	9,770r	9,684	*+17.7*
Crude Oil & NGLs	31,820	33,247	*+4.5r*	7,279	8,083	9,460	7,544	7,931	8,312	9,175r	9,445r	9,243	*+16.5*
Feedstocks	1,890	1,609	*-14.8r*	630	313	630	433	294	253	353	325	441	*+50.1*
Stock change[5]	-98	-125	*+27.2*	970	-626	355	-492	95	-83	414	-94r	190	*+99.2*
Transfers[6]	-1,152	-1,282	*+11.3r*	-225	-445	-225	-368	-209	-481	-574r	-560r	-429	*(+)*
Total supply	61,343	60,317	*-1.7*	16,331	16,292	14,236	15,159	15,343	15,579	14,581r	15,269r	15,439	*+0.6*
Statistical difference[7]	-48	-45		-16	-16	+14	-81	+4	+17	-6r	-9r	+1	
Total demand	61,391	60,362	*-1.7*	16,347	16,308	14,221	15,240	15,339	15,562	14,587	15,279	15,437	*+0.6*
TRANSFORMATION	61,391	60,362	*-1.7*	16,347	16,308	14,221	15,240	15,339	15,562	14,587	15,279	15,437	*+0.6*
Petroleum refineries	61,391	60,362	*-1.7*	16,347	16,308	14,221	15,240	15,339	15,562	14,587	15,279	15,437	*+0.6*

1. As there is no use made of primary oils and feedstocks by industries other than the oil and gas extraction and petroleum refining industries, other industry headings have not been included in this table. As such, this table is a summary of the activity of what is known as the Upstream oil industry.
2. Includes offshore and onshore production.
3. Natural Gas Liquids (NGLs) are condensate and petroleum gases derived at onshore treatment plants.
4. Foreign trade as recorded by the Petroleum Industry which may differ from the figures published by HM Revenue and Customs in the Overseas Trade Statistics. Data are subject to further revision as revised information on imports and exports becomes available.
5. Stock fall (+), stock rise (-). Stocks include stocks held at refineries, at oil terminals and also those held in tanks and partially loaded vessels at offshore facilities.
6. Mostly direct disposals to petrochemical plants.
7. Total supply minus total demand.
8. Percentage change between the most recent quarter and the same quarter a year earlier.

3 OIL AND OIL PRODUCTS

Table 3.2 Supply and use of petroleum products

Thousand tonnes

	2015	2016	*per cent change*	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	*per cent change*[1]
SUPPLY													
Indigenous production[2]	63,282	62,455	*-1.3*	16,713	16,835	14,819	15,790	15,689	16,156	15,223r	15,845r	15,943	*1.6*
Imports[3]	32,133	34,854	*8.5*	8,024	7,940	8,814	9,098	8,539	8,403	8,183r	7,818r	8,143	*-4.6*
Exports[3]	22,926	24,312	*6.0*	6,260	6,416	5,964	6,245	6,179	5,923	5,644r	5,774r	5,763	*-6.7*
Marine bunkers	2,509	2,659	*6.0*	687	573	538	727	763	632	511r	597r	729	*-4.4*
Stock change[4]	-743	89		-267	-68	148	-278	460	-241	-301	124r	243	
Transfers[5]	-1,190	-1,268		-227	-184	-474	-300	-281	-212	-189	-75	-210	
Total supply	68,046	69,158	*1.6*	17,296	17,534	16,805	17,337	17,465	17,552	16,761r	17,342r	17,627	*0.9*
Statistical difference[6]	-51	30		-62	-30	32	-2	-7	8	-6r	18r	-2	
Total demand	68,097	69,128	*1.5*	17,358	17,564	16,773	17,339	17,472	17,544	16,767r	17,323r	17,630	*0.9*
TRANSFORMATION	1,125	1,094	*-2.7*	293	314	302	254	250	288	272r	241r	242	*-3.2*
Electricity generation	560	501	*-10.5*	142	158	146	110	115	130	119r	102r	106	*-7.8*
Heat generation	59	58	*-0.7*	15	15	15	14	14	15	15	14	14	*0.0*
Other Transformation	506	535	*5.7*	136	142	142	130	121	143	139	125	122	*0.9*
Energy industry use	4,043	3,946	*-2.4*	1,089	1,047	988	1,019	949	990	991	1,026	1,037	*9.3*
Petroleum Refineries	3,344	3,284	*-1.8*	915	872	823	854	783	824	825	861	871	*11.3*
Blast Furnaces	0	0		0	0	0	0	0	0	0	0	0	
Others	699	662	*-5.3*	175	175	166	166	166	166	166	166	166	*0.0*
FINAL CONSUMPTION	62,929	64,088	*1.8*	15,976	16,203	15,482	16,066	16,273	16,266	15,505r	16,056r	16,350	*0.5*
Iron & steel	6	4	*-29.9*	2	2	3	1	0	0	3r	2r	0	*11.4*
Other industries	3,939	3,722	*-5.5*	858	1,208	1,095	821	842	964	1,080r	957r	861	*2.2*
Transport	48,374	49,292	*1.9*	12,638	12,115	11,495	12,531	12,867	12,400	11,547r	12,582r	12,935	*0.5*
Domestic	2,273	2,275	*0.1*	363	652	799	447	313	716	782r	411r	346	*10.5*
Other final users	1,813	1,840	*1.5*	467	454	410	473	485	473	437r	463r	493	*1.6*
Non energy use	6,525	6,954	*6.6*	1,648	1,773	1,681	1,794	1,766	1,714	1,656r	1,642r	1,715	*-2.9*

1. Percentage change between the most recent quarter and the same quarter a year earlier; (+) represents a positive percentage change greater than 100%.
2. Includes refinery production and petroleum gases extracted as products during the production of oil and gas.
3. Foreign trade as recorded by the Petroleum Industry which may differ from the figures published by HM Revenue and Customs in the Overseas Trade Statistics. Data are subject for further revision as revised information on imports and exports becomes available.
4. Stock fall (+), stock rise (-).
5. Mainly transfers from product to feedstock.
6. Total supply minus total demand.

3 OIL AND OIL PRODUCTS

Table 3.4 Supply and use of petroleum products - latest quarter

Thousand tonnes

	2016 3rd quarter									2017 3rd quarter p								
	Total Petroleum Products	Motor spirit	DERV [9]	Gas oil [1]	Aviation turbine fuel	Fuel oils	Petroleum gases [2]	Burning oil	Other products [3]	Total Petroleum Products	Motor spirit	DERV [9]	Gas oil [1]	Aviation turbine fuel	Fuel oils	Petroleum gases [2]	Burning oil	Other products [3]
SUPPLY																		
Indigenous Production [4]	15,689r	4,342	3,621	1,805	1,280	1,044	1,612r	309	1,676	15,943	4,431	3,441	1,821	1,482	975	1,771	358	1,664
Imports [5]	8,539	954	3,385	495	2,375	335	264	102	629	8,143	808	3,184	462	2,240	281	156	51	962
Exports [5]	6,179	2,743	821	534	380	795	236	13	659	5,763	2,751	361	557	352	784	293	22	642
Marine bunkers	763	-	-	523	-	239	0	-	-	729	-	-	501	-	228	-	-	-
Stock change [6]	+460	+51	+116	+61	+176	+14	+0	-19	+61	+243	+19	+187	-69	+80	-5	-7	+75	-37
Transfers [7]	-281	+400	-123	+35	-97	-168	-2	+85	-410	-210	+488	-192	+239	-84	-72	-17	+14	-586
Total supply	17,465r	3,005	6,178	1,339	3,354	190	1,638r	464	1,296	17,627	2,995	6,258	1,395	3,366	167	1,610	475	1,361
Statistical difference [8]	-7	-9	-	-1	-	-2	-15	+3	+18	-2	-2	+26	-	+7	-3	-27	+16	-19
Total demand	17,472r	3,014	6,167	1,340	3,354	193	1,653r	461	1,289	17,630	2,996	6,233	1,395	3,359	170	1,637	460	1,380
TRANSFORMATION	250	-	-	20	-	44	163	-	23	242	-	-	19	-	36	162	-	25
Electricity generation	115	-	-	19	-	33	63	-	-	106	-	-	18	-	25	63	-	-
Heat generation	14	-	-	1	-	11	2	-	-	14	-	-	1	-	11	2	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	18	-	-	-	-	-	0	-	18	20	-	-	-	-	-	0	-	20
Other transformation [9]	103	-	-	-	-	-	98	-	5	102	-	-	-	-	-	97	-	5
Energy industry use	949	-	-	150	-	65	474	-	260	1,037	-	-	150	-	73	524	-	290
FINAL CONSUMPTION	**16,273**	**3,014**	**6,167**	**1,170**	**3,354**	**84**	**1,016**	**461**	**1,007**	**16,350**	**2,996**	**6,233**	**1,226**	**3,359**	**61**	**951**	**460**	**1,065**
Iron & steel	0	-	-	-	-	0	0	-	-	0	-	-	-	-	0	-	-	-
Other industries	842r	-	-	458	-	49	79r	211	45	861	-	-	469	-	34	73	180	105
Transport	12,867	3,014	6,167	309	3,354	0	18	-	4	12,935	2,996	6,233	325	3,359	0	18	-	4
Domestic	313	-	-	40	-	-	23	250	-	346	-	-	43	-	-	23	279	-
Other final users	485r	-	-	358	-	35	91r	-	-	493	-	-	383	-	28	82	-	-
Non energy use	1,766	-	-	5	-	-	804	-	957	1,715	-	-	5	-	-	754	-	956

1. Includes middle distillate feedstock destined for use in the petrochemical industry and marine diesel
2. Includes ethane, propane, butane and other petroleum gases
3. Includes naphtha, industrial and white spirits, lubricants, bitumen, petroleum waxes, petroleum coke and other oil product
4. Includes refinery production and petroleum gases extracted as products during the production of oil and gas
5. Foreign trade as recorded by the Petroleum Industry which may differ from the figures published by HM Revenue and Customs in the Overseas Trade Statistics Data are subject to further revision as revised information on imports and exports becomes available
6. Stock fall (+), stock rise (-).
7. Mainly transfers from product to feedstock.
8. Total supply minus total demand.
9. Backflows from petrochemical companies have been placed on a separate row for the first time June 2016. Please see article in Energy Trend June 2016 for more information

3 OIL AND OIL PRODUCTS

Table 3.5 Biofuel sales and sales through supermarkets[1]

Thousand tonnes

	2015	2016	*per cent change*	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	*per cent change* [2]
MOTOR SPIRIT													
of which, Hydrocarbon [3]	12,082	11,951	*-1.1%*	3,072	3,040	2,877	3,072	3,014	2,988	2,815	3,015r	2,996	*-0.6%*
of which, Bio-ethanol [4]	631	603	*-4.5%*	163	157	146	154	150	152	146	153r	151	*0.7%*
Total Motor Spirit including Bio-ethanol	**12,713**	**12,554**	*-1.3%*	**3,235**	**3,197**	**3,023**	**3,226**	**3,164**	**3,140**	**2,961**	**3,169r**	**3,148**	*-0.5%*
of which, sold through Supermarkets [5]	5,794	5,885	*1.6%*	1,435	1,473	1,480	1,479	1,453	1,473	1,388	1,445	1,443	*-0.7%*
DIESEL ROAD FUEL													
of which, Hydrocarbon [3]	23,656	24,648	*4.2%*	5,976	6,106	5,889	6,173	6,167	6,419	5,903	6,280r	6,233	*1.1%*
of which, Bio-diesel [4]	595	630	*5.8%*	158	191	127	195	174	133	118	188r	158	*-9.5%*
Total Diesel Road Fuel including Bio-diesel	**24,251**	**25,279**	*4.2%*	**6,134**	**6,298**	**6,016**	**6,368**	**6,342**	**6,552**	**6,022**	**6,467r**	**6,390**	*0.8%*
of which, sold through Supermarkets 5	6,644	7,267	*9.4%*	1,706	1,685	1,793	1,802	1,814	1,858	1,761	1,811	1,863	*2.7%*

1. Monthly data for inland deliveries of oil products are available - See BEIS website: https://www.gov.uk/government/collections/oil-statistics
2. Percentage change between the most recent quarter and the same quarter a year earlier.
3. Demand excluding bioethanol. Based on HMRC data.
4. Bioethanol based on HMRC data and excludes other renewables
5. Data for sales by supermarkets collected by a monthly reporting system. Includes Asda, Morrisons, Sainsburys and Tesco only.

3 OIL AND OIL PRODUCTS

Table 3.6 Stocks of petroleum[1] at end of period

Thousand tonnes

		Crude oil and refinery process oil					Petroleum products							Total stocks		
		Refineries[2]	Terminals[3]	Offshore[4]	Net bilaterals of Crude and Process oil [5]	Total[5]	Motor Spirit[6]	Kerosene[7]	Gas/Diesel Oil[8]	Fuel oils	Other products[9]	Net bilaterals of products [5]	Total products	Total Net bilaterals [5]	Total Stocks in UK[10]	Total stocks
2012		3,829	1,194	473	195	5,690	605	1,427	1,931	491	841	2,441	7,735	2,636	10,790	13,425
2013		3,592	1,102	513	1,469	6,677	1,041	1,419	1,539	404	693	2,432	7,528	3,901	10,304	14,205
2014		3,876	1,147	460	1,728	7,211	947	1,178	1,656	253	773	2,064	6,871	3,792	10,290	14,082
2015		3,156	1,629	499	2,289	7,574	1,084	1,425	1,858	314	792	2,022	7,497	4,312	10,759	15,070
2016		3,088	1,795	526	2,006	7,415	1,079	1,342	2,033	218	687	2,082	7,442	4,089	10,769	14,857
2015	3rd quarter	3,098	1,211	350	1,793	6,451	1,087	1,436	1,825	314	750	2,703	8,116	4,496	10,071	14,567
	4th quarter	3,156	1,629	499	2,289	7,574	1,084	1,425	1,858	314	792	2,022	7,497	4,312	10,759	15,070
2016	1st quarter	3,081	1,370	478	2,193	7,122	1,085	1,456	1,767	247	763	1,812	7,130	4,005	10,247	14,253
	2nd quarter	3,201	1,586	635	2,427	7,849	1,158	1,398	1,990	270	780	1,899	7,495	4,326	11,018	15,344
	3rd quarter	3,238	1,473	615	2,323	7,650	1,107	1,241	1,809	261	718	1,826	6,964	4,150	10,464	14,614
	4th quarter	3,088	1,795	526	2,006	7,415	1,079	1,342	2,033	218	687	2,082	7,442	4,089	10,769	14,857
2017	1st quarter	3,131	1,307	557	2,229	7,224	1,212	1,575	1,970r	236r	678	1,949	7,620r	4,178	10,666r	14,844r
	2nd quarter	3,003	1,549r	542r	2,129	7,222r	1,112r	1,430	2,083r	226r	698	1,876	7,425r	4,005	10,642r	14,647r
	3rd quarter p	2,970	1,318	610	2,197	7,095	1,093	1,276	1,964	229	742	1,826	7,130	4,023	10,202	14,225
Per cent change [11]		*-8.3*	*-10.5*	*-0.9*	*-5.5*	*-7.3*	*-1.3*	*+2.8*	*+8.6*	*-12.3*	*+3.3*	*-*	*+2.4*	*-3.1*	*-2.5*	*-2.7*

1. Stocks held at refineries, terminals and power stations. Stocks in the wholesale distribution system and certain stocks at offshore fields (UK Continental Shelf [UKCS]), and others held underare approved bilateral agreements also included.
2. Stocks of crude oil, NGLs and process oil at UK refineries.
3. Stocks of crude oil and NGLs at UKCS pipeline terminals.
4. Stocks of crude oil in tanks and partially loaded tankers at offshore fields (UKCS).
5. The difference between stocks held abroad for UK use under approved bilateral agreements and the equivalent stocks held in the UK for foreign use. From 2013 onwards, EU Directive 2009/119/EC came into effect and this has lead to changes in how UK companies manage their stock-holding. The increase in crude stocks held abroad was at the expense of a decrease in product stocks held under similar agreements.
6.Motor spirit and aviation spirit.
7. Aviation turbine fuel and burning oil.
8. Gas oil, DERV fuel, middle distillate feedstock (mdf) and marine diesel oil.
9. Ethane, propane, butane, other petroleum gases, naphtha (ldf), industrial and white spirits, bitumen, petroleum wax, lubricating oil, petroleum coke, and miscellaneous products.
10. Stocks held in the national territory or elsewhere on the UKCS
11. Percentage change between the most recent quarter and the same quarter a year earlier.

Section 4 - Gas

Key results show:

The most notable development this quarter relates to UK production of natural gas, which was 11 per cent down on the same quarter last year. This is the first fall seen since Q2 2016 and was driven by lower production in August 2017, the fifth lowest volume on record following a shutdown of terminals due to maintenance **(Chart 4.1)**. Within this, production of associated gas was 13 per cent lower whilst dry gas production was 5.3 per cent lower **(Chart 4.2)**.

Whist overall trade levels have remained relatively stable, there are some significant changes in component elements. In particular, pipeline imports are up by just under 50 per cent **(Chart 4.4)**. In contrast, imports of LNG decreased by nearly three-quarters **(Chart 4.4)**. As a result, LNG imports accounted for less than 20 per cent of total imports compared with 40 per cent during Q3 2016. The decreases in LNG imports were driven by a contraction in LNG supplies from Qatar to the UK, due in part to high LNG demand from other countries.

Similarly exports have remained relatively flat, up just 1.9 per cent on last year, but once again the component elements have shifted substantially. Exports to the Republic of Ireland rose by 73 per cent on Q3 2016 due to the disruption of domestic gas supply in Ireland caused by a technical breach at Corrib. In contrast exports to the Netherlands fell by 45 per cent following the temporary shutdown of some fields which export directly to the Netherlands **(Chart 4.4)**.

Demand for natural gas in Q3 2017 increased by 1.2 per cent compared to last year to 144 TWh **(Chart 4.6)**.

Demand for electricity generation fell for the second quarter in a row in Q3 2017, down 6.7 per cent in comparison to the same quarter last year. This is in contrast to a recent period of sustained growth in demand, but – as shown in Chapter 5 - increased output from renewable energy displaced demand for gas **(Chart 4.6).**

In contrast final consumption was up 11 per cent, with domestic use and other final users up 15 per cent each, driven by reduced demand in Q3 2016 due to warmer temperatures in September last year **(Chart 4.6)**.

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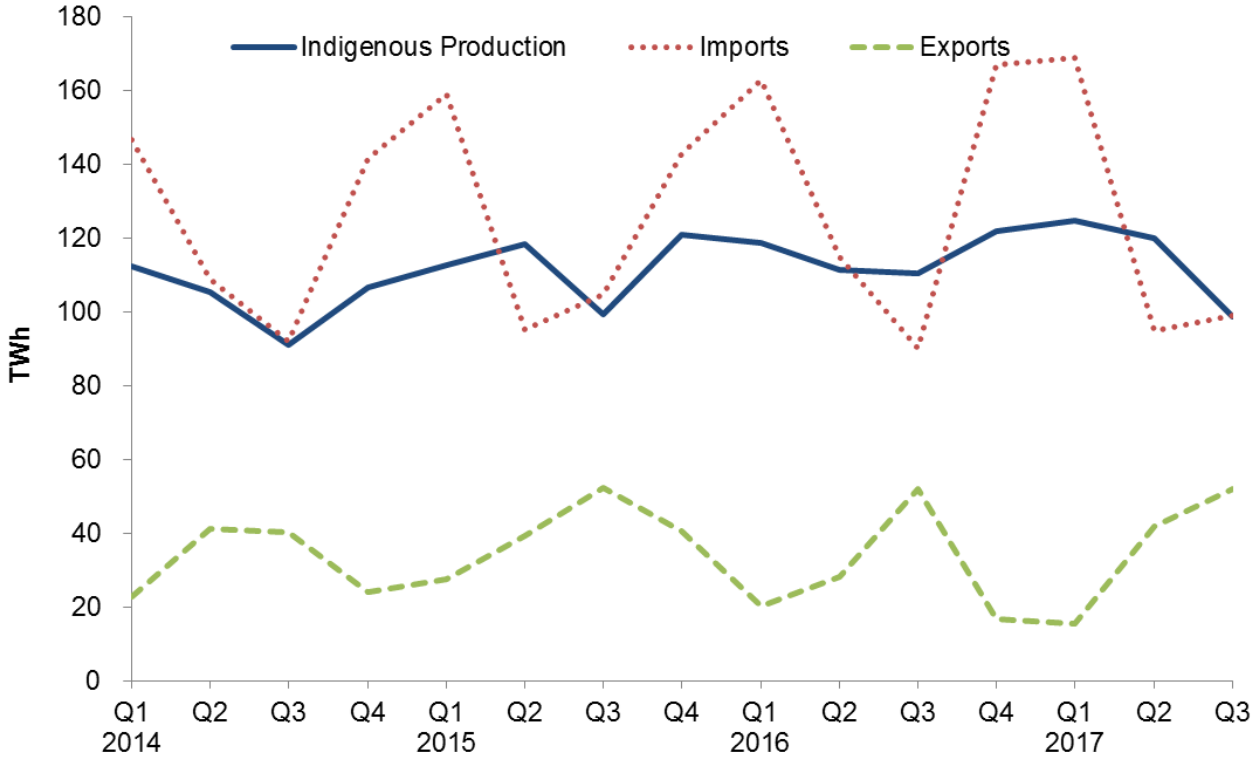
Chart 4.1 Production and imports and exports of natural gas (Table 4.1)



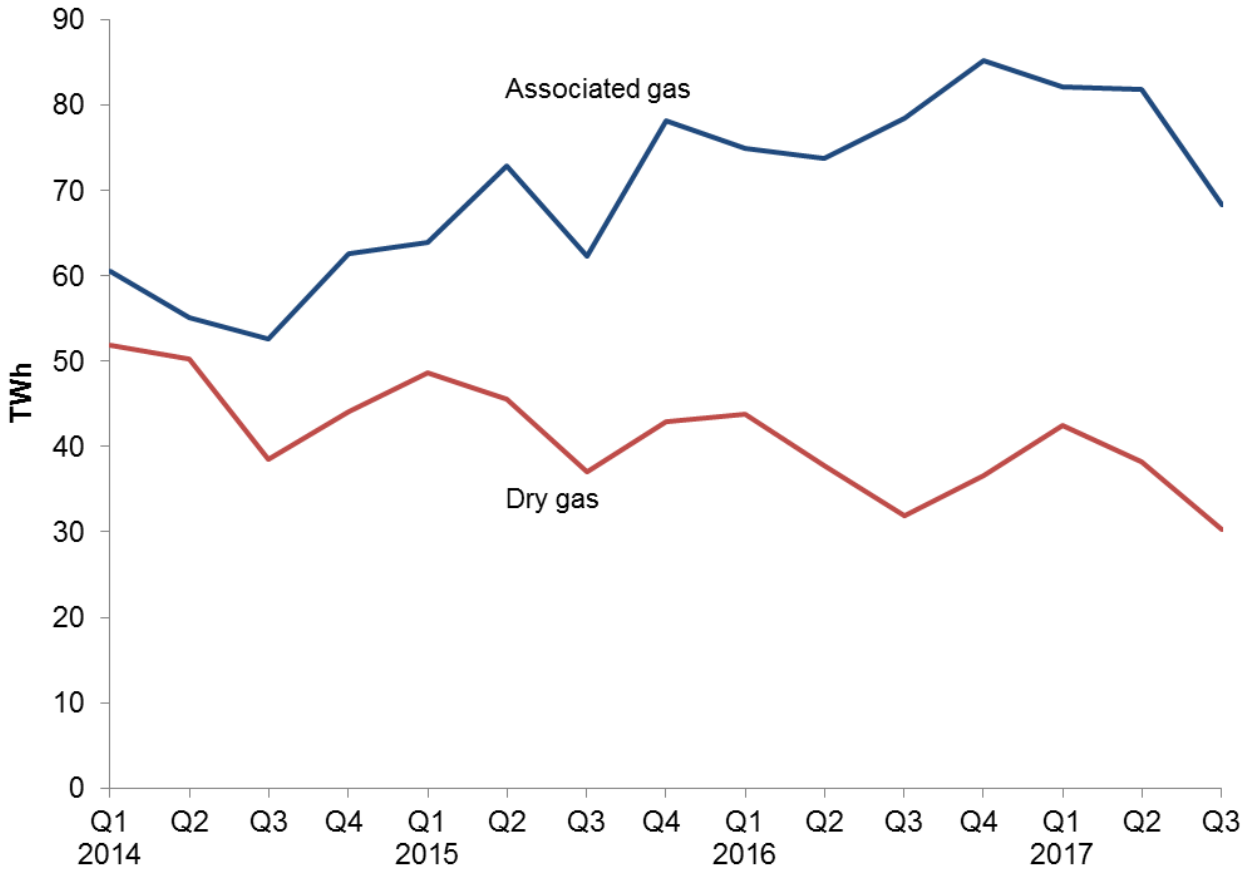
Gross production of natural gas was down by 11 per cent in Q3 2017, the first fall seen since Q2 2016 and around 40 per cent of the average quarterly production in 2000 when gas production peaked. This decrease was driven by lower production in August 2017, the fifth lowest volume on record following a shutdown of terminals due to maintenance.

The UK imports natural gas primarily from Norway (predominantly via the Langeled, Tampen Link and Gjoa/Vega pipelines). Smaller volumes are imported from Belgium (via the UK-Belgium Interconnector) and the Netherlands (via the Balgzand to Bacton line). See Map 4.1 for an illustration of trade flows.

Imports in Q3 2017 were up 9.9 per cent on the same quarter in 2016, with a 49 per cent increase in pipeline imports.

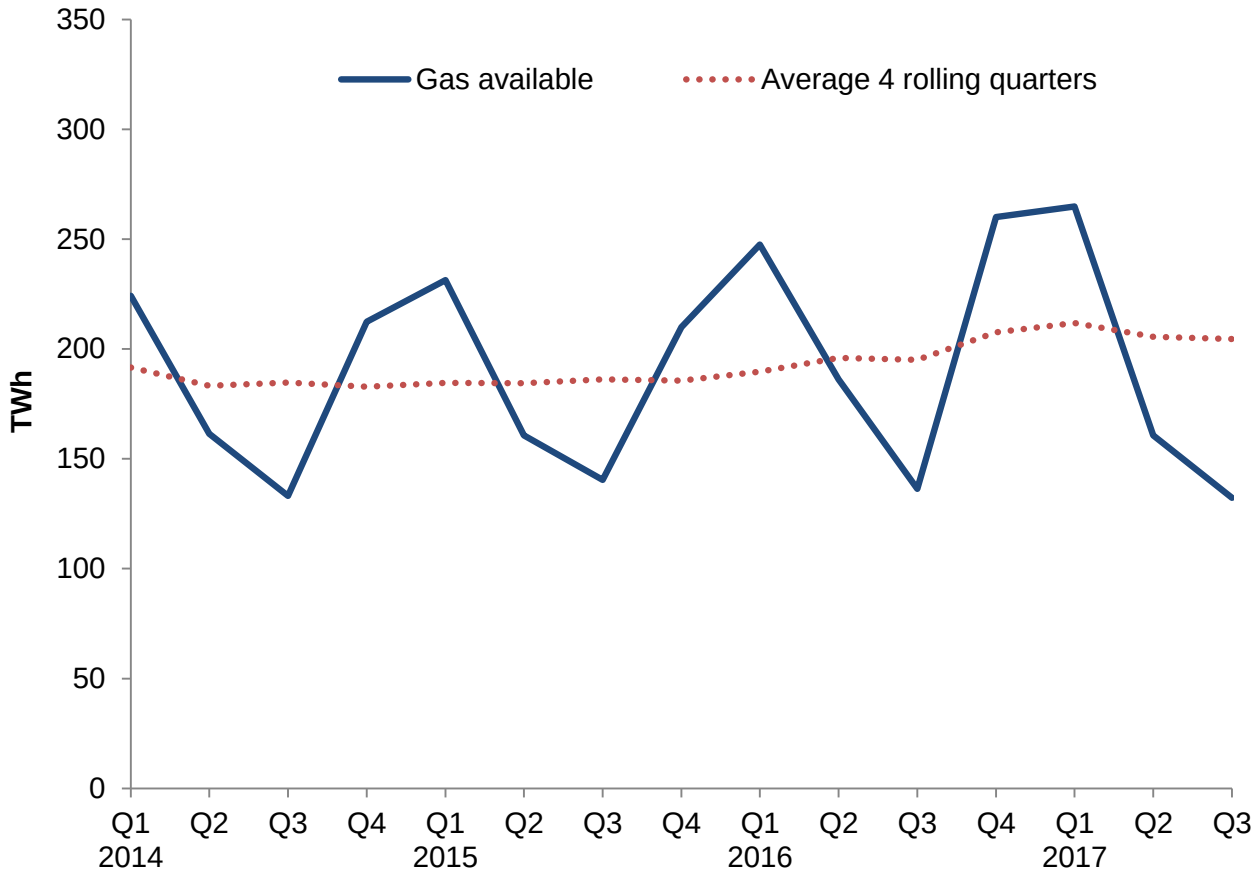
The UK exports natural gas primarily to Belgium (60 per cent of total exports in 2016) and Ireland (20 per cent of total exports in 2016). Exports rose by 1.9 per cent in Q3 2017 in comparison to the same quarter in 2016. Although a small total increase,

Chart 4.2 Production of dry gas and associated gas (not shown in published tables)



Production of associated gas (natural gas produced from oil fields) in Q3 2017 was down 13 per cent compared to the same quarter last year, from 78 to 68 TWh. Similarly dry gas production (natural gas composed mainly of methane) fell by 5.3 per cent in Q3 2017 on last year.

Chart 4.3 Gas availability (Table 4.2)

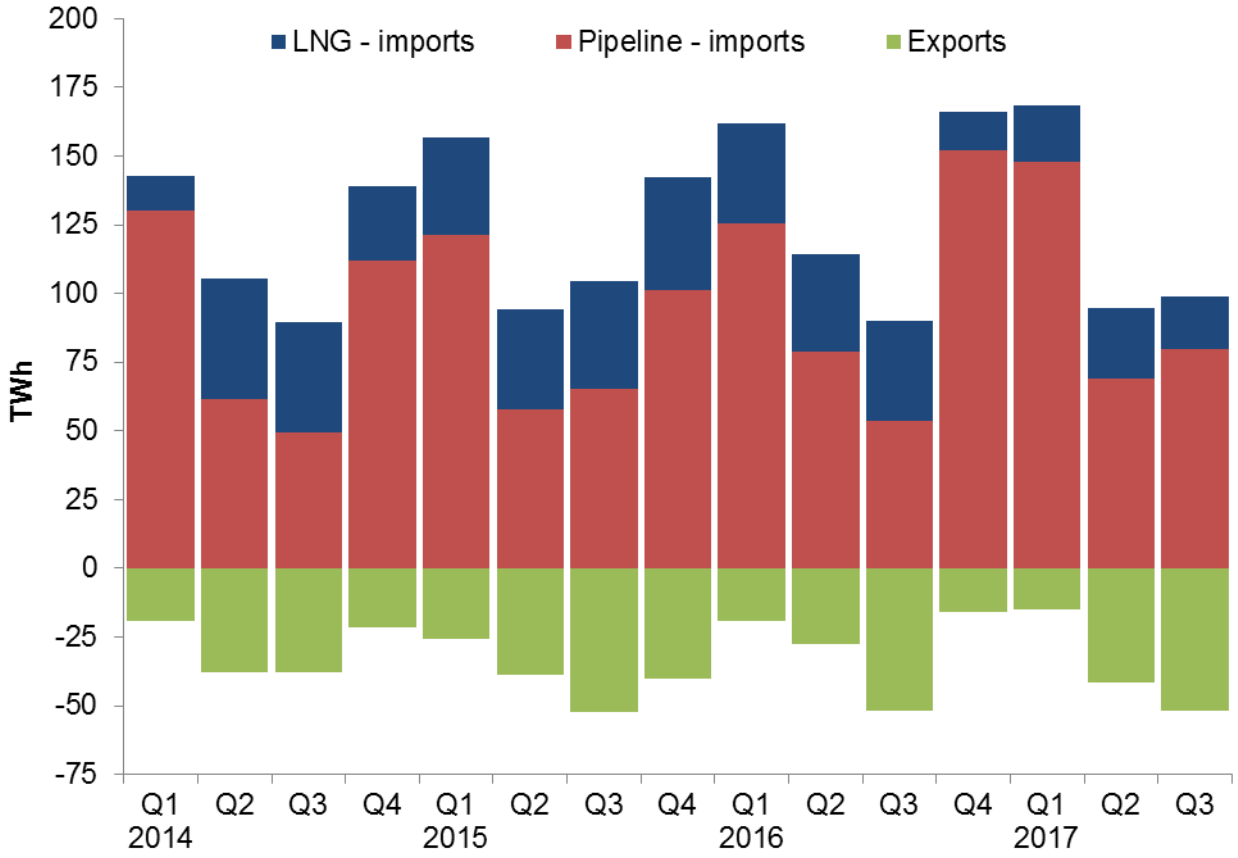


Gas available at terminals is roughly equal to gross gas production minus producers own use, plus net imports.

Gas availability is seasonal, mirroring gas demand, and peaks during Q1 and Q4 each year. Gas availability in Q3 2017 decreased by 3.0 per cent compared to Q3 2016 to 132 TWh, and was driven by the decrease in UK production.

The long-term picture shows that the average availability over four rolling quarters had remained fairly constant since the start of 2012 before increasing slightly since the start of 2015.

Chart 4.4 Import and exports (Table 4.3 and Table 4.4)



Net imports during Q3 2017 were up by one-fifth in comparison to the same quarter in 2016. This increase has been driven by the higher import figure, a result of a higher demand and a lower stock draw in Q3 2017.

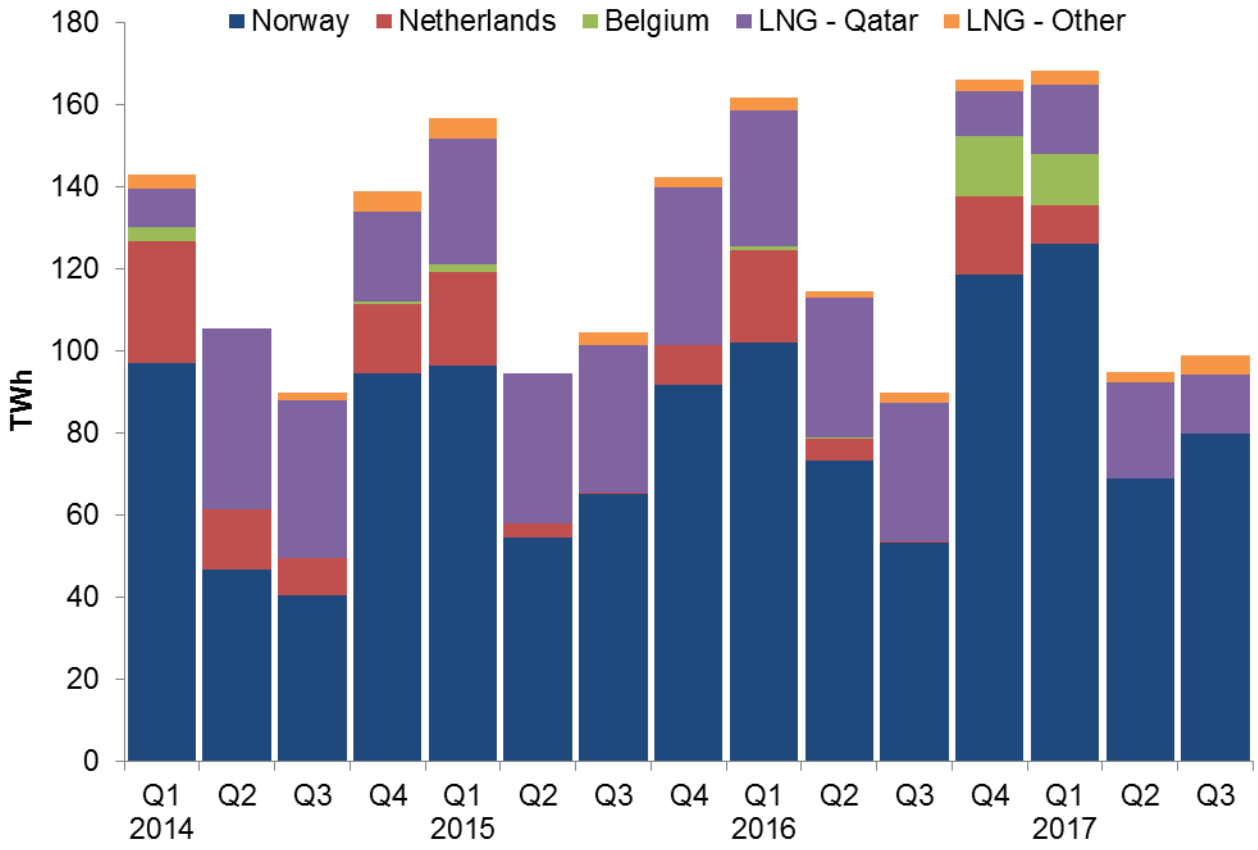
As noted in Chart 4.1, the UK imports natural gas primarily from Norway (predominantly via the Langeled, Tampen Link and Gjoa/Vega pipelines). Smaller volumes are imported from Belgium (via the UK-Belgium Interconnector) and the Netherlands (via the Balgzand to Bacton line).

Whilst imports were only up 9.9 per cent, there were some significant changes to the component elements of imports. Pipeline imports are up by just under 50 per cent, with pipeline imports from Norway up by one-half. In contrast, imports of LNG decreased by three-quarters. As a result, LNG imports only accounted for less than 20 per cent of total imports, compared with 40 per cent during Q3 2016. The decreases in LNG imports were driven by a contraction in LNG supplies from Qatar to the UK, due in part to high LNG demand from other countries.

Similarly exports have remained relatively flat, up just 1.9 per cent on last year, but once again the component elements have shifted substantially. Exports to the Republic of Ireland rose 73.4 per cent on Q3 2016 due to the disruption of domestic gas supply in Ireland caused by a technical breach at Corrib. In contrast exports to the Netherlands fell by 45 per cent, following the temporary shutdown of some fields which export directly to the Netherland.

Whilst the UK has the capacity to export LNG through reloading cargoes, for the second consecutive quarter there have been no LNG exports'

Chart 4.5 Imports by origin (Table 4.4)

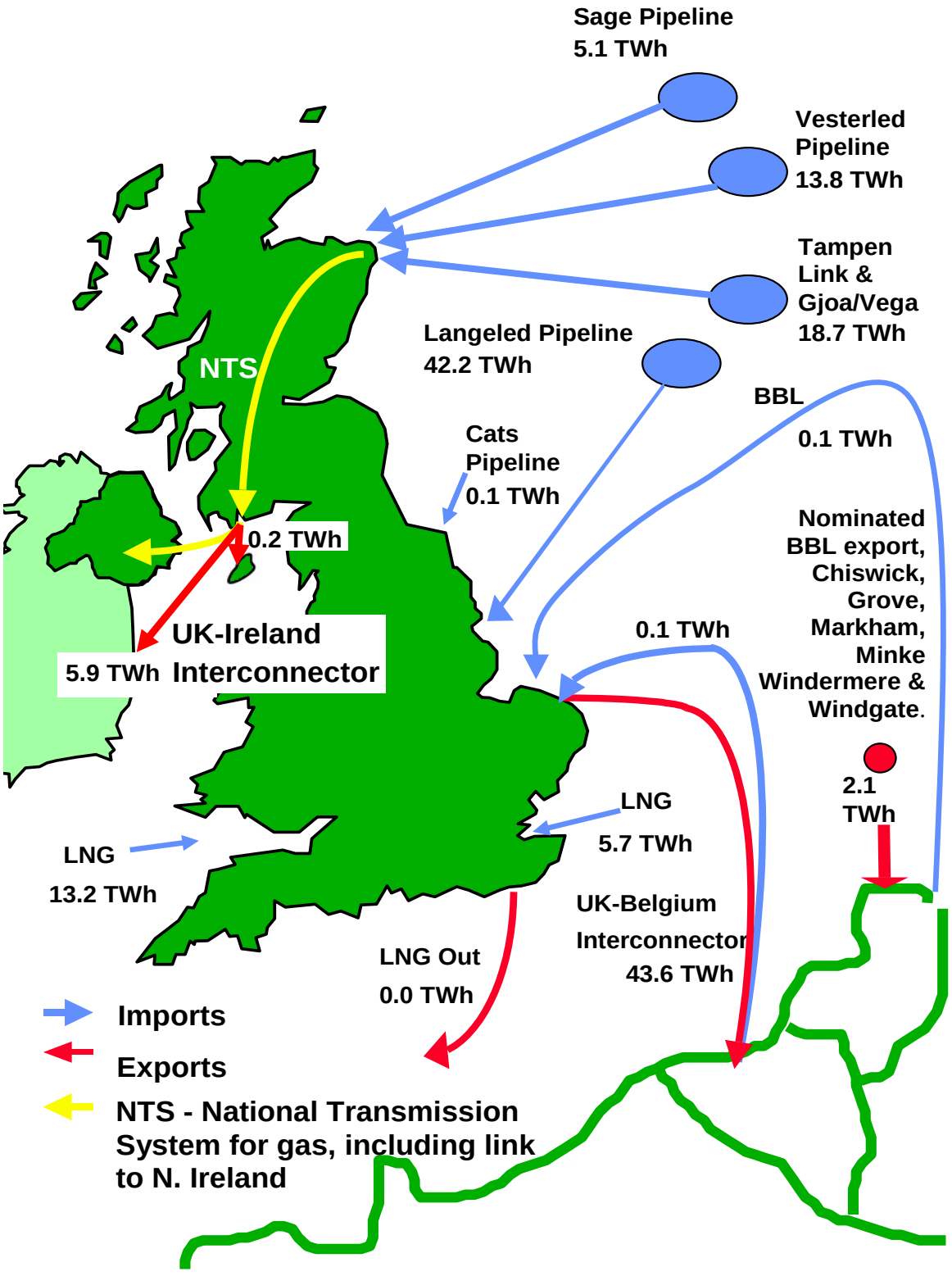


The main development in Q3 2017 is the overall increase in the amount of imports into the UK, driven by a 49 per cent increase in pipeline imports. Norway imports remain the principal source of UK gas imports (at over three-quarters of total imports in Q3 2017 compared to half in 2010) and has seen a 50 per cent increase.

In contrast in Q3 2017 LNG imports decreased by 48 per cent, with LNG's share of total imports decreasing to 19 per cent in comparison to 41 per cent in Q3 2016. The majority of LNG imports are sourced from Qatar - around three-quarters in Q3 2017 (down from roughly 90 per cent in Q3 2016), with the volume of imports from Qatar down by 57 per cent. This decrease was due to high LNG demand from other countries and a reduction in the UK's gas storage capacity.

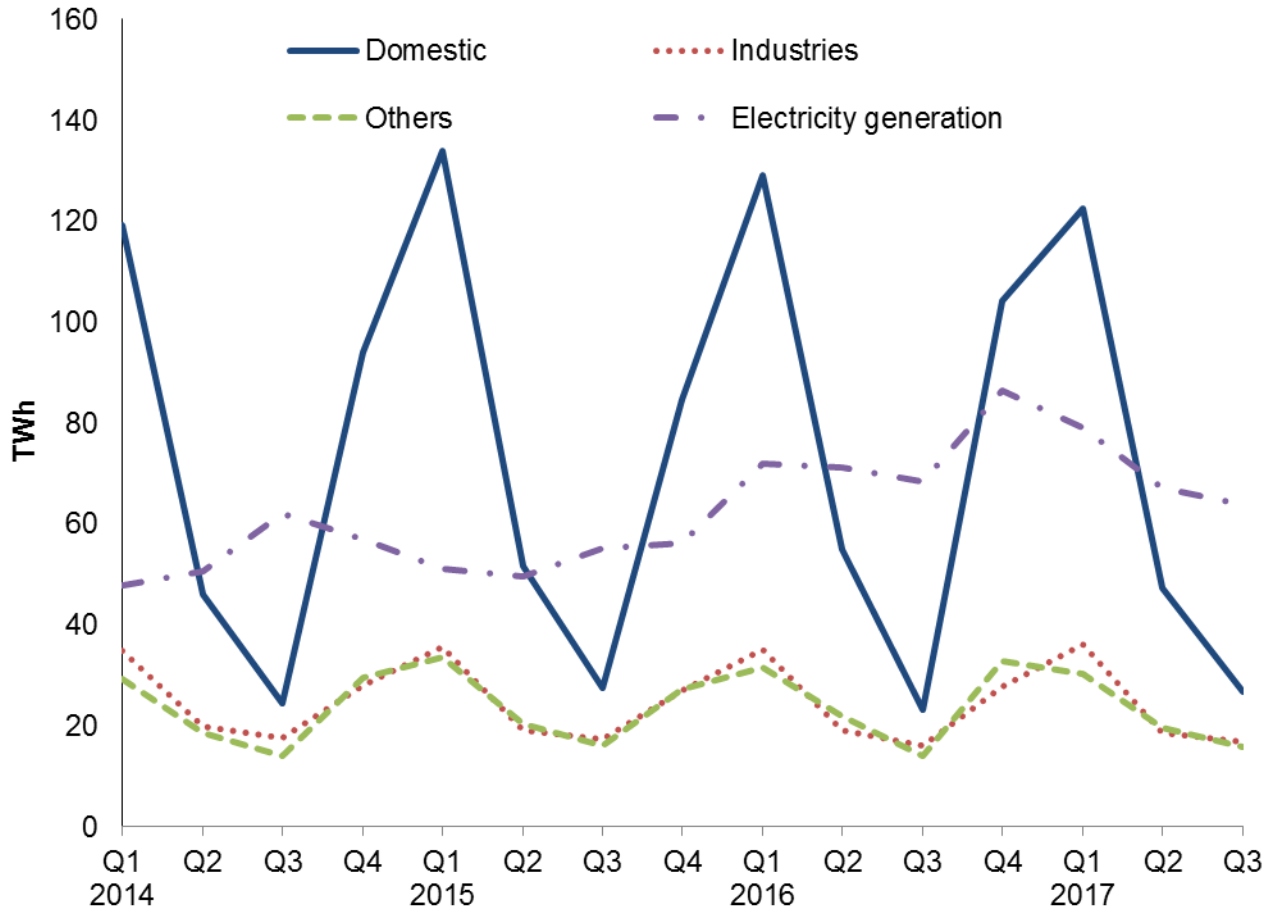
A complete country breakdown for physical pipeline and LNG imports is provided in Energy Trends Table 4.4 - *Supplementary* information *on the origin of UK gas imports*.

Map 4.1: UK imports and exports of gas Q3 2017*



*Please note that imports and exports in this map uses nominated flows through the UK-Belgium Interconnector and BBL pipeline as in Table 4.1. The figures here will differ from those in ET Table 4.3 which uses actual physical flows through the Interconnector.

Chart 4.6 UK demand for natural gas (Table 4.1)



UK demand for natural gas in Q3 2017 is up 1.2 per cent in comparison Q3 2016 to 144 TWh.

Demand for electricity generation fell for the second quarter in a row in Q3 2017, down 6.7 per cent in comparison to the same quarter last year. This is in contrast to a recent period of sustained growth in demand, but – as shown in Chapter 5 - increased output from renewable energy displaced demand for gas.

In contrast final consumption was up 11 per cent, with domestic use and other final users up 15 per cent each, driven by reduced demand in Q3 2016 due to warmer temperatures in September last year.

4 GAS

Table 4.1. Natural gas supply and consumption

GWh

	2015	2016	*per cent change*	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	*per cent change* [1]
SUPPLY													
Indigenous production	451,437	462,307	*+2.4*	99,296	121,031	118,637	111,542	110,387	121,740	124,671r	120,097r	98,597	*-10.7*
Imports	501,563	534,740	*+6.6*	104,648	142,788	162,960	114,908	89,950	166,923	168,861r	94,995	98,857	*+9.9*
of which LNG	*152,406*	*122,310*	*-19.7*	*39,207*	*41,001*	*36,505*	*35,591*	*36,351*	*13,863*	*20,477*	*26,008*	*18,876*	*-48.1*
Exports	159,517	116,862	*-26.7*	52,184	40,459	20,163	27,979	51,985	16,735	*15,417*	*41,758*	52,959	*+1.9*
Stock change [2]	3,515	16,242		-15,919	-4,024	31,688	-9,551	-6,797	901	13,185	1,597	-1,028	*-84.9*
Transfers [3]	559	1,575		182	190	238	345	457	535	562	631	676	
Total supply	797,558	898,002	*+12.6*	136,023	219,526	293,361	189,265	142,013	273,363	291,862r	175,561r	144,143	*+1.5*
Statistical difference	779	1,476		-135	443	626	859	24	-34	-517r	706r	412	
Total demand	796,779	896,527	*+12.5*	136,158	219,083	292,735	188,406	141,988	273,397	292,380r	174,855r	143,731	*+1.2*
TRANSFORMATION	237,682	323,763	*+36.2*	60,220	62,975	79,870	77,013	73,250	93,629	87,064r	72,868r	68,686	*-6.2*
Electricity generation	212,289	297,643	*+40.2*	55,277	56,289	71,854	71,180	68,295	86,314	79,048r	67,036r	63,731	*-6.7*
Heat generation [4]	25,393	26,120	*+2.9*	4,942	6,687	8,016	5,833	4,955	7,315	8,016	5,833	4,955	-
Energy industry use	58,645	57,773	*-1.5*	13,115	15,326	16,014	14,096	13,913	13,749	15,625r	15,233r	14,562	*+4.7*
Losses	6,469	5,396	*-16.6*	1,833	2,082	1,154	1,393	1,636	1,212	1,088r	1,145r	1,299	*-20.6*
FINAL CONSUMPTION	493,983	509,596	*+3.2*	60,990	138,699	195,697	95,903	53,189	164,806	188,603r	85,608r	59,184	*+11.3*
Iron & steel	5,374	4,155	*-22.7*	1,253	1,118	1,161	990	973	1,032	1,212	1,024	899	*-7.6*
Other industries	93,825	93,842	-	16,140	25,793	34,033	18,017	15,166	26,625	34,819r	17,613r	15,814	*+4.3*
Domestic	297,582	311,375	*+4.6*	27,617	84,549	129,040	55,039	23,098	104,197	122,394r	47,394r	26,626	*+15.3*
Other final users	91,935	95,115	*+3.5*	14,664	25,923	30,186	20,580	12,674	31,676	28,900r	18,300r	14,568	*+14.9*
Non energy use [4]	5,267	5,109	*-3.0*	1,317	1,317	1,277	1,277	1,277	1,277	1,277	1,277	1,277	-

1. Percentage change between the most recent quarter and the same quarter a year earlier.

2. Stock change + = stock draw, - = stock build.

3. Natural gas used in the manufacture of synthetic coke oven gas and biomethane injections into the grid from installations certified under the Renewable Heat Incentive (RHI).

4. For heat generation and non energy use, the 2017 figures currently shown are the 2016 figures carried forward - these will be updated in June 2018.

Section 5 - Electricity

Key results show:

In 2017 Q3, total electricity generated fell by 2.2 per cent, from 76.1 TWh a year earlier to 74.4 TWh. (**Chart 5.1**).

Low carbon electricity's share of generation increased from 50.2 per cent to a record high of 54.4 per cent, due to increased generation from renewables. Renewables' share of electricity generation was 30.0 per cent in 2017 Q3, a record high for Q3; and up 4.6 percentage points on the share in 2016 Q3. This was due to increased renewable capacity. **(Charts 5.2 and 5.3).**

Gas and coal made up a record low of 42.0 per cent of generation (down 4.5pp) in Q3 2017. Coal's share of generation decreased from 3.6 per cent to 2.9 per cent, whilst gas' share of generation decreased from 42.9 per cent in the third quarter of 2016 to 39.1 per cent in the third quarter of 2017. Nuclear remained a significant component at 24.4 per cent, down from 24.8 per cent last year (**Chart 5.2**).

The UK remains a net importer with 7.2 per cent of electricity supplied from net imports in the third quarter of 2017. (**Chart 5.4**).

Final consumption of electricity during the third quarter of 2017, at 68.1 TWh, was 1.9 per cent lower than in the same period last year which, alongside an increase in losses, left overall demand 1.3 per cent lower than in Q3 2016. Domestic sales increased by 1.1 per cent compared to the same quarter in 2016. (**Chart 5.5**).

Relevant tables

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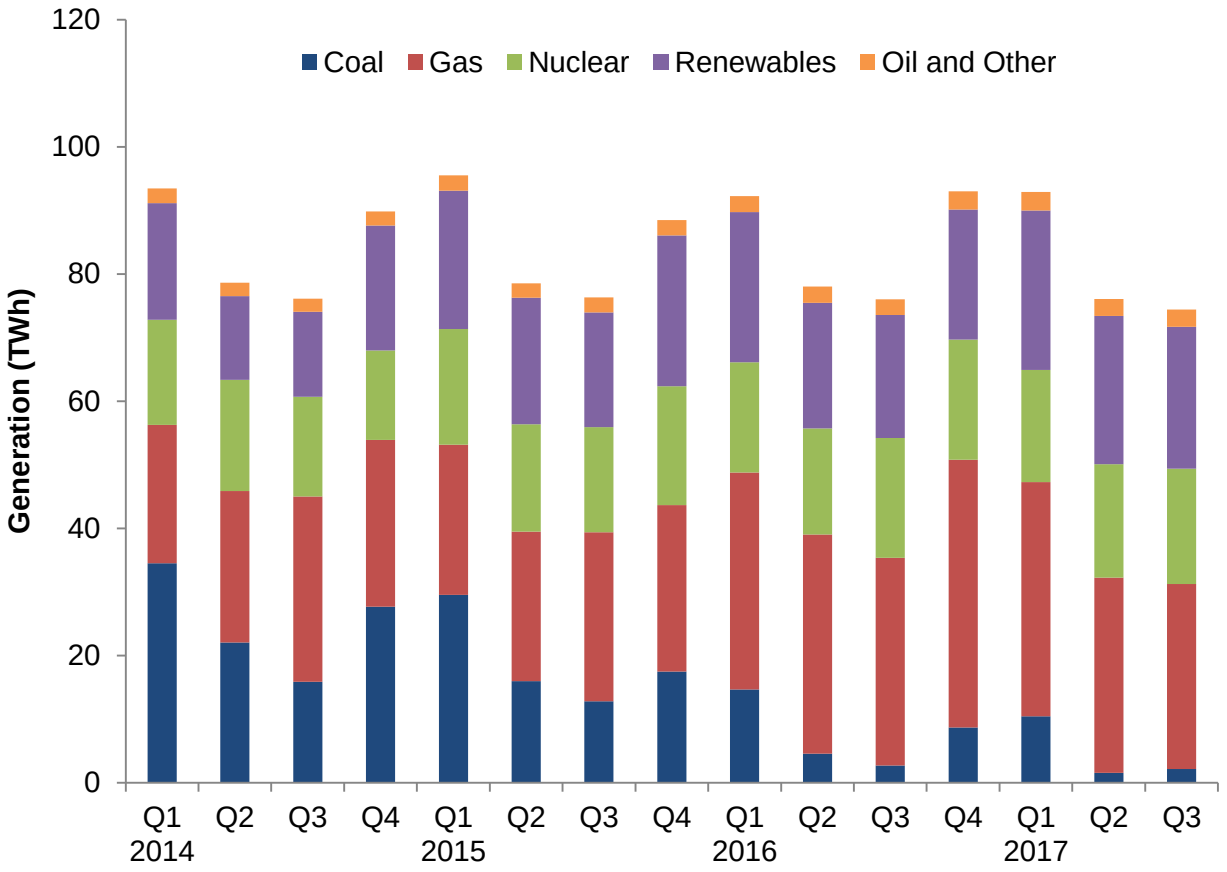
Chart 5.1 Electricity generated by fuel type (Table 5.1)

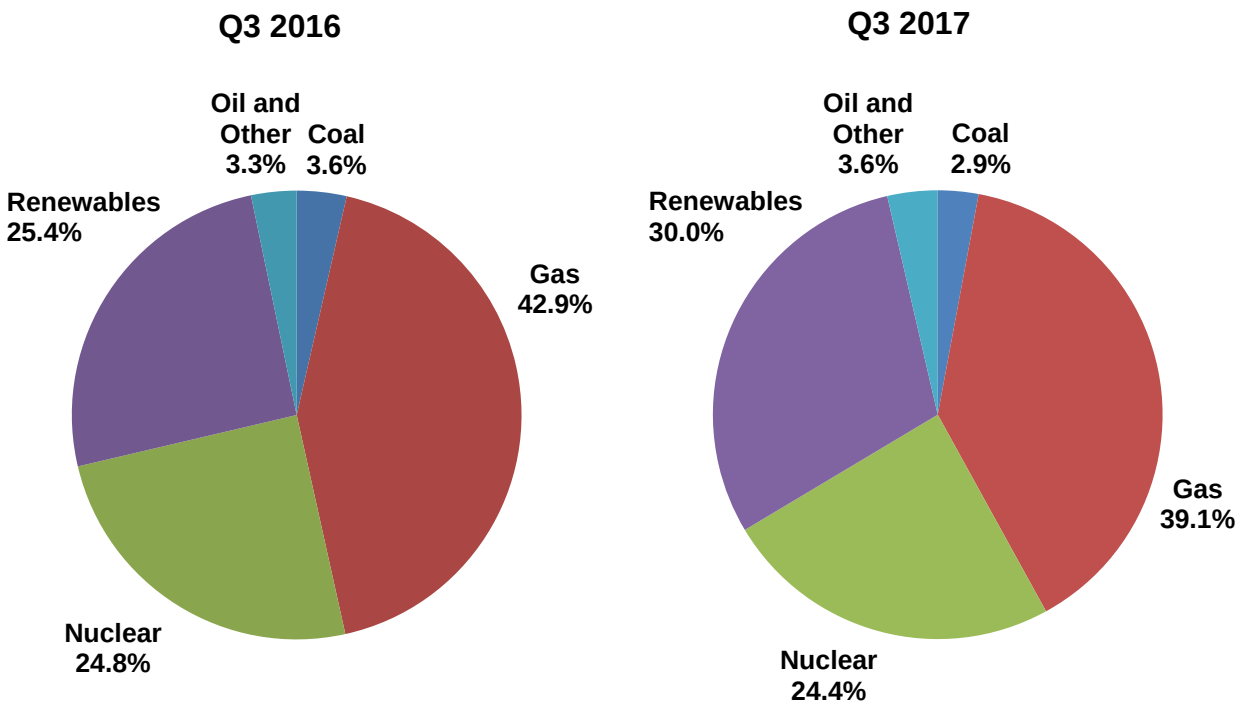


Overall generation fell by 2.2 per cent, due to falls in both MPP and other generators generation compared to the same period last year.

Although weather conditions were poorer compared to Q3 2016, increased capacity contributed to an overall increase in renewables generation. Wind generation increased by 15.9 per cent despite a small drop of 0.3 knots in average wind speeds; this was due to a 21 per cent increase in capacity over the period. Solar generation increased by 4.2 per cent despite a decrease of 0.6 average daily sun hours, this was due to an 7.6 per cent increase in capacity compared to the same period last year. Hydro generation increased by 8.3 per cent.

Gas and coal made up a record low of 42 per cent of generation (down 4.5pp) in Q3 2017. This reduction was mainly due to increased baseload (non-thermal renewable and nuclear) generation offsetting the need for fossil fuel generation. Coal fired generation fell by 20 per cent to 2.2TWh, while gas fell by 11 per cent to 29TWh. Generation from Bioenergy was up 23 per cent, making up 10.3 per cent (up 2.1pp) of generation for Q3 2017. This was mainly due to low generation in the same period last year, partly caused by long periods of outage at Drax. Nuclear accounted for 24.4 per cent of generation, down from 24.8 per cent in the same period last year.

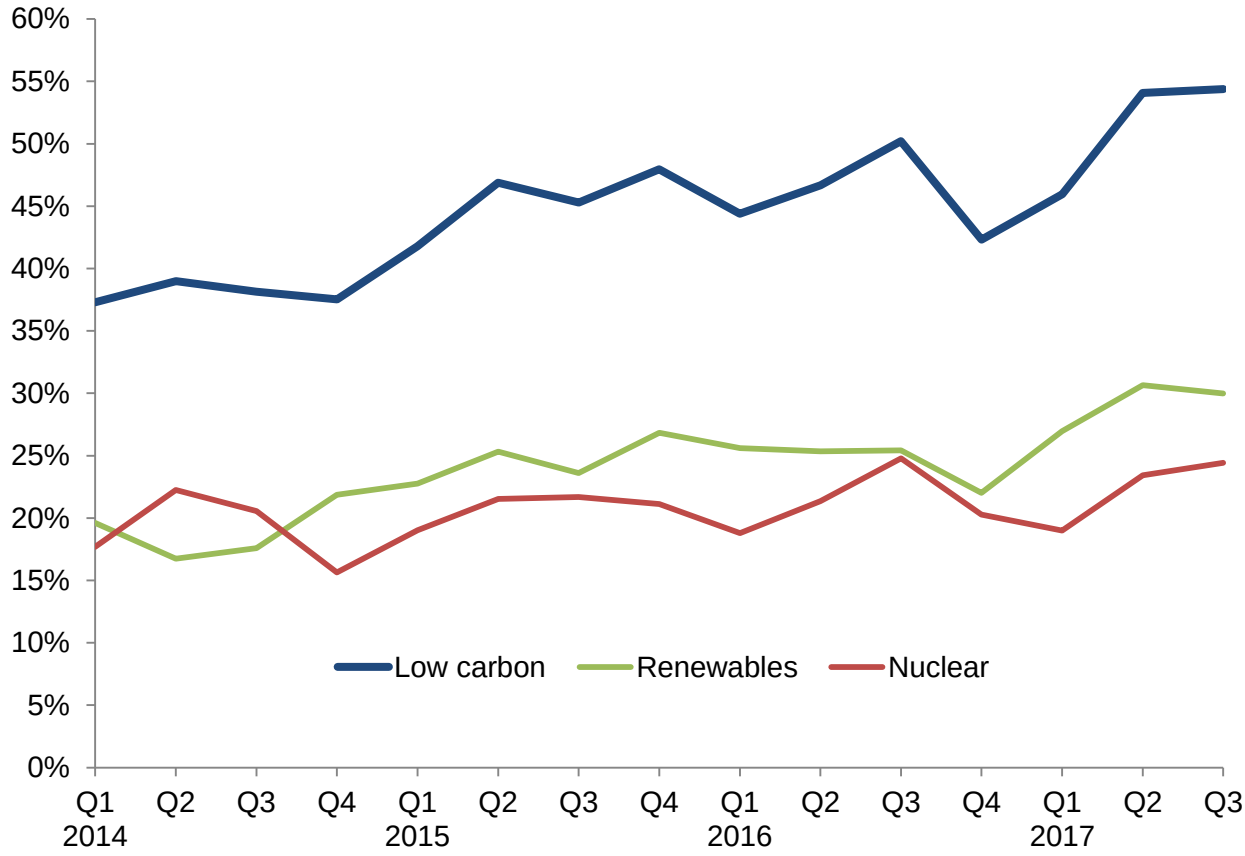
Chart 5.2 Shares of electricity generation (Table 5.1)



The share of renewables (wind, solar, hydro and other renewables) increased from 25.4 per cent in 2016 Q3 to 30.0 per cent in 2017 Q3, a record high for this measure in Q3. This was due to an increase in wind and solar capacity; as well as higher bioenergy generation compared to last year, due to outages at Drax in Q3 2016.

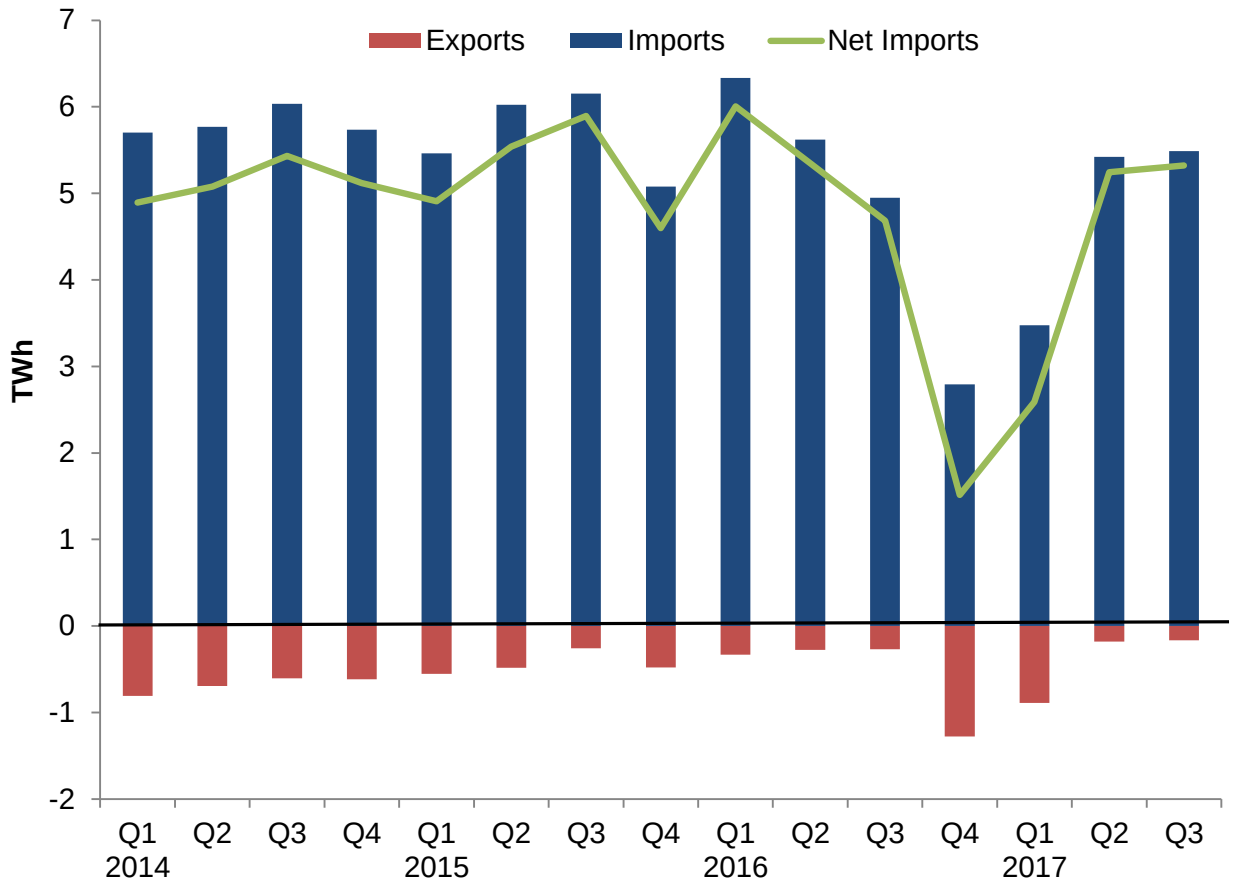
With generation from nuclear sources relatively stable, generation from fossil fuels dropped as a result of the growth of renewables. The share of generation from coal decreased from 3.6 per cent in 2016 Q3 to 2.9 per cent in 2017 Q3. Gas's share of generation decreased from 42.9 per cent in 2016 Q3 to 39.1 per cent in 2017 Q3.

Chart 5.3 Low carbon electricity's share of generation (Table 5.1)



Low carbon electricity's share of generation increased from 50.2 per cent in 2016 Q3 to a record high 54.4 per cent in 2017 Q3, with increasing generation from renewables, replacing coal and gas generation.

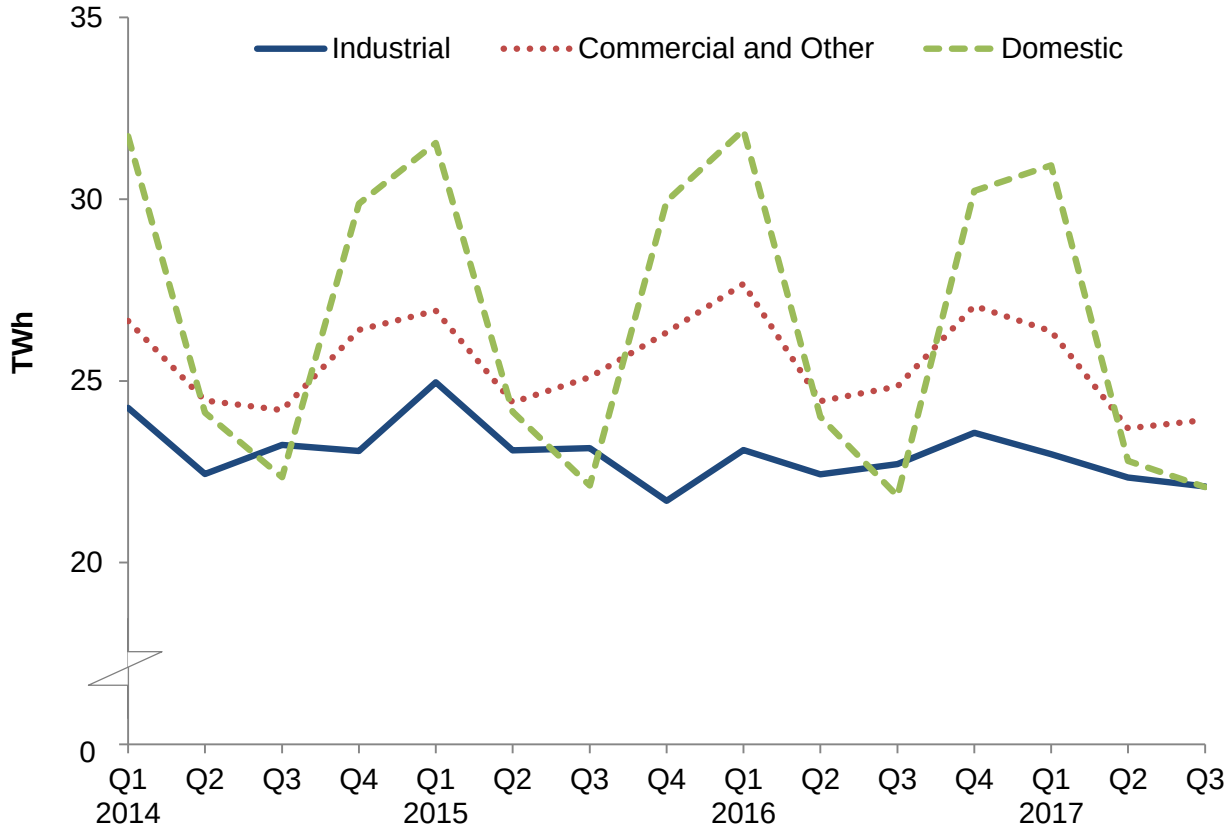
Chart 5.4 UK trade in electricity (Table 5.6)



In 2017 Q3, compared with the same period in 2016, imports of electricity grew by 11 per cent (+0.5 TWh) to 5.5 TWh mostly due to an increase in imports from France. Exports decreased by 38 per cent to 0.17 TWh mostly due to increased exports to France in Q3 2016 following a number of French nuclear outages. The UK has been a net importer of electricity since 2010 Q2.

Net imports of electricity increased by 14 per cent from 4.7 TWh in 2016 Q3 to 5.3 TWh in 2017 Q3, with a rise in imports and drop in exports for the Netherlands and France. Both imports and exports between Ireland and Wales increased in Q3 2017 compared to Q3 2016. This increased the utilisation of the interconnector by 35 per cent (to 58 per cent of its capacity), and was partially due to damage to the interconnector in September last year. Northern Ireland was a net exporter to Ireland in Q3 2017 for the first time since Q1 2014. Imports from Ireland were down 77 per cent, and exports were up over 150 per cent.

Chart 5.5 Electricity final consumption (Table 5.2)

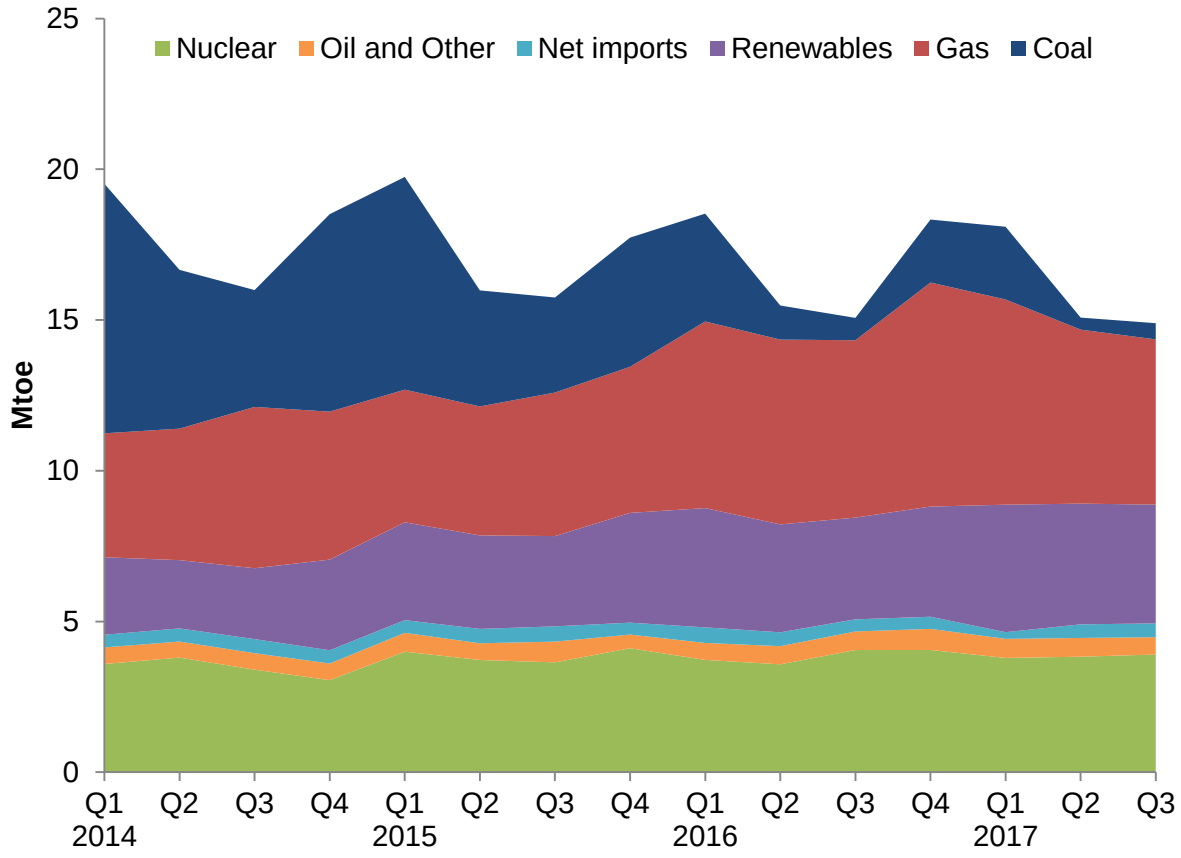


Final consumption of electricity fell by 1.9 per cent in 2017 Q3, from 69.4 TWh in 2016 Q3, to 68.1 TWh.

Domestic use increased by 1.1 per cent from 21.8 TWh in Q3 2016 to 22.1 TWh in Q3 2017. In 2017 Q3, temperatures were on average 1.2 degrees lower than in 2016 Q3 – see Energy Trends table 7.1 at: www.gov.uk/government/statistics/energy-trends-section-7-weather.

Industrial use of electricity, including iron and steel, decreased by 2.7 per cent from 22.7 TWh to 22.1 TWh, while consumption by commercial, transport and other final users decreased by 3.7 per cent, from 24.9 TWh to 23.9 TWh.

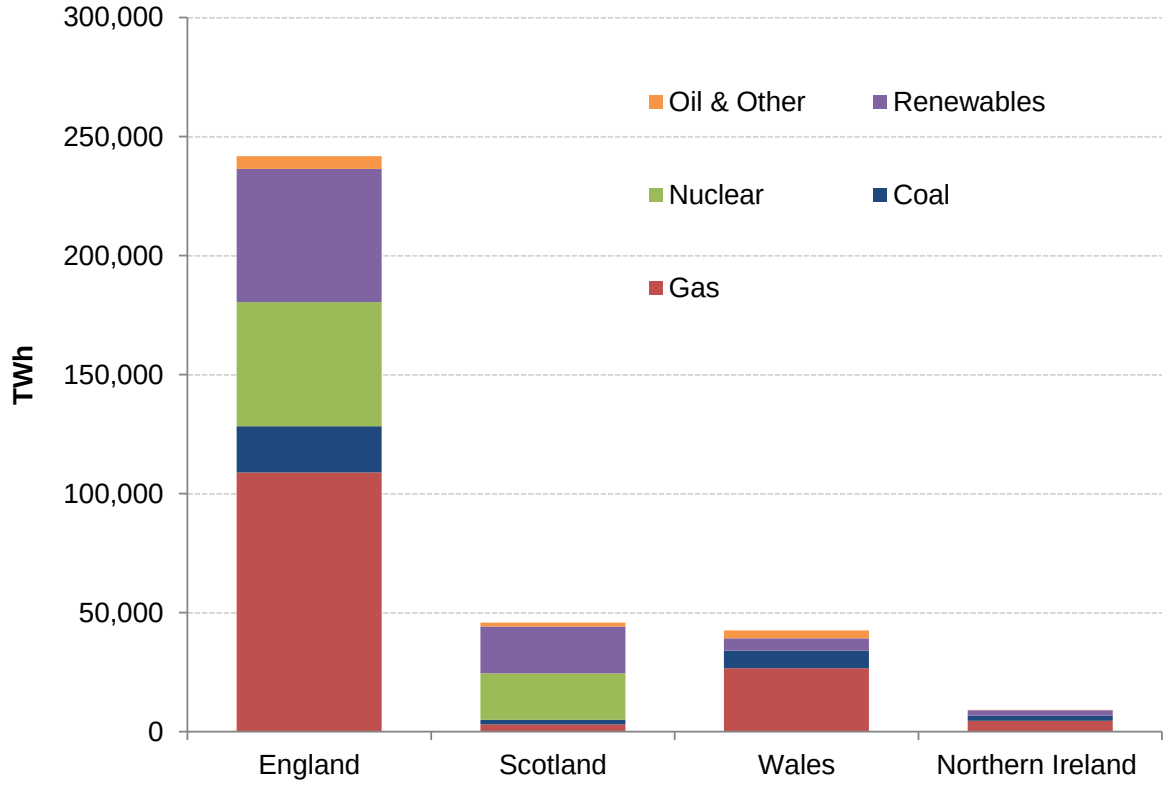
Chart 5.6 Fuel used for electricity generation (Table 5.1)



Fuel used by generators fell 1.2 per cent, from 15.1 mtoe in 2016 Q3 to 14.9 mtoe in 2017 Q3 *(note that for wind (and other primary renewable sources), the fuel used is assumed the same as the electricity generated, unlike thermal generation where conversion losses are incurred).*

In 2017 Q3, gas use was 6.8 per cent lower than in 2016. Coal use during the quarter was 27 per cent lower than a year earlier, whilst nuclear sources fell by 3.6 per cent.

Chart 5.7 Generation by fuel in 2016 for England, Scotland, Wales and Northern Ireland



In 2016, England had a share of 71.3 per cent of electricity generation in the UK with 241.8 TWh. Of England's generation 45.0 per cent was from gas and 8.0 per cent was from coal.

Scotland had a share of 13.4 per cent of electricity generation in the UK with 45.9 TWh. Of Scotland's generation 42.8 per cent was from nuclear, 42.9 per cent from renewables, and 3.9 per cent was from coal.

Wales had a share of 12.5 per cent of electricity generation in the UK with 42.5 TWh. Of Wales's generation 62.9 per cent was from gas, with 17.2 per cent from coal.

Northern Ireland had a share of 2.7 per cent of electricity generation in the UK with 9.2 TWh. Of Northern Ireland's generation, 50.0 per cent came from gas and 23.3 per cent came from coal.

Of electricity generated in the UK, 24.5 per cent came from renewables in 2016. The shares of electricity generated by renewables for each country are: Scotland 42.9 per cent, Northern Ireland 25.4 per cent, England 23.1 per cent and Wales 12.3 per cent.

Data from special feature article "Electricity generation and supply figures for Scotland, Wales, Northern Ireland and England, 2013 to 2016" (see page 65).

5 ELECTRICITY

Table 5.1. Fuel used in electricity generation and electricity supplied

	2015	2016	per cent change	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	per cent change [1]
FUEL USED IN GENERATION													
All generating companies												**Million tonnes of oil equivalent**	
Coal	18.34	7.54	*-58.9*	3.15	4.28	3.58	1.13	0.74	2.09	2.41	0.40	0.54	*-27.5*
Oil	0.61	0.58	*-3.6*	0.17	0.17	0.11	0.15	0.16	0.16	0.18	0.16	0.18	*+10.3*
Gas	18.28	25.63	*+40.2*	4.76	4.85	6.19	6.13	5.88	7.43	6.81r	5.77r	5.48	*-6.8*
Nuclear	15.48	15.41	*-0.4*	3.64	4.11	3.73	3.58	4.05	4.06	3.79	3.83	3.91	*-3.6*
Hydro	0.54	0.46	*-14.4*	0.09	0.16	0.18	0.08	0.10	0.10	0.16r	0.08r	0.11	*+8.3*
Wind and Solar [2]	4.12	4.11	*-0.2*	0.85	1.18	1.12	0.96	1.03	1.00	1.25	1.27r	1.15	*+12.2*
Bioenergy [3]	8.32	9.99	*+20.0*	2.05	2.31	2.66	2.54	2.25	2.55	2.82r	2.66r	2.68	*+19.1*
Other fuels	1.71	1.90	*+10.7*	0.51	0.28	0.46	0.45	0.45	0.54	0.45	0.46	0.39	*-12.9*
Net imports	1.80	1.78	*-1.1*	0.51	0.40	0.52	0.46	0.40	0.40	0.22r	0.45r	0.46	*+13.7*
Total all generating companies	69.20	67.41	*-2.6*	15.75	17.73	18.53	15.48	15.07	18.33	18.09r	15.08r	14.89	*-1.2*
ELECTRICITY GENERATED													
All generating companies												**TWh**	
Coal	75.88	30.71	*-59.5*	12.83	17.48	14.69	4.58	2.72	8.72	10.48r	1.56	2.17	*-20.2*
Oil	2.04	1.84	*-9.7*	0.54	0.55	0.34	0.56	0.44	0.50	0.78r	0.60r	0.64	*+44.0*
Gas	99.88	143.36	*+43.5*	26.56	26.20	34.11	34.49	32.67	42.10	36.82r	30.73r	29.08	*-11.0*
Nuclear	70.34	71.73	*+2.0*	16.56	18.69	17.34	16.66	18.86	18.87	17.64	17.83	18.17	*-3.6*
Hydro (natural flow)	6.30	5.39	*-14.4*	1.03	1.83	2.09	0.94	1.15	1.21	1.84r	0.88r	1.25	*+8.3*
Wind and Solar [2]	47.86	47.79	*-0.2*	9.93	13.69	13.02	11.13	11.96	11.67	14.50r	14.72r	13.42	*+12.2*
- of which, Offshore [6]	17.42	16.41	*-5.8*	3.41	5.76	5.15	3.25	3.58	4.42	5.16r	3.98	3.95	*+10.3*
Bioenergy [3]	29.24	30.04	*+2.7*	7.06	8.22	8.52	7.70	6.22	7.60	8.71r	7.73r	7.63	*+22.8*
Pumped Storage	2.74	2.96	*+8.0*	0.65	0.71	0.76	0.69	0.69	0.82	0.79	0.69	0.64	*-8.1*
Other fuels	4.64	5.57	*+20.2*	1.17	1.11	1.40	1.30	1.34	1.53	1.35	1.37r	1.41	*+4.8*
Total all generating companies	338.92	339.40	*+0.1*	76.34	88.49	92.27	78.04	76.06	93.03	92.92r	76.10r	74.42	*-2.2*
ELECTRICITY SUPPLIED [4]													
All generating companies												**TWh**	
Coal	71.99	29.14	*-59.5*	12.17	16.58	13.94	4.34	2.58	8.28	9.95	1.48	2.06	*-20.2*
Oil	1.85	1.67	*-9.7*	0.49	0.50	0.30	0.51	0.40	0.46	0.71r	0.55r	0.59	*+46.0*
Gas	98.00	140.84	*+43.7*	26.06	25.73	33.56	33.87	32.07	41.34	36.16r	30.18r	28.56	*-10.9*
Nuclear	63.89	65.15	*+2.0*	15.04	16.98	15.75	15.13	17.13	17.14	16.03	16.20	16.51	*-3.6*
Hydro	6.25	5.35	*-14.4*	1.02	1.82	2.07	0.93	1.14	1.20	1.83r	0.87r	1.24	*+8.1*
Wind and Solar [2]	47.87	47.79	*-0.2*	9.93	13.69	13.02	11.13	11.96	11.67	14.50r	14.72r	13.42	*+12.2*
- of which, Offshore [6]	17.42	16.41	*-5.8*	3.41	5.76	5.15	3.25	3.58	4.42	5.16r	3.98	3.95	*+10.3*
Bioenergy [3]	25.38	26.02	*+2.5*	6.12	7.15	7.41	6.69	5.34	6.58	7.60r	6.72r	6.63	*+24.0*
Pumped Storage (net supply) [5]	-0.98	-1.07	*+8.6*	-0.25	-0.25	-0.27	-0.26	-0.23	-0.30	-0.29	-0.25	-0.21	*-9.1*
Other fuels	4.30	5.16	*+20.1*	1.09	1.03	1.30	1.20	1.25	1.42	1.25	1.27r	1.31	*+4.8*
Net imports	20.94	17.55	*-16.2*	5.89	4.60	6.00	5.35	4.68	1.51	2.59r	5.24	5.32	*+13.7*
Total all generating companies	339.49	337.59	*-0.6*	77.57	87.83	93.08	78.88	76.33	89.30	90.33r	76.97r	75.42	*-1.2*

1. Percentage change between the most recent quarter and the same quarter a year earlier.

2. Includes wave and tidal

3. Up to 2006 Q4, this includes non-biodegradable wastes. From 2007 Q1, this is included in 'Other fuels' (as it is not considered a renewable source).

4. Electricity supplied net of electricity used in generation

5. Net supply from pumped storage is usually negative, as electricity used in pumping is deducted.

6. This now includes a small amount of offshore wind generation from other generators

5 ELECTRICITY

Table 5.2 Supply and consumption of electricity

GWh

	2015	2016	*Per cent change*	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	*Per cent change* [1]
SUPPLY													
Indigenous production	338,917	339,398	*+0.1*	76,337	88,489	92,267	78,039	76,062	93,029	92,918r	76,099r	74,421	*-2.2*
Major power producers [2 3]	293,251	289,985	*-1.1*	64,903	77,438	80,565	65,450	63,025	80,945	80,636r	62,882r	61,651	*-2.2*
Auto producers	42,926	46,453	*+8.2*	10,780	10,337	10,940	11,900	12,345	11,268	11,491r	12,523r	12,133	*-1.7*
Other sources [4]	2,739	2,959	*+8.0*	653	714	762	689	693	815	791	694	636	*-8.1*
Imports	22,716	19,699	*-13.3*	6,152	5,080	6,334	5,622	4,951	2,792	3,476r	5,423	5,487	*+10.8*
Exports	1,778	2,153	*+21.1*	259	480	331	275	268	1,279	888r	179	165	*-38.5*
Transfers	-	-		-	-	-	-	-	-	-	-	-	
Total supply	359,855	356,943	*-0.8*	82,230	93,088	98,271	83,386	80,745	94,543	95,506r	81,342r	79,743	*-1.2*
Statistical difference	1,192	194		193	455	-85	186	120	-26	-471r	392r	147	
Total demand	358,663	356,749	*-0.5*	82,037	92,633	98,356	83,200	80,625	94,568	95,977r	80,950r	79,596	*-1.3*
TRANSFORMATION	-	-		-	-	-	-	-	-	-	-	-	
Energy industry use [5]	27,896	26,631	*-4.5*	6,592	7,154	6,974	6,297	6,273	7,087	6,962r	6,228r	6,200	*-1.2*
Losses	27,319	26,323	*-3.6*	5,065	7,499	8,713	6,016	4,969	6,624	8,740r	5,888r	5,302	*+6.7*
FINAL CONSUMPTION	303,448	303,795	*+0.1*	70,380	77,979	82,669	70,886	69,383	80,857	80,275r	68,835r	68,093	*-1.9*
Iron & steel	3,688	2,847	*-22.8*	887	875	708	703	707	730	714	702	685	*-3.0*
Other industries	89,219	88,961	*-0.3*	22,267	20,827	22,387	21,728	22,000	22,845	22,269r	21,637r	21,407	*-2.7*
Transport	4,516	4,669	*+3.4*	1,129	1,129	1,167	1,167	1,167	1,167	1,167	1,167	1,167	-
Domestic	107,764	107,971	*+0.2*	22,124	29,947	31,904	24,014	21,831	30,222	30,926r	22,799r	22,079	*+1.1*
Other final users	98,262	99,347	*+1.1*	23,974	25,202	26,502	23,274	23,679	25,892	25,198r	22,530	22,755	*-3.9*
Non energy use	-	-		-	-	-	-	-	-	-	-	-	

1. Percentage change between the most recent quarter and the same quarter a year earlier.

2. Companies that produce electricity from nuclear sources plus all companies whose prime purpose is the generation of electricity are included under the heading "Major Power Producers". At the end of December 2017 they were:

AES Electric Ltd., Anesco Ltd., Acquisintionco, Baglan Generation Ltd., British Energy plc., British Solar Renewables Ltd., Centrica Energy, Centrica Renewable Energy Ltd., CEP Wind 2, Coolkeeragh ESB Ltd., Corby Power Ltd., Coryton Energy Company Ltd., Cubico Sustainable Investments Ltd., Deeside Power Development Company Ltd., DONG Energy Burbo UK Ltd., Drax Power Ltd., EDF Energy plc., EDF Energy Renewables Ltd., Eggborough Power Ltd., E.On UK plc., Eneco Wind UK Ltd., Energy Power Resources, Falck Renewables Ltd., Fellside Heat and Power Ltd., Ferrybridge Mulitfuel Energy Limited, First Hydro Company., Greencoat UK Wind plc., Immingham CHP, Infinis plc., International Power Mitsui, Lark Energy Ltd., Lightsource Renewable Energy Ltd., London Waste Ltd., Lynemouth Power Ltd., Magnox North Ltd., Marchwood Power Ltd., Peel Energy Ltd., Premier Power Ltd., REG BlackRock , Riverside Resource Recovery Ltd., Rocksavage Power Company Ltd., RWE Innogy Markinch Ltd., RWE Npower plc., Saltend Cogeneration Company Ltd., Scira Offshore Energy Ltd., Scotia Wind (Craigengelt) Ltd., Scottish Power plc., Scottish and Southern Energy plc., Seabank Power Ltd., SELCHP Ltd., Sembcorp Utilities (UK) Ltd., Severn Power Ltd., Slough Heat and Power Ltd., Spalding Energy Company Ltd., Statkraft Energy Ltd., Statkraft Wind UK Ltd.,Third Energy Trading Ltd., Viridor Waste Management Ltd., Xceco

3. This table includes the change of definition of Major power producers (MPPs) to include major wind farm companies. Details of this change of definition were given in an article on pages 43 to 48 of the September 2008 edition of Energy Trends.

4. Gross supply from pumped storage hydro.

5. Includes electricity used in generation and for pumping, along with energy used by other fuel industries (including coal and coke, blast furnaces, extraction of oil and gas, petroleum refiniries, nuclear fuel production and gas and electricity supply) .

Section 6 - Renewables

Key results show:

Renewables' share of electricity generation was 30.0 per cent in 2017 Q3, up 4.6 percentage points on the share in 2016 Q3, with increased renewable capacity and availability (as well as lower overall generation), outweighing slightly less favourable weather conditions for renewable generation (lower wind speeds). However, this was down 0.7 percentage points on 2017 Q2's record 30.7 per cent. **(Chart 6.1)**

Renewable electricity generation was 22.3 TWh in 2017 Q3, an increase of 15 per cent on the 19.3 TWh in 2016 Q3, though 11 per cent lower than the peak quarterly generation of 2017 Q1 (25.1 TWh). **(Chart 6.2)**

Bioenergy generation rose by 23 per cent (1.4 TWh), the highest increase across the technologies, to 7.6 TWh, due to increased availability at Drax, following outages one year ago. Onshore wind generation increased by 20 per cent, from 4.6 TWh in 2016 Q3 to 5.6 TWh in 2017 Q3, while offshore wind increased from 3.6 TWh to 3.9 TWh, an increase of 10 per cent. **(Chart 6.2)**

Renewable electricity capacity was 38.9 GW at the end of 2017 Q3, a 13 per cent increase (4.4 GW) on a year earlier, and a 2.1 per cent (0.8 GW) increase on the previous quarter, with half of the annual increase coming from onshore wind, and around one quarter from offshore wind. **(Chart 6.3)**

In 2017 Q3, just 62 MW of capacity eligible for the Feed in Tariff scheme was installed, increasing the total to 6.2 GW, across 914,560 installations. **(Chart 6.5)**

Liquid biofuels consumption fell by 4.5 per cent, from 385 million litres in 2016 Q3 to 368 million litres in 2017 Q3. Bioethanol consumption increased by 0.7 per cent while biodiesel consumption decreased by 9.5 per cent. In 2017 Q3, liquid biofuels represented 3.1 per cent of petrol and diesel consumed in road transport, down from 3.2 per cent a year earlier. **(Chart 6.6)**

Relevant tables

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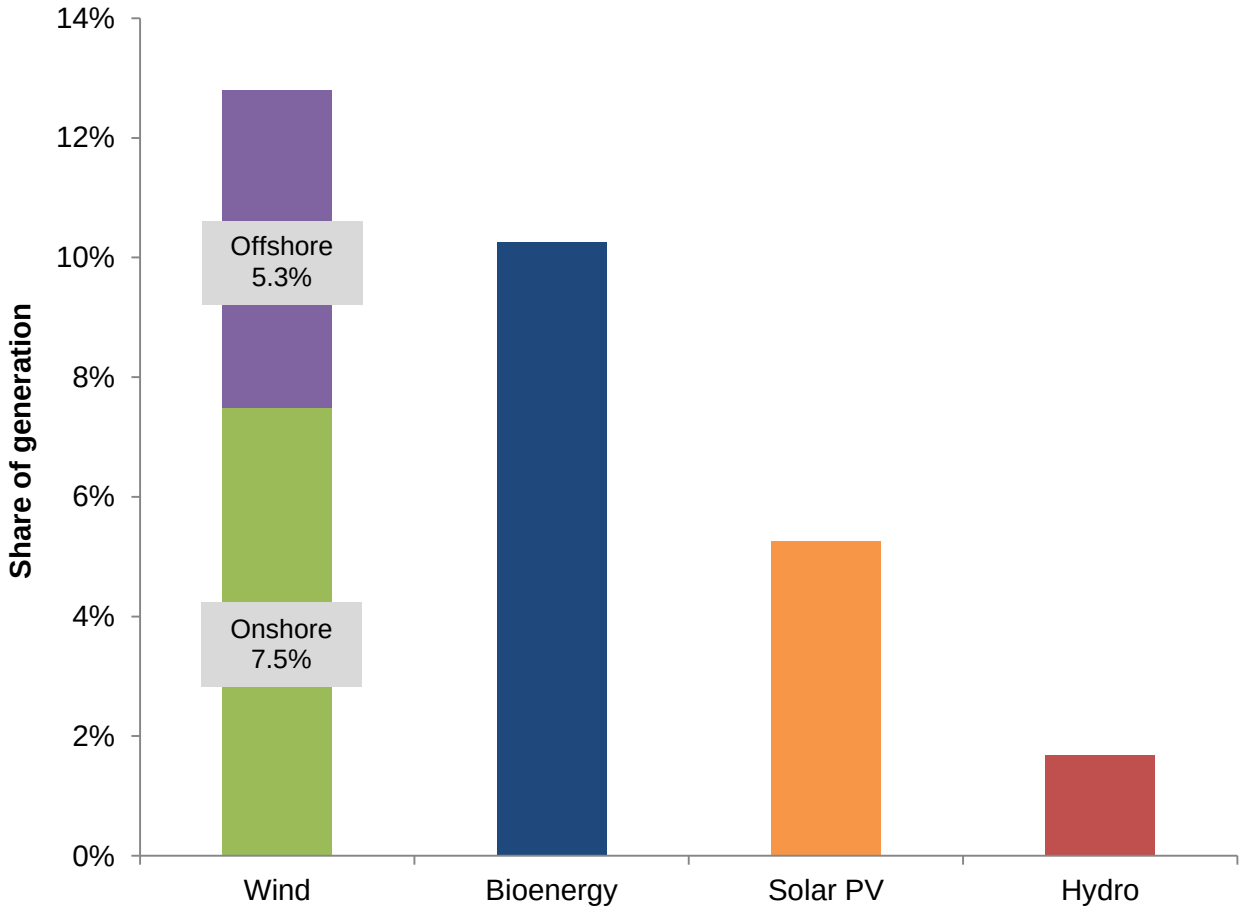
Chart 6.1 Renewables' share of electricity generation (Table 6.1)



Renewables' share of electricity generation increased from 25.4 per cent in 2016 Q3 to 30.0 per cent in 2017 Q3. However, compared to 2017 Q2, renewables' share was 0.7 percentage points lower.

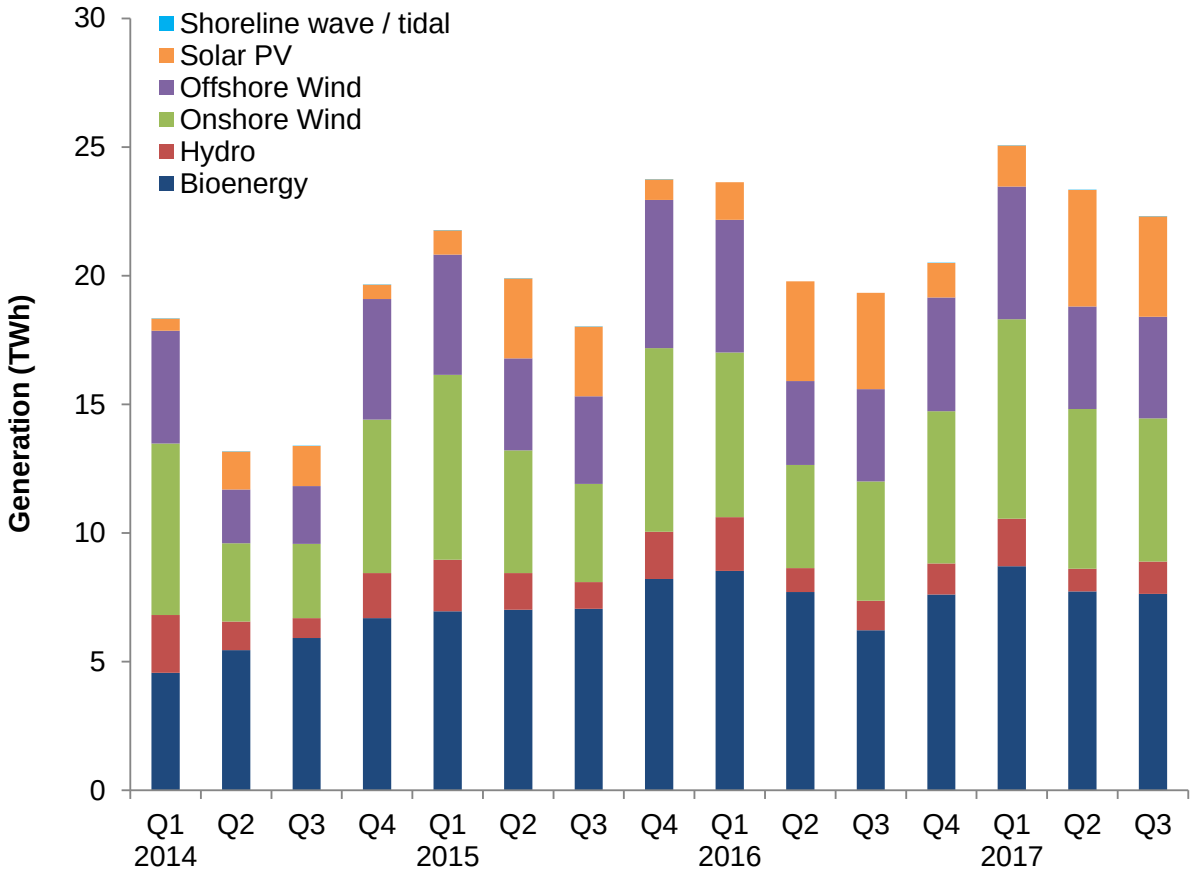
The increased share on a year earlier reflects the increase in renewables generation in addition to a decrease (2.2 per cent) in total electricity generation.

Total electricity generated from renewables in 2017 Q3 was 22.3 TWh, an increase of 3.0 TWh (15 per cent) compared to 2016 Q3, but 11 per cent lower than the record of 25.1 TWh in 2017 Q1.

Overall electricity generation fell by 2.2 per cent (1.6 TWh) from 76.1 TWh in 2016 Q3 to 74.4 TWh in 2017 Q3. This decrease accounted for 0.6 percentage points of the 4.6 percentage point increase in the share of renewable generation.

Total electricity generation figures (all generating companies) can be found in table ET 5.1, at: www.gov.uk/government/statistics/electricity-section-5-energy-trends

Chart 6.2 Renewable electricity generation (Table 6.1)



In 2017 Q3, generation from bioenergy[1], at 7.6 TWh, was up by 1.4 TWh (23 per cent) on a year earlier. Within this, generation from plant biomass was up 35 per cent (1.2 TWh), due to increased availability at Drax, following extensive outages a year earlier; this was offset slightly by reduced generation from landfill gas.

In 2017 Q3, electricity generated from onshore wind increased by 20 per cent, from 4.6 TWh in 2016 Q3 to 5.6 TWh, with generation from offshore wind up by 10 per cent to 3.9 TWh. Large increases in capacity over the year, particularly for onshore wind, more than out-weighed reduced wind speeds during the quarter. Wind speeds in 2017 Q3, at 8.0 knots, were down 0.3 knots on 2016 Q3, but around the same as the long term mean - see Energy Trends table 7.2 at: www.gov.uk/government/statistics/energy-trends-section-7-weather.

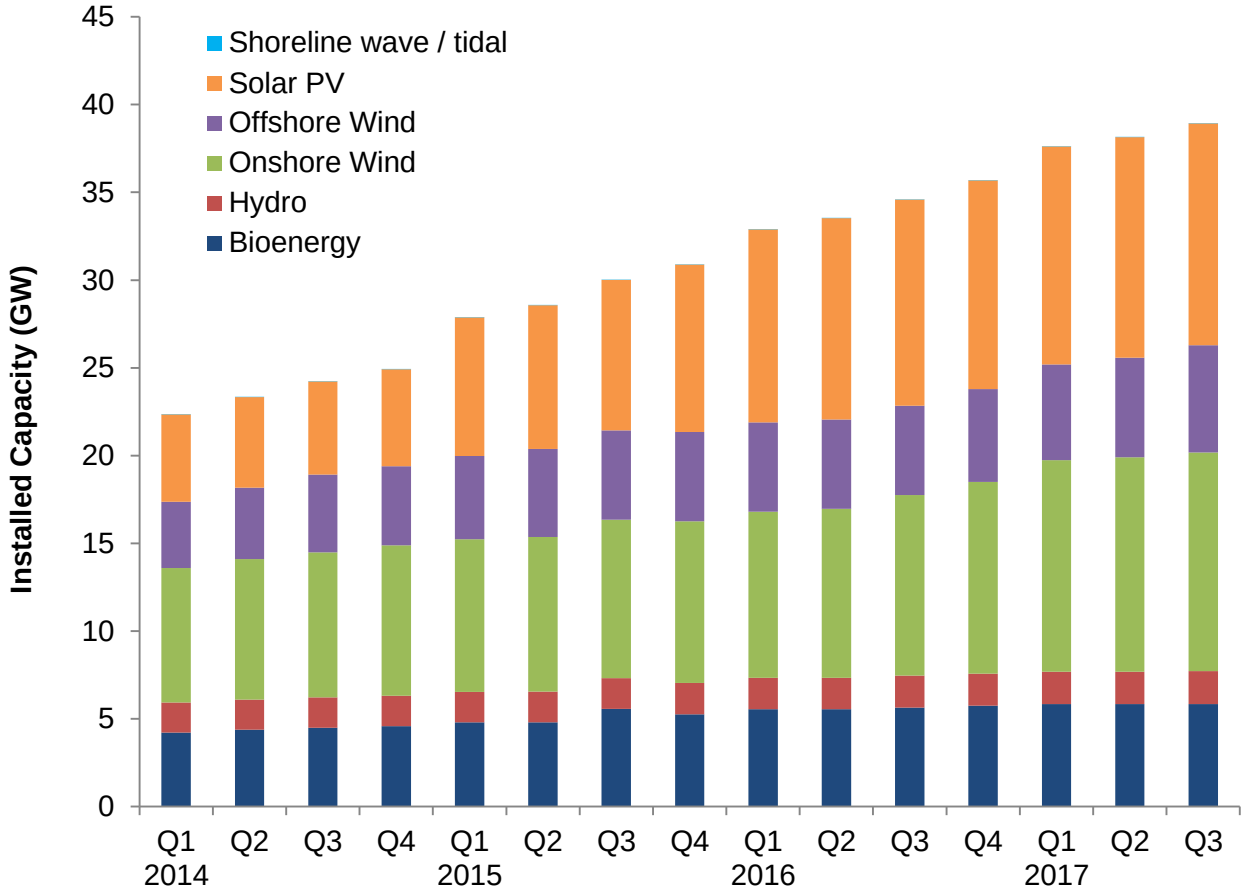
Generation from solar photovoltaics increased by 4.2 per cent (0.2 TWh) to 3.9 TWh, compared to 2016 Q3, due to increased capacity.

Hydro generation rose by 8.3 per cent on a year earlier to 1.2 TWh; average rainfall (in the main hydro catchment areas) fell by 9.5 per cent during the quarter; however, within this, rainfall in the more critical first two months was up 2.8 per cent (including the wettest August since 2004), following the wettest June in the last 17 years (over double that of a year earlier)- see Energy Trends table 7.4 at: www.gov.uk/government/statistics/energy-trends-section-7-weather.

Bioenergy had the largest share of generation (34 per cent) with, 25 per cent from onshore wind, 18 per cent from each of offshore wind and solar PV, and 5.6 per cent from hydro.

[1] Bioenergy consists of: landfill gas, sewage gas, energy from waste, plant biomass, animal biomass, anaerobic digestion and co-firing (generation only)

Chart 6.3 Renewable electricity capacity (as at end of quarter) (Table 6.1)



At the end of 2017 Q3, the UK's renewable electricity capacity totalled 38.9 GW, an increase of 13 per cent (4.4 GW) on that installed at the end of 2016 Q3, and 1.8 per cent (0.7 GW) higher than the previous quarter.

At the end of 2017 Q3, solar PV, at 12.6 GW, represented just over 32 per cent of all renewable capacity, the highest share of renewable technologies. This was followed by onshore wind (32 per cent), offshore wind (16 per cent) and bioenergy (15 per cent).[2]

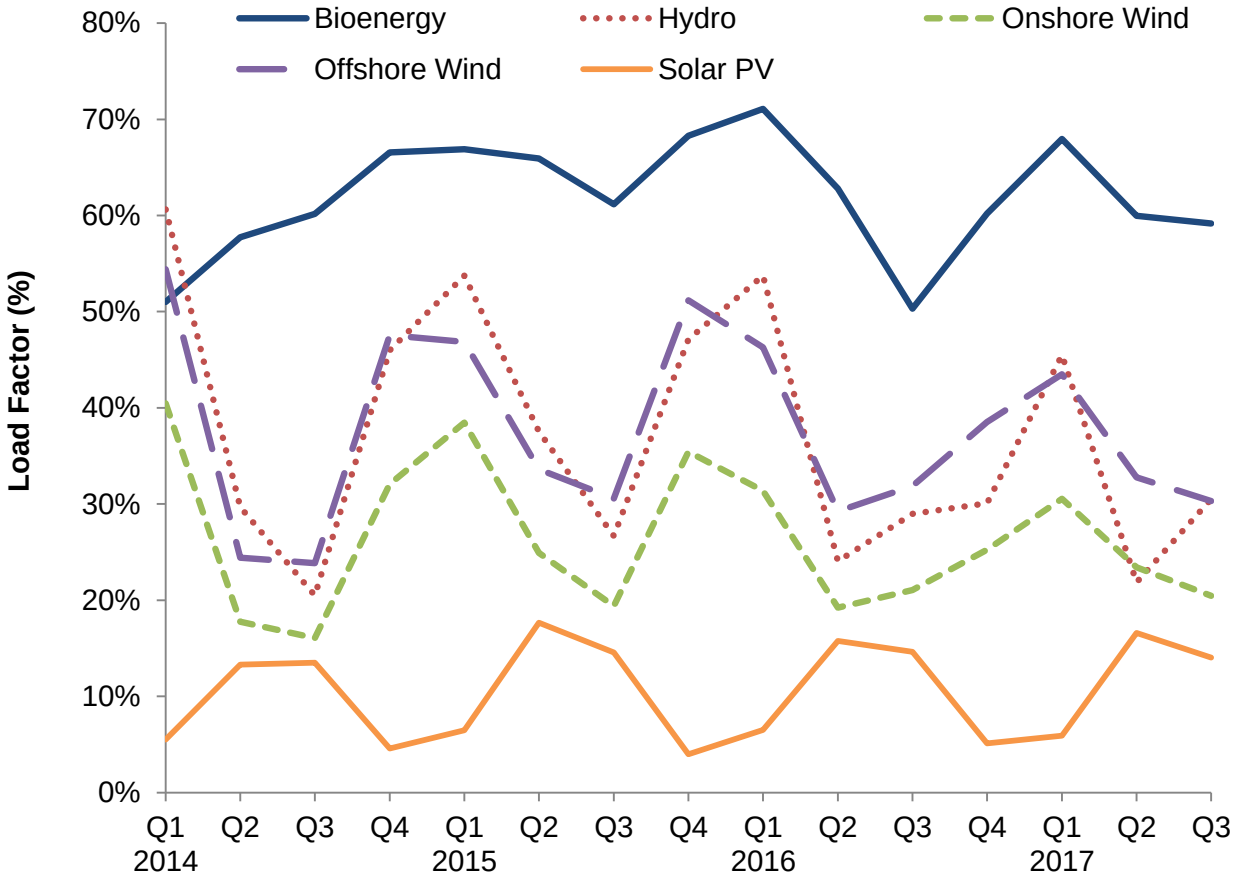
Compared with 2016 Q3, onshore wind capacity increased by 2.2 GW (21 per cent), and offshore wind by 1.0 GW (20 per cent). During 2017 Q3, offshore wind capacity increased by 456 MW, with the final 162 MW (of 402 MW) installed at Dudgeon and a further 282 MW installed at Race Bank (with 360 MW of the final 573 MW now operational). Additionally, the first two (of five) 6 MW turbines at the world's first floating offshore wind farm, Hywind (in Scotland), became operational. Meanwhile, onshore wind capacity increased by 240 MW, mainly in Scotland: a further 83 MW installed at Bhlaraidh (just short of the 110 MW final capacity), 77 MW at Kilgallioch (increasing capacity to 194 MW, of the final 239 MW), and the opening of the 61.5 MW Brockloch Rig.

Solar PV increased by 0.9 GW on a year ago, with over half deployed in 2017 Q1, with the closure of the Renewables Obligation (RO) to the remaining new (grace period) solar schemes on 31 March 2017. During 2017 Q3, just 63 MW was deployed, with reduced RO/FiT support levels.

Although bioenergy capacity was broadly unchanged on the previous quarter, across the year, it increased by 208 MW, with almost half from plant biomass and around one quarter each from energy from waste and (mainly FiT-supported) anaerobic digestion plants.

[2] To note that renewable generation and capacity figures include installations accredited on all support schemes (Renewables Obligation, Feed in Tariffs, Contracts for Difference), as well as those not eligible for support or are commissioned but awaiting support accreditation. This should particularly be noted for solar PV (and onshore wind), where figures consist of many installations across several or all of these categories.

Chart 6.4 Renewable electricity load factors (Table 6.1)



In 2017 Q3, onshore wind's load factor fell by 0.6 percentage points, from 21.0 per cent in 2016 Q3 to 20.4 per cent, due to lower onshore wind speeds. Offshore wind's load factor fell by 1.6 percentage points, from 31.9 per cent in 2016 Q3 to 30.3 per cent in 2017 Q3. [3]

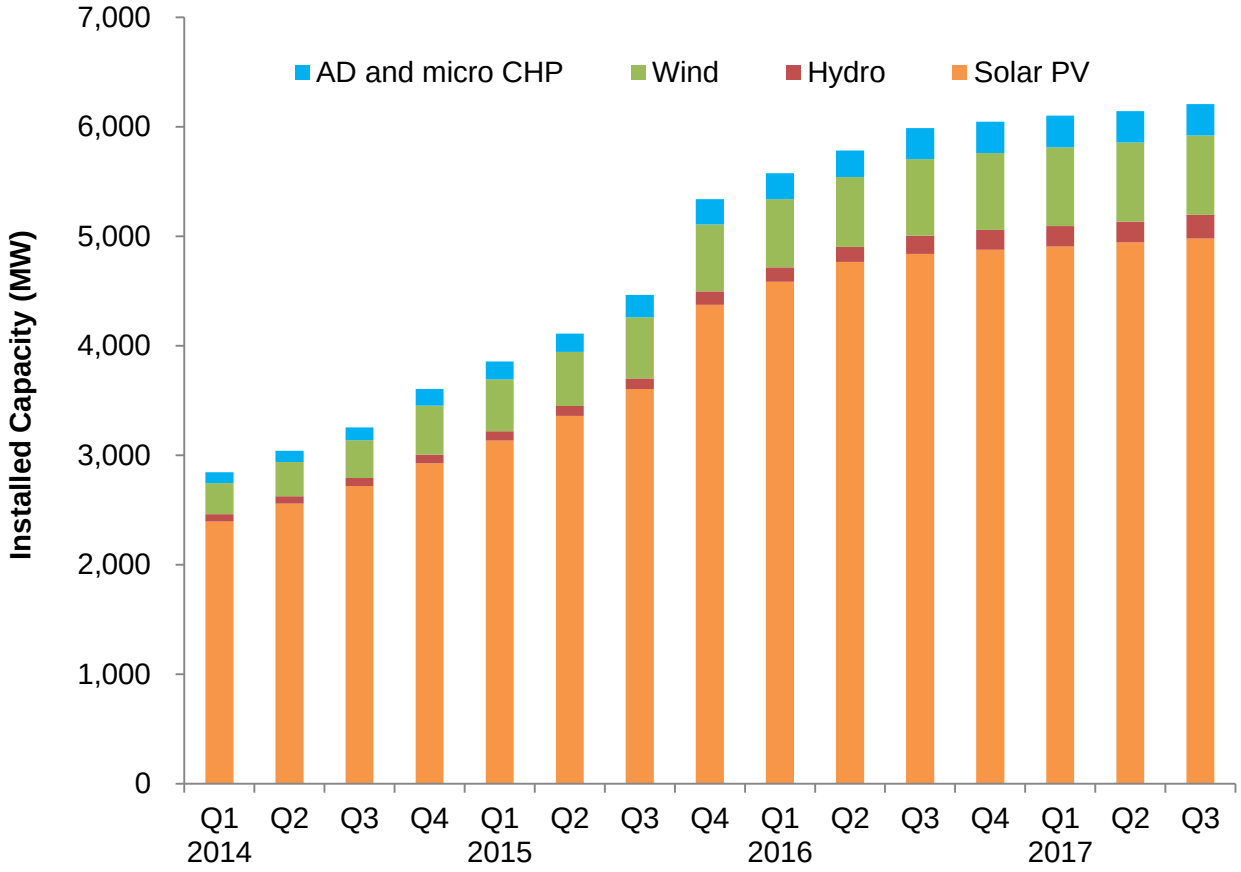
Compared with 2017 Q2, onshore wind's load factor was down by 3.0 percentage points, while offshore wind's load factor was 2.5 percentage points lower, with wind speeds 0.4 knots lower, at 8.0 knots.

Hydro's load factor in 2017 Q3 increased by 1.5 percentage points, from 29.0 per cent in 2016 Q3 to 30.5 per cent, due to higher rainfall in the first two months of the quarter, and a seventeen-record high rainfall in June. Compared with 2017 Q2, hydro's load factor in 2017 Q3 was 8.6 percentage points higher, with 63 per cent more rainfall in the main hydro areas.

For bioenergy, the load factor in 2017 Q3, at 59.2 per cent, was up by 8.9 percentage points on a year earlier, but down by 0.8 percentage points on 2017 Q2, with one Drax unit, the largest generator within the bioenergy category, on outage in September.

[3] Load Factors are calculated using an average of capacity at the start and end of the quarter. Therefore, they can be influenced by the time in the quarter when any new capacity came online. This may particularly be the case for large wind farms, such as London Array offshore, that come online incrementally throughout the quarter.

Chart 6.5 Feed in Tariffs: eligible installed capacity (as at end of quarter)



At the end of 2017 Q3, 6,206 MW of capacity was installed and eligible for the GB Feed in Tariff (FiT) scheme[4]. This was a 3.6 per cent increase on that installed at the end of 2016 Q3, but just 1.0 per cent (62 MW) up on the previous quarter.

In terms of number of installations, at the end of 2017 Q3, there were over 914,000 installed and eligible for the FiT scheme, a 4.0 per cent increase on the number installed a year earlier.

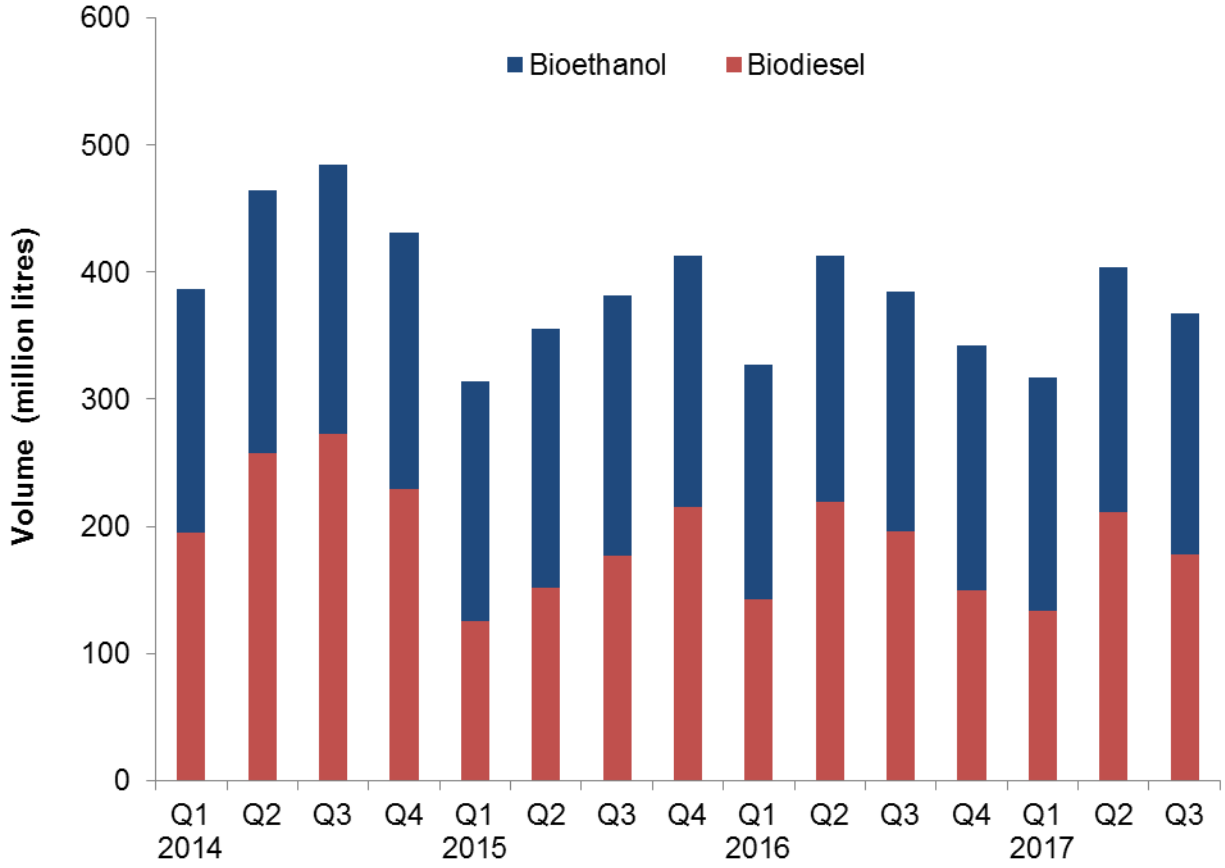
Solar photovoltaics (PVs) represent the majority of both installations and installed capacity on FiTs, with, respectively, 99 per cent and 80 per cent of the total. The majority of FiT-eligible PV installations are sub-4 kW retrofitted schemes, 2,454 MW (49 per cent) across 851,000 installations at the end of 2017 Q3.

Renewable installations eligible for FiTs (all except MicroCHP) represented 16 per cent of all renewable installed capacity.

Statistics on Feed in Tariffs can be found at: www.gov.uk/government/collections/feed-in-tariff-statistics

[4] Data are for schemes accredited under the Microgeneration Certification Scheme (MCS) and ROOFIT, which are pre-requisites for registering for the FIT scheme; not all of these installations will eventually be confirmed onto the FIT scheme.

Chart 6.6 Liquid biofuels for transport consumption (Table 6.2)



In 2017 Q3, 368 million litres of liquid biofuels were consumed in transport, a fall of 4.5 per cent (17 million litres) on the total in 2016 Q3.

In 2017 Q3, biodiesel accounted for 2.3 per cent of diesel, and bioethanol 4.4 per cent of motor spirit. The combined contribution of the two fuels was 3.1 per cent, 0.2 percentage points lower than 2016 Q3's share.

Bioethanol consumption increased by 0.7 per cent, from 189 million litres in 2016 Q3 to 190 million litres in 2017 Q3, while biodiesel consumption fell by 19 million litres (9.5 per cent), to 177 million litres over the same period.

Biofuel consumption was split broadly equally between bioethanol and biodiesel, with bioethanol taking the slightly larger share at 52 per cent.

6 RENEWABLES

Table 6.1. Renewable electricity capacity and generation

	2015	2016	per cent change	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter p	per cent change [11]
Cumulative Installed Capacity [1]												**MW**	
Onshore Wind	9,222	10,924	*+18.5*	9,022	9,222	9,479	9,633	10,295	10,924	12,057r	12,219r	12,459	*+21.0*
Offshore Wind	5,094	5,294	*+3.9*	5,094	5,094	5,094	5,094	5,094	5,294	5,455	5,671	6,127	*+20.3*
Shoreline wave / tidal	9	13	*+50.9*	9	9	8	8	8	13	18r	18r	18	*(+)*
Solar photovoltaics	9,535	11,899	*+24.8*	8,581	9,535	11,008	11,469	11,742	11,899	12,420r	12,569r	12,632	*+7.6*
Small scale Hydro	299	358	*+19.6*	271	299	307	311	343	358	361r	366r	390	*+13.6*
Large scale Hydro	1,477	1,477	-	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	-
Landfill gas	1,061	1,062	*+0.1*	1,061	1,061	1,062	1,062	1,062	1,062	1,068r	1,068r	1,068	*+0.5*
Sewage sludge digestion	231	257	*+11.3*	231	231	257	257	257	257	270r	271r	271	*+5.4*
Energy from waste	925	1,017	*+9.9*	902	925	934	934	983	1,017	1,033	1,033	1,033	*+5.0*
Animal Biomass (non-AD) [2]	111	129	*+17.0*	111	111	129	129	129	129	129	129	129	-
Anaerobic Digestion	323	420	*+29.9*	299	323	370	377	405	420	449r	450r	450	*+11.0*
Plant Biomass [3]	2,607	2,850	*+9.3*	2,963	2,607	2,787	2,787	2,796	2,850	2,891r	2,891r	2,891	*+3.4*
Total	30,893	35,700	*+15.6*	30,021	30,893	32,909	33,537	34,591	35,700	37,629r	38,162r	38,945	*+12.6*
Co-firing [4]	21	13	*-35.9*	21	21	13	13	13	13	2	2	2	*-81.9*
Generation [5]												**GWh**	
Onshore Wind [6]	22,894	20,962	*-8.4*	3,817	7,135	6,406	4,010	4,631	5,915	7,752r	6,205r	5,570	*+20.3*
Offshore Wind [6, 7]	17,423	16,406	*-5.8*	3,412	5,757	5,150	3,253	3,584	4,419	5,160r	3,983r	3,947	*+10.1*
Shoreline wave / tidal [6]	2	0	*-99.6*	0	0	-	-	-	0	0	0r	1	
Solar photovoltaics [6]	7,546	10,420	*+38.1*	2,701	798	1,464	3,872	3,750	1,335	1,591r	4,527r	3,907	*+4.2*
Hydro [6]	6,298	5,395	*-14.3*	1,028	1,834	2,089	938	1,154	1,214	1,844r	879r	1,249	*+8.3*
Landfill gas [6]	4,872	4,703	*-3.5*	1,201	1,220	1,218	1,171	1,158	1,156	1,093r	1,050r	1,033	*-10.8*
Sewage sludge digestion [6]	894	950	*+6.3*	217	220	236	251	229	234	265r	273r	265	*+15.7*
Energy from waste [8]	2,585	2,741	*+6.0*	687	688	728	626	677	710	791r	842r	906	*+33.8*
Co-firing with fossil fuels	183	117	*-35.9*	57	55	51	15	5	47	21	0	1	*-84.8*
Animal Biomass (non-AD) [2, 6]	648	650	*+0.4*	142	165	171	165	140	173	173	169r	147	*+4.6*
Anaerobic Digestion	1,471	2,052	*+39.5*	371	426	482	492	524	554	572r	595r	592	*+13.0*
Plant Biomass [3, 6]	18,587	18,829	*+1.3*	4,383	5,443	5,637	4,981	3,481	4,730	5,792r	4,802r	4,689	*+34.7*
Total	83,403	83,225	*-0.2*	18,015	23,741	23,633	19,773	19,333	20,485	25,055r	23,326r	22,307	*+15.4*
Non-biodegradable wastes [9]	2,586	2,742	*+6.0*	687	688	728	626	678	710	791r	841r	906	*+33.7*
Load Factors [10]													
Onshore Wind	29.4%	23.7%		19.4%	35.4%	31.4%	19.2%	21.0%	25.2%	31.2%r	23.4%r	20.4%	
Offshore Wind	41.5%	36.0%		30.6%	51.2%	46.3%	29.2%	31.9%	38.5%	44.5%r	32.8%r	30.3%	
Solar photovoltaics	11.4%	11.1%		14.6%	4.0%	6.5%	15.8%	14.6%	5.1%	6.1%r	16.6%r	14.0%	
Hydro	41.0%	34.0%		26.7%	47.1%	53.7%	24.1%	29.0%	30.1%	46.5%r	21.9%r	30.5%	
Landfill gas	52.5%	50.4%		51.2%	52.1%	52.5%	50.5%	49.4%	49.3%	47.5%r	45.0%r	43.8%	
Sewage sludge digestion	44.2%	44.3%		42.4%	43.1%	44.3%	44.7%	40.3%	41.3%	46.5%r	46.2%r	44.2%	
Energy from waste	36.8%	32.1%		35.8%	34.1%	35.9%	30.7%	32.0%	32.1%	35.7%r	37.3%r	39.7%	
Animal Biomass (non-AD)	66.9%	61.7%		58.1%	67.7%	65.4%	58.5%	49.2%	60.7%	62.0%	59.9%r	51.5%	
Anaerobic Digestion	59.3%	62.8%		59.5%	61.9%	63.7%	60.4%	60.7%	60.8%	60.9%r	60.6%r	59.6%	
Plant Biomass	87.2%	78.6%		75.5%	88.5%	95.7%	81.8%	56.5%	75.9%	93.4%r	76.1%r	73.5%	
Total (excluding co-firing and non-biodegradable wastes)	34.0%	28.4%		27.8%	35.2%	33.8%	27.2%	25.7%	26.3%	31.6%r	28.2%r	26.2%	

1. Cumulative capacity at the end of the quarter/year
2. Includes the use of poultry litter and meat and bone.
3. Includes the use of straw and energy crops. Also includes high-range co-firing (>85% biomass).
4. This is the amount of fossil fuelled capacity used for co-firing of renewables based on the proportion of generation accounted for by the renewable source over the course of the year.
5. Generation figures for the latest quarter are highly provisional, particularly for the thermal renewable technologies (such as landfill gas) in the lower half of the table.
6. Actual generation figures are given where available, but otherwise are estimated using a typical load factor or the design load factor, where known. Generation from FiT schemes is estimated this way.
7. For 2009, shoreline wave and tidal are included in offshore wind.
8. Biodegradable part only, which accounts for 50% from 2015.
9. Non-biodegradable (50%, from 2015) part of Energy from Waste, plus a small quantity of generation from waste tyres, hosptal waste and general industrial waste.
10. Load factors are calculated based on installed capacity at the beginning and the end of the quarter/year. These can be influenced by the time in the period when new capacity came online.

Load factors on an *unchanged configuration* basis, which consider just those sites operational throughout the year, are available annually in table DUKES 6.5, at:
www.gov.uk/government/publications/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes

11. Percentage change between the most recent quarter and the same quarter a year earlier; (+) represents a positive percentage change greater than 100%.

6 RENEWABLES

Table 6.2. Liquid biofuels for transport consumption

	2015	2016	*per cent change*	2015 3rd Quarter	2015 4th Quarter	2016 1st quarter	2016 2nd quarter	2016 3rd Quarter	2016 4th Quarter	2017 1st Quarter	2017 2nd Quarter	2017 3rd Quarter p	*per cent change* [1]
Volume (million litres)												**Million litres**	
Bioethanol	795	759	*-4.5*	205	198	184	194	189	192	184	193	190	*0.7%*
Biodiesel	669	708	*+5.8*	177	215	143	219	196	150	133	211	177	*-9.5%*
Total biofuels for transport	1,464	1,467	*+0.2*	382	413	327	413	385	342	317	404	368	*-4.5%*
Energy (thousand toe)												**ktoe**	
Bioethanol	448	428	*-4.5*	116	112	104	109	107	108	104	109	107	*0.7%*
Biodiesel	550	582	*+5.8*	145	177	117	180	161	123	109	173	146	*-9.5%*
Total biofuels for transport	998	1,010	*+1.2*	261	288	221	289	268	231	213	282	253	*-5.4%*
Shares of road fuels													
Bioethanol as per cent of Motor Spirit	4.6%	4.4%		4.7%	4.5%	4.5%	4.4%	4.4%	4.5%	4.6%	4.5%	4.4%	
Biodiesel as per cent of DERV	2.3%	2.4%		2.4%	2.9%	2.0%	2.9%	2.6%	1.9%	1.9%	2.7%	2.3%	
Total biofuels as per cent of road fuels	3.2%	3.1%		3.3%	3.5%	2.9%	3.4%	3.2%	2.8%	2.8%	3.4%	3.1%	

1. Percentage change between the most recent quarter and the same quarter a year earlier.

Source: HM Revenue and Customs Hydrocarbon Oils Bulletin, available at
www.uktradeinfo.com/Statistics/Pages/TaxAndDutybulletins.aspx

Shares of road fuels - % change on quarter in previous year	**% change on quarter in previous year (-ve value is decrease)**								
Bioethanol as per cent of Motor Spirit	-0.1%	0.0%	-0.1%	-0.2%	-0.3%	-0.1%	0.1%	0.1%	0.1%
Biodiesel as per cent of DERV	-1.4%	-0.3%	0.2%	0.8%	0.2%	-0.9%	-0.1%	-0.1%	-0.3%
Total biofuels as per cent of road fuels	-0.9%	-0.2%	0.0%	0.4%	0.0%	-0.7%	-0.1%	-0.1%	-0.2%

Electricity generation and supply figures for Scotland, Wales, Northern Ireland and England, 2013 to 2016

Introduction

This article shows how generation and consumption of electricity varies across the four countries of the United Kingdom. It updates and extends a previous version published in December 2016[1]. The UK figures shown in this article are taken from chapters 5 and 6 of the Digest of United Kingdom Energy Statistics (DUKES) 2017[2] and so the definitions used are identical to those in the Digest. Tables 1 and 2 are included at the end of the main text and cover the last four years, with revised data for 2004 to 2016 available in the accompanying Excel spreadsheet.

Key points

- As in previous years, England had the largest share of total generation at 71 per cent, while Scotland's share fell from 15 per cent to 14 per cent. Wales saw an increase from 11 per cent to 13 per cent and Northern Ireland's share of generation remained stable at 3 per cent.
- The share of UK electricity generation from coal fell sharply in 2016 across all four nations (down 13.3 percentage points), while gas generation increased (up 12.8 pp).
- Autogenerators supplied a rising share of UK public electricity, at 7.2 per cent in 2016 (up 2.7 pp since 2013), particularly from non-MPP renewable sources. Autogenerators provide a particularly large proportion of public electricity consumption in Scotland and Northern Ireland with shares of 12.8 per cent and 11.3 per cent respectively in 2016.
- The share of renewable generation in 2016 was stable at 25 per cent (down 0.1 pp from 2015). Scotland maintained the highest share at a record high 43 per cent (up 0.5 pp), whilst England increased its share the most, to 23 per cent (up 0.6 pp). In Wales and Northern Ireland the share of generation from renewables decreased slightly in 2016 from record highs in 2015, to 12 per cent (down 1.4 pp), and 25 per cent (down 0.2 pp) respectively. These small movements were due to poor weather conditions for renewables generation despite increases in capacity.
- The 2015 closure of the Wylfa nuclear power station in Wales means that England and Scotland are now the only countries generating nuclear power. However this closure did not decrease the overall share of generation from nuclear energy because outages had curtailed generation at existing English and Scottish nuclear plants in 2015.

Revisions to previously published figures

In previous versions of this article some Major Power Producer (MPP) Wales gas generation was incorrectly allocated to England in all years back to 2012, as Severn Power CCGT and Pembroke CCGT were incorrectly classified as generation from England. This has been corrected and consequently around 12.5 TWh has been reallocated from Wales to England for 2015, with similar reallocations back to 2012.

MPP thermal renewables generation for 2014 and 2015 have been increased by 270 GWh and 330 GWh respectively due to the addition of Markinch to the MPP survey.

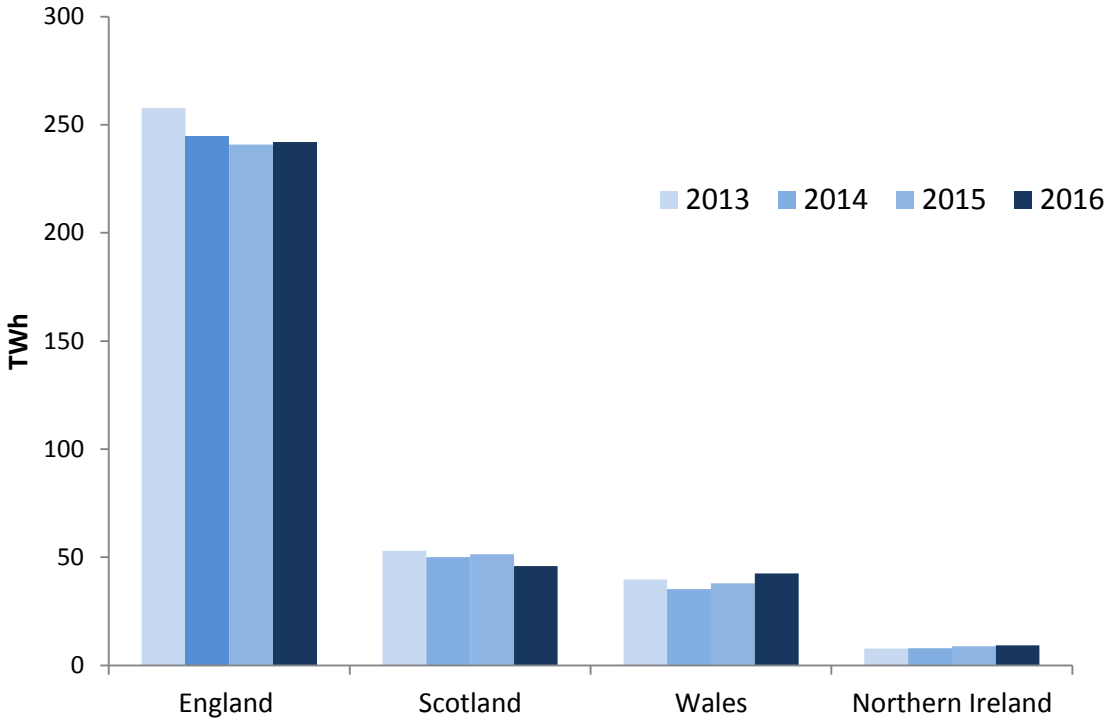
Previous versions of the figures remain available online for comparison at:
www.gov.uk/government/collections/energy-trends-articles

[1] Electricity generation and supply figures for Scotland, Wales, Northern Ireland and England, 2012 to 2015: www.gov.uk/government/publications/energy-trends-december-2016-special-feature-articles
[2] Digest of UK Energy Statistics (DUKES) 2017: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

Generation and trade

Chart 1 shows total generation of electricity in each UK country between 2013 and 2016.

Chart 1: Total generation by country (all generating companies) 2013-2016



Between 2015 and 2016 England's share of total generation remained broadly stable at 71 per cent (up 0.2 pp) while Scotland's share fell from 15 per cent to 14 per cent, mostly due to the closure of Longannet but also due to a drop in renewables generation following a year of poor weather conditions for renewables. For Wales, there was an increase in the share from 11 per cent to 13 per cent, mainly due to increased generation from gas. Northern Ireland's share of generation remained stable at 3 per cent. On average, over the last four years, 72 per cent of UK electricity generation has taken place in England, 15 per cent in Scotland, 11 per cent in Wales and 2 per cent in Northern Ireland.

England is a net importer of electricity from Scotland, Wales and from continental Europe (via the France and Netherlands interconnectors). Total net imports from Europe made up 6.1 per cent of consumption from the public supply in the UK, down from a record high 7.2 per cent in 2015. This was due to a fall in net imports from France of 30 per cent to 9.7 TWh following nuclear outages in France. Net imports from the Netherlands were 7.3 TWh, 8.7 per cent down on 2015[3].

In 2016, Scotland exported 20 per cent of the electricity generated there to consumers elsewhere in the UK, the lowest proportion since 2008; this has decreased from 29 per cent in 2015 due to a reduction in generation in Scotland (down 11 per cent) along with steady total consumption. Transfers from Scotland to England fell by 34 per cent between 2015 and 2016, following a record high in 2015.

In 2016, Wales exported a record high 43 per cent of total generation to England. This was due to Wales experiencing a 12 per cent increase in generation, mostly due to a rise in generation from gas, but just a 6 per cent increase in total consumption. Wales started trading with the Republic of Ireland in 2012 and was a net importer from them for the first time in 2016. However, this accounted for only 2 per cent of consumption from the public supply in Wales.

[3] Energy Trends: electricity – Table 5.6:
www.gov.uk/government/statistics/electricity-section-5-energy-trends

Northern Ireland trades electricity with the Republic of Ireland and has been a net importer since 2014. Northern Ireland usually imports electricity from Scotland via the Moyle interconnector but was a net exporter to Scotland for the first time in 2016.

Generation by fuel

For each of the four UK countries, Table A shows the percentage shares of the generation of electricity by fuel category for 2015 and 2016. Because the mix of generating plants is not the same in each country, the overall percentage for each fuel type in individual years will change according to the fuels and stations that are available and the most advantageous to use.
The data for 2016 is also shown in Chart 2.

Table A: Percentage shares of each country's generation, by fuel type, 2015 and 2016

2015	Scotland	Wales	Northern Ireland	England	UK Total
Coal	16.1	21.5	24.4	23.8	22.4
Gas	3.7	46.2	49.1	31.6	29.5
Nuclear	34.6	10.2	0.0	20.2	20.8
Renewables	42.4	13.7	25.5	22.5	24.6
Oil and Other	3.2	8.3	0.9	1.9	2.8
2016					
Coal	3.9	17.2	23.3	8.0	9.0
Gas	6.8	62.9	50.0	45.0	42.2
Nuclear	42.8	0.0	0.0	21.5	21.1
Renewables	42.9	12.3	25.3	23.1	24.5
Oil and Other	3.5	7.6	1.3	2.2	3.1

Coal's share of UK generation had been steadily falling since 2012 before a large drop to a record low 9 per cent in 2016. The largest falls were in England (down 15.8 pp) and Scotland (down 12.2 pp) due to reduced capacity after the closure or partial closure of multiple coal plants that were opted out of the Large Combustion Plant Directive (LCPD)[4] and its successor, the Industrial Emissions Directive. This includes the closures of Ferrybridge C in England, and Longannet in Scotland, both in March 2016. Another factor in the steady reduction of coal generation in England was the conversion of two units of Drax from coal to biomass, one in 2013 and one in 2014, and one unit from coal to high range co-firing (85% to <100% biomass) in 2015. The decrease in the share of coal generation in Wales, from 21 per cent to 17 per cent, is due to market conditions leading to production favouring gas. Whilst fuel costs for coal-fired generation are lower than for gas, emissions from coal are higher so generators must pay a greater carbon price per GWh produced. Coal generation in Northern Ireland remained broadly stable at 23 per cent (down 1.1 pp).

There was an increase in the share of gas generation between 2015 and 2016 in all countries as gas replaced coal in the energy mix, due to favourable market conditions as noted above. The largest increases were seen in Wales (up 16.6 pp) and England (up 13.4 pp), with the overall UK share increasing from 29 per cent to 42 per cent. Gas generation in Northern Ireland remained stable at 50 per cent.

The share of generation from nuclear plants remained steady despite the closure of Wylfa in December 2015 resulting in no nuclear generation in Wales. In Scotland, the share of nuclear

[4] Large Combustion Plant Directive (LCPD): Running hours during winter 2014/15 and capacity for 2015/16, page 71: www.gov.uk/government/statistics/energy-trends-september-2015-special-feature-articles

generation increased from 35 per cent to 43 per cent between 2015 and 2016, due to both increased nuclear generation, and lower overall Scottish generation. In England the share from nuclear generation remained relatively stable at 22 per cent in 2016 (up 1.3 pp).

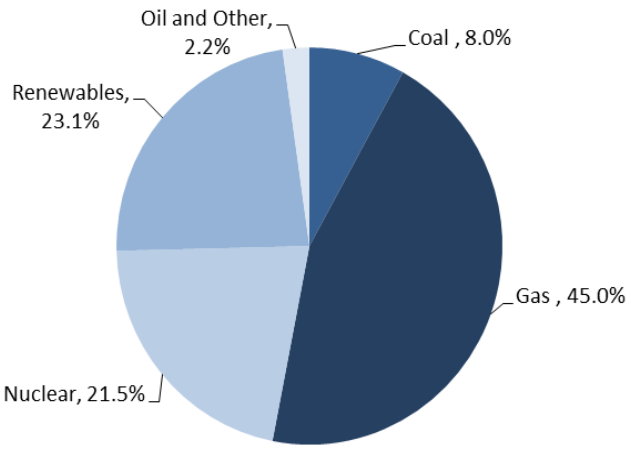
Renewables' share of generation had been continually increasing in the UK, reaching a record high of 24.6 per cent in 2015. Despite increases in capacity for wind and solar (wind capacity up by 13.3 percent, solar capacity up by 25 per cent)[5], the generation share from renewables fell marginally to 24.5 per cent in 2016 due to poor weather conditions for renewables generation (wind speeds down by 11 per cent, sun hours down by 4 per cent and rainfall down by 20 per cent)[6].

Conversions at Drax from coal to biofuel increased England's renewables share of generation to 22.5 per cent in 2015 and 23.1 per cent in 2016. Of Scotland's generation in 2016, a record high of 43 per cent was from renewables, up from 42 per cent in 2015. This was mainly due to the large fall in coal generation following the closure of Longannet; absolute renewable generation decreased by 3.3 TWh in Scotland as a result of unfavourable weather conditions despite increasing capacity (a 17 per cent increase in wind capacity and a 23 per cent increase in solar capacity). The share of generation from renewables fell slightly in Wales, down 1.4 pp to 12 per cent, due to increased total generation with renewable generation remaining broadly stable. Renewables generation remained stable in Northern Ireland at 25 per cent.

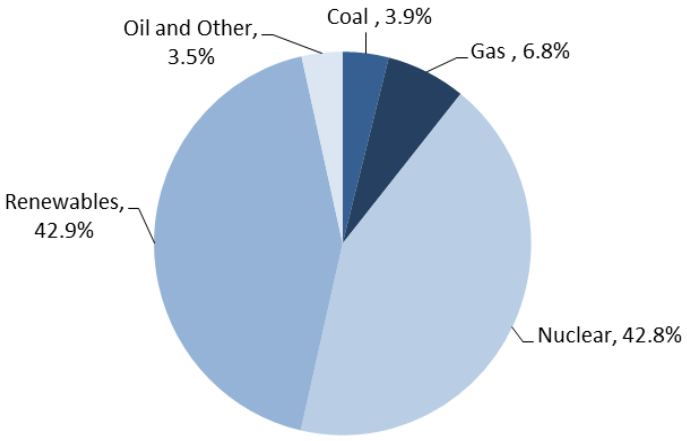
[5] Capacity of, and electricity generated from, renewable sources (Energy Trends 6.1): www.gov.uk/government/statistics/energy-trends-section-6-renewables
[6] Energy Trends: weather: www.gov.uk/government/statistics/energy-trends-section-7-weather

Chart 2: Generation by fuel type for each country in 2016 (all generating companies)

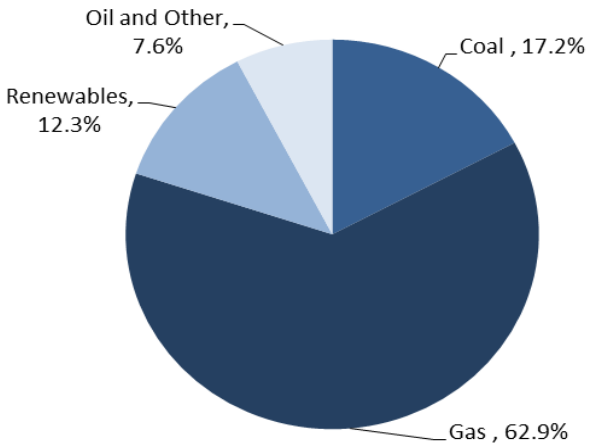
England
Total Generation: 241.8 TWh



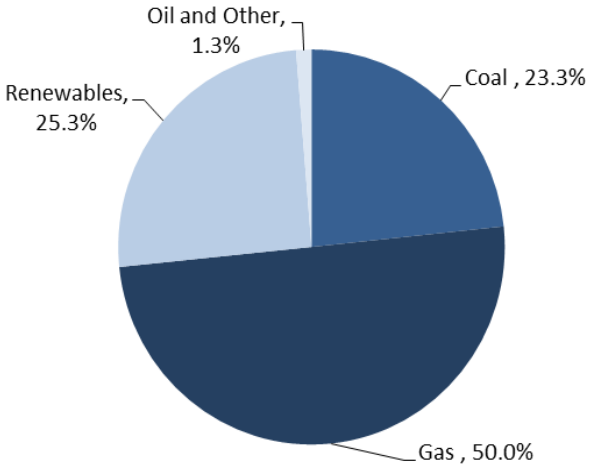
Scotland
Total Generation: 45.8 TWh



Wales
Total Generation: 42.5 TWh



Northern Ireland
Total Generation: 9.2 TWh



Combined heat and power (CHP) forms around half of "Other generators" generation, although some major power producers (MPPs) also operate generating plants that are partially CHP. CHP statistics for 2016 on a sub-national and regional basis were published in the September 2017 issue of Energy Trends[7].

The share of generation accounted for by generators other than major power producers has steadily increased since 2013 and reached a high of 13.7 per cent in 2016 (up 4.3 pp since 2013). In Scotland, in 2016, other generators had a 16.9 per cent share (up 1.9 pp), while in England the share was 13.9 per cent (up 1.4 pp), in Wales 7.7 per cent (down 1.9 pp) and in Northern Ireland 20 per cent (down 0.5 pp). These larger shares were due to increases in smaller-scale renewables capacity and reductions in larger-scale fossil fuel capacity, with the decrease in Wales due to a 13.9 per cent increase in MPP gas generation.

Overall the UK saw a small increase in total generation (up 0.1 per cent), despite a 1.0 per cent fall in MPP generation, due to an 8.2 per cent increase in autogeneration. The largest reduction in generation share was experienced by coal, with coal fired plants closing throughout 2015 and 2016 due to the LCPD/IED, along with conversions of coal units to biomass units at Drax. Adverse market conditions also led to a reduction in the use of coal for generation. The largest increase in generation share came from gas (up 12.8 pp) due to favourable market conditions. Thermal renewables also showed a large increase, (up 5.4 pp) partially due to the unit conversion at Drax.

Renewables

The share of renewables in electricity generation or sales is measured in two different ways in the UK[8]. First, there is the "headline" overall measure that shows the percentage of electricity generation accounted for by all renewables. Secondly, there is the measure that is based on the Renewables Obligation (RO) (and the analogous Renewables Obligation (Scotland) - ROS) which shows the percentage of electricity sales accounted for by renewables eligible under these obligations. The main differences are the exclusion from the RO of large-scale hydro and non-biodegradable wastes[9]. Table B shows the "headline" overall measure for 2013 to 2016.

Table B: Renewables percentages

	UK	Scotland	Wales	Northern Ireland	England
2013	14.9	32.1	6.6	19.5	12.4
2014	19.1	38.1	9.6	21.6	16.5
2015	24.6	42.4	13.7	25.5	22.5
2016	24.5	42.9	12.3	25.3	23.1

With its large capacity of natural flow hydro and rapidly increasing wind capacity, as well as the closure of the Longannet coal plant in March 2016, renewables' share in Scotland under the headline measure increased by 0.5 percentage points to stand at 43 per cent in 2016, despite poor weather conditions for renewables generation. In 2016 Wales (down 1.4 pp) and Northern Ireland

[7] Combined Heat and Power in Scotland, Wales, Northern Ireland and the regions of England in 2016 – Energy Trends September 2017, page 89:
www.gov.uk/government/publications/energy-trends-september-2017-special-feature-articles

[8] There is also a third method used by the EU – a Renewables Directive basis – see Chapter 6 of the Digest of UK Energy Statistics 2017, table 6.7 and paragraph 6.45:
www.gov.uk/government/statistics/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes

[9] Specific exclusions from eligibility for the RO are existing hydro plants over 20 MW; all plants using renewable sources built before 1990 (unless re-furbished); and energy from mixed waste combustion unless the waste is first converted to fuel using advanced conversion technology.

(down 0.2 pp) saw small falls in the percentage of electricity generated from renewables, while England (up 0.6 pp) saw a small increase.

On a RO basis, the percentage measure for the UK (15 per cent in 2013, 18 per cent in 2014, 23 per cent in 2015, and 23 per cent in 2016) is not meaningful at a sub-national level because electricity generated in one part of the UK can be sold in a different part of the UK.

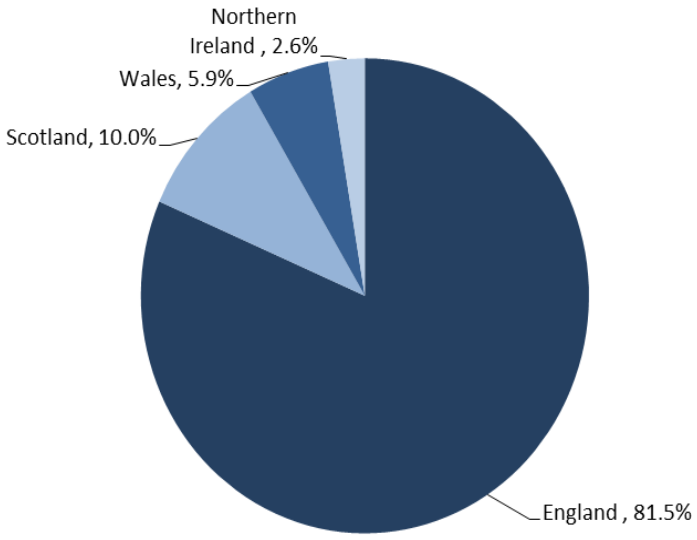
In Scotland, the renewables target to reach 100 per cent by 2020 is expressed as generation as a proportion of gross electricity consumption (defined as generation plus transfers into Scotland less transfers out of Scotland). This measure increased from 44 per cent in 2013 to 60 per cent in 2015, surpassing the interim target of 50 per cent by 2015. However in 2016 due to both lower renewable generation, and a reduction in net imports, this measure dropped to 54 per cent.

The amount of electricity from renewable sources transferred from Scotland or Wales to England, or from Scotland to Northern Ireland, cannot be disaggregated from other sources of electricity transferred. What is known from Table 2 is that the amount of ROs eligible electricity generated in Scotland in 2016 was 11 per cent lower than in 2015, while the amount of RO eligible electricity generated in Wales in 2016 was 0.6 per cent lower than in 2015. In England, the decrease was 1.2 per cent. These falls are due to poor weather conditions for renewables generation. In Northern Ireland RO eligible electricity generated was 0.9 per cent higher. In the UK as a whole, RO eligible electricity production fell by 3.6 per cent between 2015 and 2016. Over the four years shown in Table 2, the increases in RO eligible electricity production have been substantial across all countries, namely 47 per cent for Northern Ireland, 9 per cent for Scotland, 99 per cent for Wales and 61 per cent for England.

Renewables statistics for 2016 on a sub-national and regional basis were published in the September 2017 issue of Energy Trends[10].

[10] Renewable energy in Scotland, Wales, Northern Ireland and the regions of England in 2016 – Energy Trends September 2017, page 64:
www.gov.uk/government/publications/energy-trends-september-2017-special-feature-articles

Chart 3: Electricity consumption in 2016



Consumption and sales

Transmission and distribution losses are not separately available for Scotland, Wales, Northern Ireland and England so estimates have been made using the UK proportions for generation and sales. Consumption figures have then been calculated by deducting net transfers, own use, and losses figures from the electricity generated figures shown in Table 1. Chart 3 shows that in 2016, 10 per cent of electricity consumption in the UK was in Scotland, 6 per cent in Wales, 3 per cent in Northern Ireland and 81 per cent in England. These remain similar to the average percentage shares for each country for the period 2013 to 2016, namely 82 per cent for England, 10 per cent for Scotland, 5 per cent for Wales and 3 per cent for Northern Ireland.

Separate data is collected for sales of electricity from the public supply system in Scotland, England and Wales, and Northern Ireland. This is published in monthly table ET 5.5 on the BEIS Energy Statistics website[11], but for this article the breakdown between England and Wales has been estimated. Because of definitional and other differences set out in the technical notes to Chapter 5 of DUKES 2017, there is a statistical difference between the calculated consumption and the sales data in Table 1.

As part of its commitment to improving the quality of its statistics, BEIS continues to examine this statistical difference (-0.2 per cent for the UK in 2016) and look further at the component series to see where the differences might be arising and thus where improvements to the data might be made.

Chart 4 shows the relationship between generation and consumption of electricity in each of the countries by means of a flow diagram.

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[11] Energy Trends monthly table 5.5:
www.gov.uk/government/statistics/electricity-section-5-energy-trends

References:

Digest of UK Energy Statistics 2017 (DUKES); available on BEIS's energy statistics website at:
www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes

Electricity generation and supply figures for Scotland, Wales, Northern Ireland and England, 2012 to 2015:
www.gov.uk/government/publications/energy-trends-december-2016-special-feature-articles

Large Combustion Plant Directive (LCPD): Running hours during winter 2014/15 and capacity for 2015/16, page 71:
www.gov.uk/government/statistics/energy-trends-september-2015-special-feature-articles

Capacity of, and electricity generated from, renewable sources (Energy Trends 6.1):
www.gov.uk/government/statistics/energy-trends-section-6-renewables

Combined Heat and Power in Scotland, Wales, Northern Ireland and the regions of England in 2016 – Energy Trends September 2017, page 89:
www.gov.uk/government/publications/energy-trends-september-2017-special-feature-articles

Renewable energy in Scotland, Wales, Northern Ireland and the regions of England in 2016 – Energy Trends September 2017, page 64:
www.gov.uk/government/publications/energy-trends-september-2017-special-feature-articles

Energy Trends monthly table 5.5:
www.gov.uk/government/statistics/electricity-section-5-energy-trends

Chart 4: Electricity generation and consumption flow chart, 2016

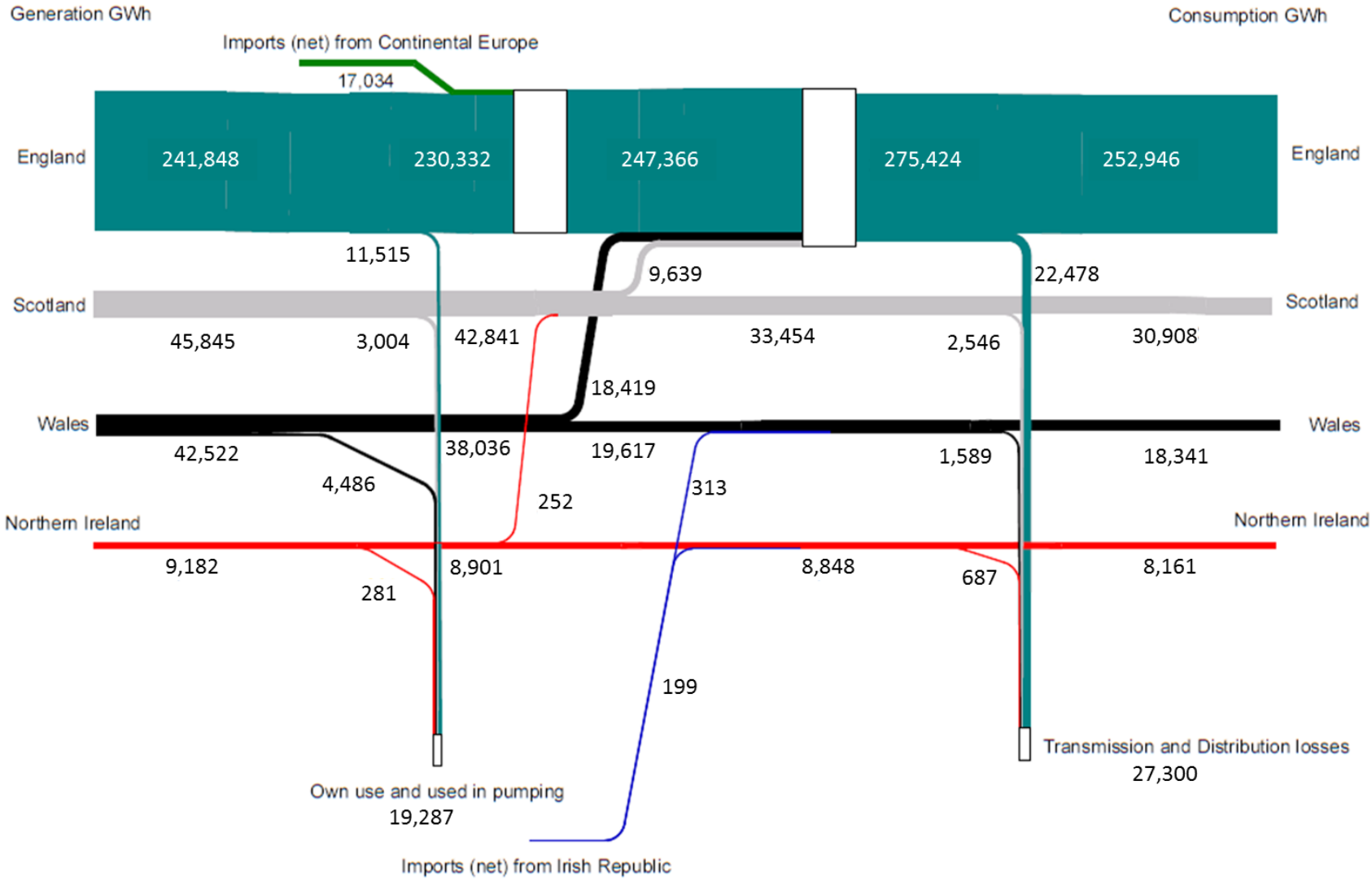


Table 1: Generation and supply of electricity in Scotland, Wales, Northern Ireland and England, 2013 to 2016

GWh

		2013					2014				
		UK total	Scotland	Wales	Northern Ireland	England	UK total	Scotland	Wales	Northern Ireland	England
Generated by	Major power producers	324,623	46,882	36,780	6,702	234,258	300,822	43,164	32,338	6,661	218,659
	Other generators	33,661	6,142	2,951	1,080	23,488	37,274	6,878	2,982	1,220	26,195
Total generated		358,284	53,024	39,731	7,782	257,747	338,096	50,042	35,319	7,880	244,854
Own use by Other generators		2,191	283	209	32	1,667	2,522	342	219	39	1,922
Electricity supplied (net) by Other generators		31,470	5,858	2,742	1,048	21,821	34,752	6,535	2,763	1,180	24,273
Used in pumping at pumped storage and other own use by MPPs		19,588	3,143	4,766	195	11,484	17,842	2,758	4,360	180	10,544
Electricity supplied (net) by MPPs		305,035	43,740	32,013	6,507	222,775	282,980	40,406	27,978	6,481	208,116
Electricity transferred to England (net of receipts)		0	13,275	14,671	0	-27,946	0	10,770	11,186	0	-21,956
Electricity transferred to Northern Ireland (net of receipts)		0	1,541	0	-1,541	0	0	1,044	0	-1,044	0
Electricity transferred to Europe (net of receipts)		-14,431	0	2,161	45	-16,637	-20,520	0	2,408	-121	-22,807
Transfers from other generators to public supply		13,719	2,554	1,195	457	9,513	15,084	2,837	1,199	512	10,536
Transmission losses		6,351	575	302	159	5,315	6,509	613	308	164	5,423
Distribution losses		21,375	2,012	1,052	543	17,768	22,142	2,195	1,094	566	18,287
Consumption from public supply [A]		305,458	28,891	15,022	7,757	253,788	289,934	28,621	14,180	7,429	239,704
Consumption by autogenerators		17,751	3,304	1,547	591	12,309	19,668	3,699	1,563	668	13,737
Total Electricity consumption		323,209	32,195	16,569	8,348	266,096	309,601	32,319	15,744	8,097	253,442
Electricity sales (public supply) [B]		306,747	28,879	15,094	7,791	254,985	291,153	28,863	14,379	7,438	240,473
Statistical difference between calculated consumption [A] and sales [B]		-1,289	12	-71	-34	-1,197	-1,220	-243	-199	-9	-769

Figures in this table do not sum exactly to the UK totals shown because of rounding

Table 1 continued: Generation and supply of electricity in Scotland, Wales, Northern Ireland and England, 2013 to 2016

GWh

		2015					2016				
		UK total	Scotland	Wales	Northern Ireland	England	UK total	Scotland	Wales	Northern Ireland	England
Generated by	Major power producers	295,991	43,652	34,442	7,066	210,831	292,944	38,119	39,232	7,358	208,235
	Other generators	42,926	7,700	3,491	1,696	30,039	46,453	7,726	3,290	1,823	33,613
Total generated		338,917	51,351	37,933	8,762	240,870	339,397	45,845	42,522	9,182	241,848
Own use by Other generators		2,836	375	274	58	2,130	2,933	382	210	88	2,253
Electricity supplied (net) by Other generators		40,090	7,325	3,217	1,638	27,910	43,520	7,345	3,080	1,736	31,360
Used in pumping at pumped storage and other own use by MPPs		17,529	2,800	4,439	185	10,105	16,354	2,622	4,276	194	9,262
Electricity supplied (net) by MPPs		278,462	40,852	30,003	6,881	200,726	276,590	35,497	34,957	7,164	198,972
Electricity transferred to England (net of receipts)		0	14,598	13,349	0	-27,947	0	9,639	18,419	0	-28,058
Electricity transferred to Northern Ireland (net of receipts)		0	191	0	-191	0	0	-252	0	252	0
Electricity transferred to Europe (net of receipts)		-20,938	0	1,065	-167	-21,837	-17,546	0	-313	-199	-17,034
Transfers from other generators to public supply		19,113	3,492	1,534	781	13,306	20,613	3,479	1,459	822	14,853
Transmission losses		7,395	644	385	179	6,187	7,395	656	424	179	6,136
Distribution losses		20,065	1,834	1,081	515	16,635	19,905	1,890	1,165	508	16,341
Consumption from public supply [A]		291,054	27,077	15,657	7,327	240,994	287,449	27,042	16,720	7,247	236,440
Consumption by autogenerators		20,977	3,833	1,684	857	14,604	22,907	3,866	1,621	914	16,507
Total Electricity consumption		312,031	30,909	17,341	8,184	255,597	310,356	30,908	18,341	8,161	252,946
Electricity sales (public supply) [B]		290,007	26,505	15,621	7,445	240,435	288,129	27,356	16,870	7,357	236,546
Statistical difference between calculated consumption [A] and sales [B]		1,047	571	36	-119	558	-680	-315	-149	-110	-107

Figures in this table do not sum exactly to the UK totals shown because of rounding

Table 2: Generation of electricity by fuel in Scotland, Wales, Northern Ireland and England, 2013 to 2016

GWh

			2013					2014				
			UK total	Scotland	Wales	Northern Ireland	England	UK total	Scotland	Wales	Northern Ireland	England
Major power producers:	Coal		130,175	10,761	11,339	2,596	105,479	100,167	10,157	7,368	2,160	80,482
	Oil		745	206	244	26	268	530	192	148	24	166
	Gas		82,891	3,497	17,212	3,458	58,725	88,871	880	18,564	3,817	65,610
	Nuclear		70,607	18,498	4,325	0	47,784	63,748	16,633	1,953	0	45,162
	Thermal renewables		9,212	395	0	0	8,816	12,698	645	0	0	12,053
	Other thermal		522	0	0	0	522	528	0	0	0	528
	Hydro natural flow		3,609	3,414	175	0	20	4,635	4,393	213	0	28
	Hydro pumped storage		2,904	620	2,284	0	0	2,883	494	2,389	0	0
	Non thermal renewables		23,958	9,492	1,200	622	12,644	26,762	9,769	1,702	660	14,632
	Total		324,623	46,882	36,780	6,702	234,258	300,822	43,164	32,338	6,661	218,659
Other Generators:	Coal		83	9	0	39	35	72	0	0	39	33
	Oil		1,321	433	49	38	801	1,390	639	43	39	668
	Gas		12,952	1,942	1,043	102	9,865	12,021	1,843	853	101	9,224
	Thermal renewables		8,888	977	623	135	7,154	9,921	1,071	577	168	8,105
	Other thermal		1,389	61	594	7	727	1,440	135	621	0	683
	Hydro natural flow		1,092	956	53	22	62	1,253	1,090	64	27	72
	Non thermal renewables		6,454	1,757	588	738	3,371	9,253	2,076	824	844	5,509
	Wastes		1,481	8	0	0	1,473	1,923	22	0	0	1,901
	Total		33,661	6,142	2,951	1,080	23,488	37,274	6,878	2,982	1,220	26,195
Total generation by fuel			358,284	53,024	39,731	7,782	257,747	338,096	50,042	35,319	7,880	244,854
within which:	Renewables	Hydro	4,701	4,369	229	22	82	5,888	5,484	277	27	100
		Wind, wave, solar	30,412	11,248	1,788	1,361	16,015	36,016	11,845	2,526	1,504	20,140
		Other	18,100	1,372	623	135	15,971	22,619	1,716	577	168	20,158
		Total	53,213	16,990	2,639	1,517	32,067	64,522	19,045	3,380	1,699	40,398
Renewables eligible under the renewables obligation			44,996	13,979	2,107	1,452	27,458	53,207	15,096	2,628	1,602	33,881
Percentage shares of generation:	Coal		36.4	20.3	28.5	33.9	40.9	29.6	20.3	20.9	27.9	32.9
	Oil		0.6	1.2	0.7	0.8	0.4	0.6	1.7	0.5	0.8	0.3
	Gas		26.8	10.3	45.9	45.7	26.6	29.8	5.4	55.0	49.7	30.6
	Nuclear		19.7	34.9	10.9	0.0	18.5	18.9	33.2	5.5	0.0	18.4
	Hydro natural flow		1.3	8.2	0.6	0.3	0.0	1.7	11.0	0.8	0.3	0.0
	Other renewables		13.5	23.8	6.1	19.2	12.4	17.3	27.1	8.8	21.2	16.5
	Other		1.8	1.3	7.2	0.1	1.1	2.0	1.3	8.5	0.0	1.3
	Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Figures in this table do not sum exactly to the UK totals shown because of rounding

Table 2 continued: Generation of electricity by fuel in Scotland, Wales, Northern Ireland and England, 2013 to 2016 *GWh*

			2015					2016				
			UK total	Scotland	Wales	Northern Ireland	England	UK total	Scotland	Wales	Northern Ireland	England
Major power producers:	Coal		75,812	8,275	8,153	2,102	57,283	30,655	1,806	7,316	2,107	19,427
	Oil		683	188	163	42	290	555	157	182	69	147
	Gas		88,461	126	16,851	4,187	67,297	131,978	1,523	26,022	4,489	99,944
	Nuclear		70,345	17,763	3,887	0	48,696	71,726	19,630	0	0	52,096
	Thermal renewables		17,694	727	0	0	16,966	17,401	735	33	0	16,634
	Other thermal		689	0	0	0	689	968	0	0	0	968
	Hydro natural flow		4,907	4,605	273	0	28	3,951	3,692	235	0	25
	Hydro pumped storage		2,739	523	2,217	0	0	2,959	486	2,474	0	0
	Non thermal renewables		34,662	11,445	2,899	735	19,582	32,750	10,091	2,972	694	18,994
	Total		295,991	43,652	34,442	7,066	210,831	292,944	38,119	39,232	7,358	208,235
Other Generators:	Coal		66	0	0	38	28	56	0	0	36	20
	Oil		1,354	693	30	40	592	1,285	529	36	42	678
	Gas		11,415	1,793	693	115	8,814	11,384	1,606	706	106	8,966
	Thermal renewables		11,546	1,116	764	270	9,397	12,641	1,162	694	458	10,326
	Other thermal		1,364	207	594	0	562	1,864	407	430	7	1,019
	Hydro natural flow		1,392	1,210	78	29	75	1,444	1,272	73	24	75
	Non thermal renewables		13,203	2,655	1,199	1,205	8,144	15,037	2,725	1,237	1,151	9,925
	Wastes		2,586	26	132	0	2,428	2,742	25	113	0	2,603
	Total		42,926	7,700	3,491	1,696	30,039	46,453	7,726	3,290	1,823	33,613
Total generation by fuel			338,917	51,351	37,933	8,762	240,870	339,397	45,845	42,522	9,182	241,848
within which:	Renewables	Hydro	6,298	5,815	352	29	103	5,395	4,963	308	24	100
		Wind, wave, solar	47,865	14,100	4,099	1,939	27,726	47,788	12,815	4,209	1,844	28,919
		Other	29,240	1,844	764	270	26,363	30,043	1,897	727	458	26,960
		Total	83,403	21,759	5,214	2,238	54,192	83,225	19,676	5,244	2,326	55,979
Renewables eligible under the renewables obligation			68,134	17,078	4,212	2,116	44,728	65,696	15,189	4,187	2,135	44,185
Percentage shares of generation:	Coal		22.4	16.1	21.5	24.4	23.8	9.0	3.9	17.2	23.3	8.0
	Oil		0.6	1.7	0.5	0.9	0.4	0.5	1.5	0.5	1.2	0.3
	Gas		29.5	3.7	46.2	49.1	31.6	42.2	6.8	62.9	50.0	45.0
	Nuclear		20.8	34.6	10.2	0.0	20.2	21.1	42.8	0.0	0.0	21.5
	Hydro natural flow		1.9	11.3	0.9	0.3	0.0	1.6	10.8	0.7	0.3	0.0
	Other renewables		22.8	31.1	12.8	25.2	22.5	22.9	32.1	11.6	25.1	23.1
	Other		2.2	1.5	7.8	0.0	1.5	2.5	2.0	7.1	0.1	1.9
	Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Figures in this table do not sum exactly to the UK totals shown because of rounding

Physical gas flows across Europe and diversity of gas supply in 2016

Background

This article has two purposes. The first is to help illustrate gas flows through Europe using 2016[1] data published by the International Energy Agency (IEA). The second is to compare the resilience of the UK's supply infrastructure with that of other EU Member States using a metric that accounts for the diversity of gas supply.

European Physical Gas Flows

European Gas Production

The total EU-28 gas production in 2016 was 133.9 billion cubic metres (bcm), with the Netherlands and the UK accounting for 38 per cent and 31 per cent of this total respectively. This is 3.3 per cent lower than EU-28 production in 2015 which was 138.5 bcm. Out of all EU-28 countries, only the Netherlands and Denmark produced more gas than they consumed, demonstrating Europe's reliance on gas imports from outside the EU.

European Gas Consumption

The highest demand among EU-28 countries came from Germany, the United Kingdom and Italy. Similar to 2015, these countries together accounted for around 46 per cent of EU-28 consumption. Germany remained the largest net importer in Europe in 2016 at 79 bcm, followed by Italy at 43 bcm and then France at 39 bcm[2]. Overall EU-28 net imports increased by 9% compared to 2015.

Natural gas consumption[3] in the EU-28 increased in 2016 compared to 2015, from 445 bcm to 465 bcm. The majority of EU countries saw a rise in gas demand with France and Italy contributing most significantly to this increase.

Sources of Gas

The flow of physical gas throughout Europe is closely inter-related with disruptions in one part of the network having the ability to spread elsewhere, as witnessed in November of this year with the disruption of gas flows following the explosion at the Baumgarten Hub in Austria. However, this interconnectedness is also strength with countries able to avail themselves of multiple ways of obtaining gas.

There are four sources of gas supply available to EU Member States: indigenous production, imports via Liquefied Natural Gas (LNG) terminal, imports via pipeline and prior gas production/imports held in storage facilities. There is the potential for multiple sources within each of these categories.

The largest single category of gas supply to the EU-28 was indigenous production, supplying 29 per cent of EU-28 consumption in 2016. A total of 18 countries have at least some indigenous gas production with the largest being from the Netherlands and UK which met 11 and 9 per cent of total EU demand respectively.

Aside from indigenous production, Russia remained the single supplier of gas to the EU-28, delivering around 132 bcm in 2016 compared to 130 bcm in 2015. This accounted for 28 and 29

1 January 1st 2016 to December 31st 2016 data

2 These numbers differ slightly from the IEA's annual figures due to the adjustments necessary to balance supply. The supply for some countries may appear unbalanced as stock changes are not shown. Data were calculated primarily from 2016 monthly pipeline gas flows, with 2016 annual imports, exports, production and consumption used for quality assurance amendments.

3 Natural gas consumption has been calculated using 2016 monthly pipeline gas flows and production data from the IEA and may differ from the observed consumption figures quoted in the 2016 annual gas information provided by the IEA. See Annex 3 for statistical differences between these figures.

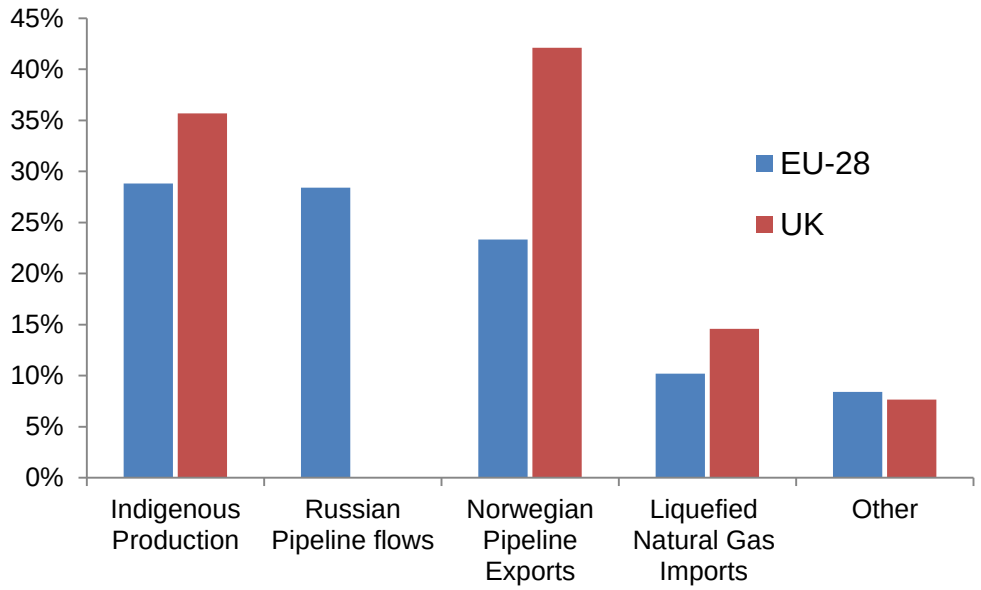
per cent of total EU-28 gas demand in 2016 and 2015 respectively. The European pipeline infrastructure means that Central and Eastern European countries receive almost all of their natural gas supply from Russia. It should be noted that the origin of all of this gas is not necessarily Russian, since Russia acts as a transit country for gas from Kazakhstan and Turkmenistan to reach European markets.

Norwegian pipeline exports to the EU-28 remained steady between 2015 and 2016. In 2016 pipeline exports were around 108 bcm, making up 23 per cent of total EU-28 gas consumption compared to 108 bcm (24 per cent) in 2015. An observed fall in exports to Germany was offset by an increase in exports to the UK; 30 per cent of Norwegian exports were directed to the UK in 2015. In addition to pipeline exports, Norway exported 4 bcm of LNG.

North African pipelines via Spain and Italy provided 39 bcm, or 8 per cent, of EU-28 demand. Algerian gas, coming direct from Algeria as well as via Morocco and Tunisia, accounted for 88 per cent of North African gas delivered to the EU-28, with Libya supplying the remainder.

EU-28 imports of LNG were 47.5 bcm in 2016 versus 47.2 bcm in 2015. LNG met 10 per cent of EU-28 demand. The largest suppliers of LNG to the EU-28 were Qatar, Algeria and Nigeria, who supplied 46, 23 and 16 per cent of total EU-28 LNG imports respectively.

Chart 1: Sources of all EU-28 and UK gas, 2016



UK Physical Gas Flows

UK consumption in 2016 was 81.5 bcm, up from 72.4 in 2015. Around 51 per cent of this was met by indigenous production in 2016, up compared to 2015 where 56 per cent was met by indigenous production. The rest were met by LNG imports and pipeline imports from Norway, Netherlands and Belgium.

Norway and Netherlands accounted for 85 per cent and 12 per cent of pipeline imports respectively, whilst the small remainder came from Belgium. The UK also exported 13.8 bcm through pipelines to Belgium (63 per cent), Ireland (21 per cent), Netherlands (16 per cent) and Isle of Man (1 per cent).

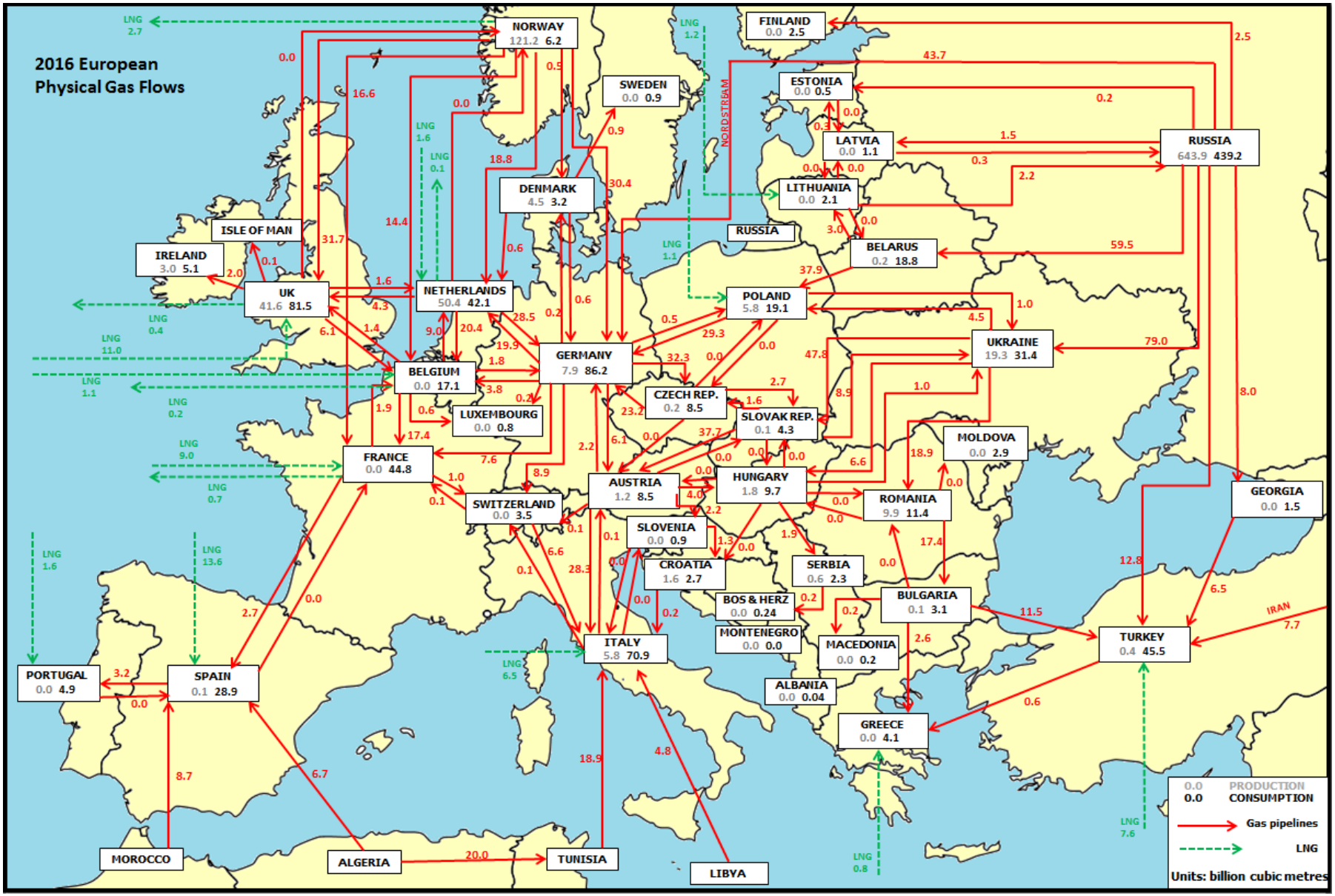
UK imports of LNG fell by 23 per cent, from 13.9 bcm in 2015 to 10.6 bcm in 2015 making the UK the second largest importer of LNG in 2016 within EU-28, with only Spain importing more. Ninety-five per cent of UK imports of LNG came from Qatar in 2016, remaining consistent with import levels in 2015 and 2014.

Note

The map below uses pipeline data from the IEA to show entry and exit flows between countries and does not necessarily indicate that the gas actually passed through the domestic infrastructure of a country (for instance: Russian gas is transmitted to Turkey through Bulgaria but is separate to the Bulgarian domestic network).

Further data

For readers wanting a greater level of detail, the IEA have made available an interactive gas map, based on entry and exit points throughout Europe. This map is available free of charge at: www.iea.org/gtf/index.asp


2016 European
Physical Gas Flows
NORWAY
121.2 6.2
SWEDEN
0.0 0.9
FINLAND
0.0 2.5
ESTONIA
0.0 0.5
LATVIA
0.0 1.1
LITHUANIA
0.0 2.1
RUSSIA
643.9 439.2
DENMARK
4.5 3.2
ISLE OF MAN
IRELAND
3.0 5.1
UK
41.6 81.5
NETHERLANDS
50.4 42.1
BELGIUM
0.0 17.1
LUXEMBOURG
0.0 0.8
GERMANY
7.9 86.2
POLAND
5.8 19.1
CZECH REP.
0.2 8.5
SLOVAK REP.
0.1 4.3
UKRAINE
19.3 31.4
MOLDOVA
0.0 2.9
FRANCE
0.0 44.8
AUSTRIA
1.2 8.5
HUNGARY
1.8 9.7
SWITZERLAND
0.0 3.5
SLOVENIA
0.0 0.9
CROATIA
1.6 2.7
SERBIA
0.6 2.3
ROMANIA
9.9 11.4
BULGARIA
0.1 3.1
BOS & HERZ
0.0 0.24
MONTENEGRO
0.0 0.0
MACEDONIA
0.0 0.2
ALBANIA
0.0 0.04
GREECE
0.0 4.1
TURKEY
0.4 45.5
GEORGIA
0.0 1.5
ITALY
5.8 70.9
PORTUGAL
0.0 4.9
SPAIN
0.1 28.9
MOROCCO
ALGERIA
TUNISIA
LIBYA
RUSSIA
BELARUS
0.2 18.8
NORDSTREAM
IRAN
LNG
0.0 PRODUCTION
0.0 CONSUMPTION
Gas pipelines
LNG
Units: billion cubic metres

EU-28 Infrastructure peak daily gas supply in 2016

As noted above, there are four sources of gas supply available to EU Member States: indigenous production, imports via Liquefied Natural Gas (LNG) terminal, imports via pipeline and prior gas production/imports held in storage facilities. There is the potential for multiple sources within each of these categories. We have used the peak flow (i.e. the maximum gas deliverable in billion cubic metres per day) as a comparative measure of gas supply for each individual source for each country. For pipeline and LNG terminal, peak flow data were extracted from IEA physical gas flows data[4]. Similarly, peak outputs for storage facilities were extracted from the IEA Natural Gas Information 2017[5]. Storage facilities are assumed to be capable of working at peak capacity during times of peak demand. Although this is susceptible to inaccuracies, because peak capacity from storage facilities may not be achievable by the point of peak demand in EU member states, it does allow a consistent metric across all storage facilities. Data for peak outputs for production was estimated by taking the maximum monthly production (bcm) in 2016 for each gas-producing member state and dividing this by the number of days in that month.

Chart 2 shows peak gas supply for each individual country as a stacked bar chart, with different colours representing different categories of gas supply. Stacks have been arranged with production and storage facilities shown at the base of the chart and imports via LNG terminals and pipelines shown above. Further, for these imports and storage sources, data were divided within categories by individual source (represented by horizontal lines within an individual bar colour). Please note these data were collected from a range of sources and we have not confirmed each of the data items with the countries who submit data to the IEA.

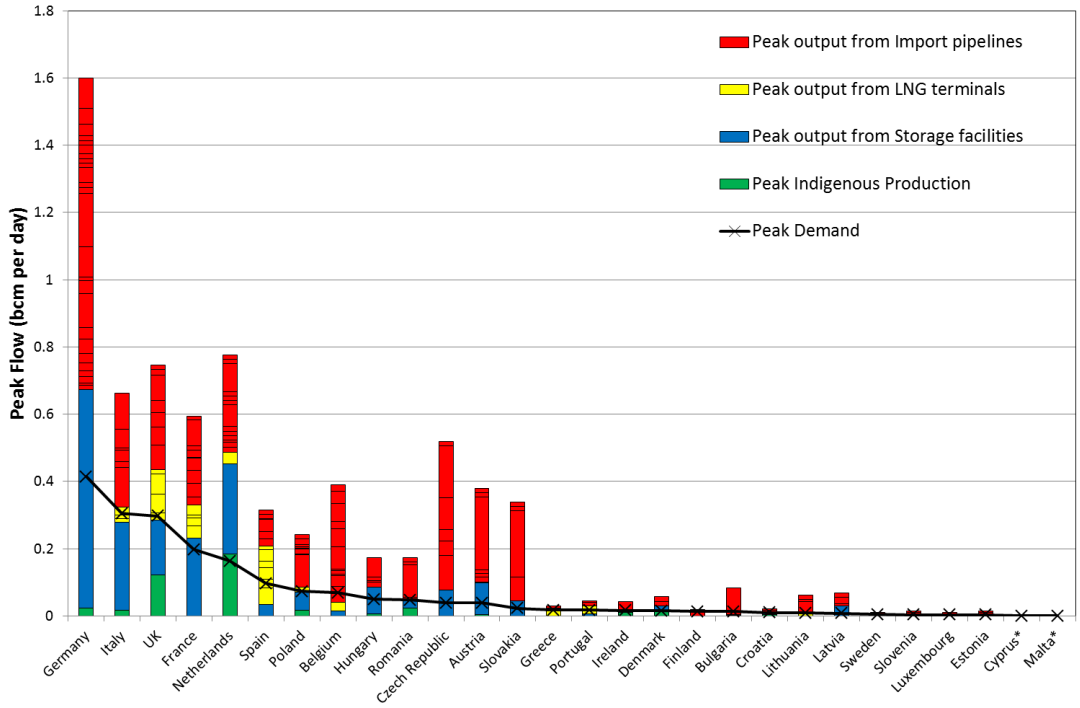
Chart 2 includes all EU-28 member states in order of peak gas demand. Estimated peak gas demand data (bcm per day) are shown by the single line-and-cross plot running across the graph. Peak gas demand acts as a comparator for peak gas supply, and was estimated for each country by taking the maximum monthly demand in 2016 (bcm) divided by the number of days within that month. Whilst this is a conservative estimate, it does allow for a common metric for comparison. Data for peak flows are provided in the table in Annex 1.

Chart 2 illustrates that in all EU countries where data were available, maximum gas supply exceeded peak demand. According to the data, Germany had the highest peak demand in 2016, but also had the largest potential peak output from both indigenous storage facilities and import pipelines. The data indicated that only the Netherlands had sufficient indigenous production capacities to meet peak daily demand. The majority of countries had a peak supply more than double that of peak demand, with the exception of Finland and Greece.

The UK had the third largest peak demand of the EU member states after Germany and Italy

[4] www.iea.org/gtf/index.asp
[5] Natural Gas Information 2017, International Energy Agency, ISBN 978-92-64-27814-1

Chart 2: Estimated Peak outputs for gas supply sources versus estimated peak demand for EU-28 Member States



Source: BEIS analysis of IEA data. *Cyprus and Malta have no consumption and are included for completeness only. For import data, stacks are further divided by number/volume of pipelines/terminals. Data are provided in Table in Annex 1.

Looking at the pipeline import data in Chart 2 (red stacks), it is clear that the five member states with the largest peak demand have a diverse range of import pipelines. Germany in particular has a large number of import pipelines, 26 in total. There are substantially fewer import pipelines in EU countries east of Germany. Of particular note, the Slovak Republic appeared to have a peak supply that far exceeded demand, where almost all of this came via a single pipeline from Russia, which has pipelines transiting through to several other member states.

Aside from Spain (seven), the UK and Italy (four), France (three) and Sweden (two) all other member states had at most a single LNG terminal.

EU-28 Gas Infrastructure Resilience 2016

In order to given an indication of the resilience of the gas supply infrastructure, we have developed a simple methodology that takes the sum of all gas supplies coming into a country running at maximum capacity (*PF*, peak flow), removes the largest supply route, and looks at the remaining percentage supply relative to peak demand. The equation below indicates PF as

$$PF - 1[\%] = \frac{EP_{max} + P_{max} + S_{max} + LNG_{max} - I_{max}}{D_{max}} \qquad \text{Equation 1}$$

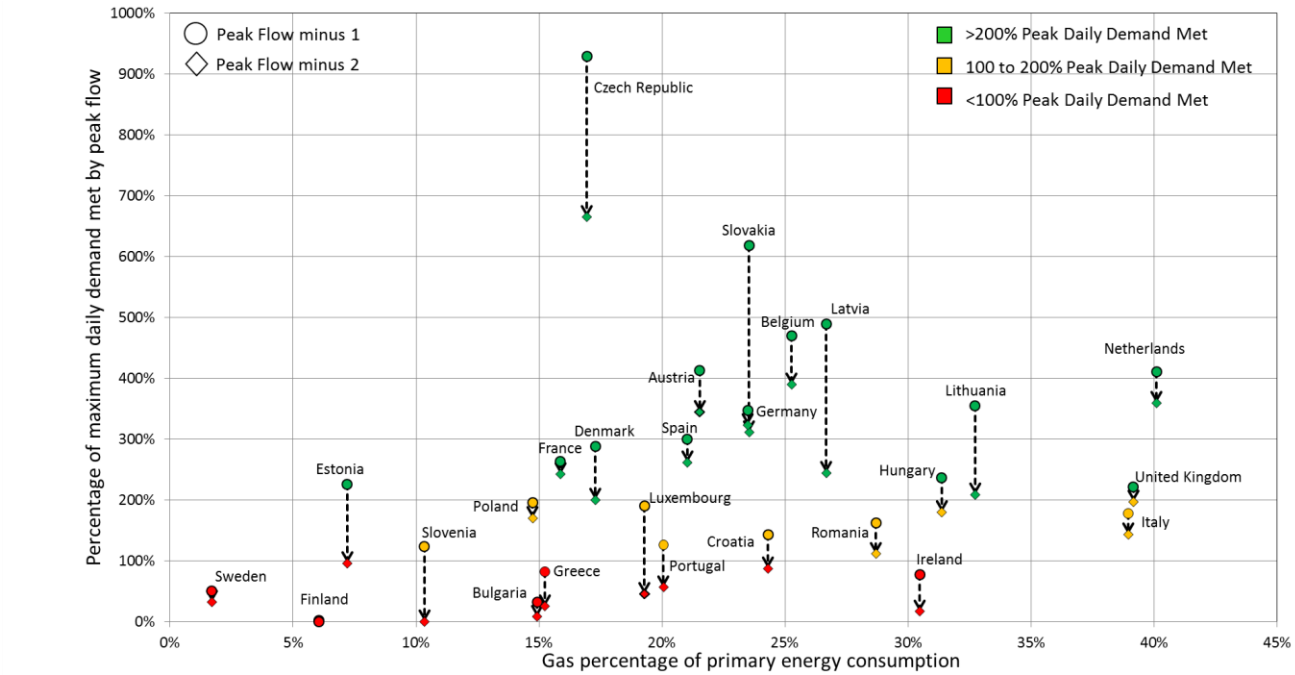
Where:

PF = Peak Flow (bcm/day)
EP_{max} = Peak capacity of entry points (bcm/day)
P_{max} = Peak capacity for each indigenous production pipeline (bcm/day)
S_{max} = Peak output for each storage facility (bcm/day)
LNG_{max} = Peak output for each LNG terminal (bcm/day)
D_{max} = Average 2013 peak gas demand (bcm/day)
I_{max} = Peak daily capacity of single largest supply route (bcm/day)

This formula is similar to a more widely used metric - the 'N-1' measure of supply outlined in the EU Regulation No. 994/2010 - but differs to that due to both the historical nature of the data used here and the definition of demand. In the EU regulation, peak demand (D_{max}) is defined as the total daily gas demand of the country during a day of exceptionally high gas demand occurring with a statistical probability of once in 20 years. In this report, because we are calculating resilience for 2016, we use the estimated peak gas demand in each country for 2016 (January 1st 2016 to December 31st 2016), taking the maximum monthly demand in 2016 (bcm) and dividing this by the number of days within that month. Beyond *PF*-1, *PF*-2 was also calculated using the same methodology but removing the two largest supply routes as a more rigorous test of infrastructure resilience.

As well as considering infrastructure resilience, it is also important to consider the extent to which each EU-28 country relies on gas to meet its primary energy demand. If the *PF*-1 score is less than 100 per cent, it could have considerable consequences for a country that relies on gas for a large proportion of its primary energy demand, compared to a lesser extent for a country that mainly uses other energy sources. We therefore plotted out *PF*-1 and *PF*-2 against the percentage of total primary energy demand met by gas for each EU Member State (Chart 3).

Chart 3: EU-28* gas infrastructure resilience versus percentage of primary energy consumption met by gas, 2016



*Data for Cyprus and Malta not available. Peak flow minus 1 = total gas supply capacity minus largest gas supply route (*PF*-1). Peak flow minus 2 = total gas supply capacity minus two largest gas supply routes (*PF*-2). For each member state, top circle represents *PF*-1 and bottom diamond represents *PF*-2. Red-amber-green are illustrative, and do not reflect any pre-defined or standard resilience metric.

Chart 3 shows France, Czech Republic, Denmark, Austria, Spain, Germany, Slovakia, Latvia, Belgium and the Netherlands to have particularly resilient gas infrastructure. In all nine countries, the gas infrastructure was able to provide more than double the estimated –if conservative - peak gas demand in 2016, even with the loss of their two largest gas supply routes. Finland, Sweden, Ireland, Bulgaria and Greece appear particularly vulnerable to infrastructure disruptions, with these five countries unable to meet peak daily demand after the loss of the largest gas supply route. Sweden and Finland use very little gas however in Ireland gas accounts for nearly 30 per cent of primary energy demand. Ireland's indigenous

gas production has increased significantly due to production at the Corrib gas field. PF-1 Scores increased from 23 per cent in 2015 to 78 per cent in 2016 leaving Ireland more resilient than in previous years.

Including both *PF*-1 and *PF*-2 scores in Chart 2 gives further insight into infrastructure resilience which would not be captured by the *PF*-1 score alone. For example, the data indicate that Slovenia clearly has two major import routes. Although resilient to a single supply disruption (meeting 124 per cent of peak demand), Slovenia would be vulnerable after the loss of these two main routes. This is also the case for Portugal, Croatia and Luxembourg.

UK gas infrastructure resilience 2016

From the UK perspective there are a diverse range of gas sources including pipeline and LNG imports, storage and indigenous production, with good resilience to disruption of major supply sources. According to these data in 2016 the UK would have met 222 and 197 per cent of the estimated peak demand with the loss of the largest and two largest gas supply routes respectively. Overall, according to *PF-2* scores, the UK was the eleventh most resilient Member State to gas supply infrastructure disruptions, but it was the second most dependent on gas for primary energy demand in 2016. The planned closure of the Rough facility, the largest gas storage facility in the UK, highlights the importance of maintaining a resilient gas supply due to the reduction of gas reserves that can be drawn from in the event of UK gas infrastructure disruption.

EU regulations, enforcing that all Member States must have an *N*-1 score of greater than 100 per cent (using the larger value of peak gas demand based on a statistical probability of once in 20 years) came into force from 3rd December 2014. Given the similarity between the EU *N*-1 methodology and the *PF*-1 methodology used here, the UK remains well-placed to meet this requirement.

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Annex 1: Table of key data for gas use in the EU-28* countries, 2016

	Peak daily [X] (Billion cubic metres per day)								
EU-28 MS	**Demand ****	**Indigenous production ****	**Import pipelines**	**Storage output**	**LNG out-put**	***PF*-1 score**	***PF*-2 score**	**Natural Gas Consumption (Mtoe)**	**Total Primary Energy Consumption (Mtoe)**
Austria	0.039	0.004	0.281	0.094	0.000	413%	344%	7.2	33.3
Belgium	0.069	0.000	0.349	0.015	0.026	470%	390%	14.3	56.5
Bulgaria	0.013	0.001	0.078	0.003	0.000	32%	9%	2.7	18.1
Croatia	0.010	0.004	0.012	0.006	0.000	143%	87%	2.2	9.1
Cyprus*	0.000	0.000	0.000	0.000	0.000	0%	0%	0.0	2.5
Czech Republic	0.039	0.001	0.442	0.076	0.000	929%	665%	7.0	41.4
Denmark	0.015	0.014	0.028	0.016	0.000	288%	200%	2.9	16.5
Estonia	0.003	0.000	0.014	0.000	0.000	226%	96%	0.4	6.0
Finland	0.013	0.000	0.019	0.000	0.000	2%	0%	2.1	33.9
France	0.197	0.000	0.265	0.231	0.099	263%	243%	38.3	241.2
Germany	0.415	0.022	0.926	0.652	0.000	347%	323%	73.2	311.5
Greece	0.018	0.000	0.015	0.000	0.014	82%	26%	3.5	22.9
Hungary	0.049	0.005	0.088	0.080	0.000	237%	180%	8.0	25.6
Ireland	0.016	0.010	0.030	0.003	0.000	78%	17%	4.2	13.8
Italy	0.304	0.017	0.339	0.262	0.043	178%	143%	58.1	149.0
Latvia	0.008	0.000	0.038	0.030	0.000	489%	244%	1.1	4.2
Lithuania	0.009	0.000	0.050	0.000	0.011	355%	209%	1.8	5.5
Luxembourg	0.003	0.000	0.011	0.000	0.000	190%	46%	0.7	3.7
Malta*	0.000	0.000	0.000	0.000	0.000	0%	0%	0.0	2.3
Netherlands	0.163	0.184	0.289	0.268	0.035	411%	359%	30.2	75.2
Poland	0.074	0.017	0.157	0.054	0.014	196%	170%	14.6	99.2
Portugal	0.017	0.000	0.015	0.007	0.022	126%	57%	4.3	21.4
Romania	0.047	0.024	0.122	0.027	0.000	162%	112%	9.5	33.1
Slovak Republic	0.023	0.000	0.292	0.045	0.000	618%	311%	3.9	16.5
Slovenia	0.004	0.000	0.015	0.000	0.000	124%	0%	0.7	6.8
Spain	0.097	0.000	0.108	0.034	0.199	300%	262%	25.0	119.0
Sweden	0.005	0.000	0.009	0.001	0.002	50%	32%	0.8	48.2
United Kingdom	**0.297**	**0.122**	**0.310**	**0.162**	**0.151**	**222%**	**197%**	**69.6**	**177.7**

Source: BEIS analysis of IEA data. *No data available for Cyprus and Malta **Calculated by peak month divided by number of days in that month.

Annex 2: Table of *PF*-1 and *PF*-2 values for EU-28* countries, 2016

EU-28 MS	PF (bcm/day)	PF-1 (bcm/day)	Nature of the largest supply source	PF-2 (bcm/day)	Nature of the second largest supply source
Austria	0.379	0.161	Import pipeline	0.134	Storage
Belgium	0.390	0.324	Import pipeline	0.269	Import pipeline
Bulgaria	0.082	0.004	Import pipeline	0.001	Storage
Croatia	0.022	0.015	Import pipeline	0.009	Storage
Cyprus*	0.000	0.000	-	0.000	-
Czech Republic	0.519	0.363	Import pipeline	0.260	Import pipeline
Denmark	0.058	0.043	Import pipeline	0.030	Import pipeline
Estonia	0.014	0.007	Import pipeline	0.003	Import pipeline
Finland	0.019	0.000†	Import pipeline	0.000	LNG
France	0.595	0.519	Import pipeline	0.479	Import pipeline
Germany	1.600	1.440	Import pipeline	1.340	Import pipeline
Greece	0.029	0.015	LNG	0.005	Import pipeline
Hungary	0.173	0.116	Import pipeline	0.088	Storage
Ireland	0.042	0.013	Import pipeline	0.003	Indigenous Production
Italy	0.662	0.542	Import pipeline	0.436	Import pipeline
Latvia	0.068	0.038	Storage	0.019	Import pipeline
Lithuania	0.062	0.030	Import pipeline	0.018	Import pipeline
Luxembourg	0.011	0.006	Import pipeline	0.001	Import pipeline
Malta*	0.000	0.000	-	0.000	-
Netherlands	0.775	0.670	Indigenous production	0.586	Import pipeline
Poland	0.242	0.144	Import pipeline	0.125	Storage
Portugal	0.044	0.022	LNG	0.010	Import pipeline
Romania	0.173	0.077	Import pipeline	0.053	Storage
Slovak Republic	0.338	0.140	Import pipeline	0.071	Import pipeline
Slovenia	0.015	0.004	Import pipeline	0.000	Import pipeline
Spain	0.341	0.292	LNG	0.254	Import pipeline
Sweden	0.011	0.003	Import pipeline	0.002	Storage
United Kingdom	**0.733**	**0.658**	**Import pipeline**	**0.584**	**Import pipeline**

Source: BEIS analysis of IEA data. *PF* = peak flow (defined in Equation 1 in report). *No data available for Cyprus and Malta.
†Finland PF-1 value too small for the number of decimal places shown.

Annex 3: Table of Statistical differences between observed and calculated consumption for EU-28* countries, 2016

EU-28 MS	Observed Consumption (bcm)	Calculated Consumption (bcm)	Statistical Difference (bcm)	Statistical Difference (Per cent)
Austria	8.7	8.5	0.3	3.2%
Belgium	17.4	17.1	0.3	1.7%
Bulgaria	3.2	3.1	0.1	3.5%
Croatia	2.7	2.7	0.0	-1.7%
Cyprus	0.0	0.0	0.0	0.0%
Czech Republic	8.5	8.5	0.0	0.0%
Denmark	3.2	3.2	0.0	1.0%
Estonia	0.5	0.5	0.0	0.3%
Finland	2.5	2.5	0.0	0.9%
France	43.2	44.8	-1.6	-3.6%
Germany	86.1	86.2	-0.1	-0.1%
Greece	4.1	4.1	0.0	-0.8%
Hungary	9.7	9.7	0.0	0.0%
Ireland	5.1	5.1	0.0	0.0%
Italy	70.9	70.9	0.0	0.0%
Latvia	1.4	1.1	0.3	22.3%
Lithuania	2.2	2.1	0.1	6.8%
Luxembourg	0.8	0.8	0.0	0.6%
Malta	0.0	0.0	0.0	0.0%
Netherlands	42.1	42.1	0.0	0.1%
Poland	19.1	19.1	0.1	0.3%
Portugal	5.1	4.9	0.2	4.2%
Romania	11.5	11.4	0.1	0.5%
Slovakia	4.7	4.3	0.4	9.0%
Slovenia	0.9	0.9	0.0	-3.4%
Spain	28.6	28.9	-0.3	-1.1%
Sweden	0.9	0.9	0.0	0.0%
United Kingdom	81.6	81.5	0.1	0.2%

Table shows differences between IEA observed consumption and calculated consumption based on pipeline import and export flows. As this article prioritises pipeline flows the data reported are calculated flows. Source: BEIS analysis of IEA data. *No data available for Cyprus and Malta.

Feed-in Tariff load factor analysis

Introduction

This article updates the FIT load factor analysis presented in the December 2016 edition of Energy Trends[1] with data for FIT year seven (financial year 2016/17). We also present regional analysis of solar PV for the six years that data has been published (FIT years two to seven) and wind for years five to seven. All the data in this article is also available in Excel format at the following link, including quarterly load factors for solar PV:
www.gov.uk/government/statistics/quarterly-and-annual-load-factors

Background

The Feed-in Tariff (FIT) scheme was launched in April 2010. It is a financial support scheme for eligible low-carbon electricity technologies, aimed at small-scale installations. The following technologies are supported:

- Solar photovoltaic (PV; Up to 5 MW capacity)
- Anaerobic digestion (AD; Up to 5 MW capacity)
- Hydro (Up to 5 MW capacity)
- Wind (Up to 5 MW capacity)
- Micro combined heat and power (MicroCHP; Up to 2 kW capacity)

Installers receive support through generation and export tariffs, paid directly from electricity suppliers. The generation tariff is based on the number of kilowatt hours (kWh) generated whereas the export tariff is based on electricity that is generated on site, not used and exported back to the grid.

Since the start of the scheme, DECC/BEIS has provided regular updates on the number and capacity of installations installed under the scheme, currently publishing monthly updates on deployment levels with quarterly reports on geographical distribution, amongst other outputs[2]. From 2013, DECC/BEIS obtained meter readings for each registered installation from Energy Suppliers and used this to produce quarterly and annual load factors for FIT years two to seven (data from year one is not available as the number of installations running for the full year was very small).

Methodology

The methodology used for the load factor analysis has been described in detail in an Energy Trends article from September 2014[3]. One additional quality assurance (QA) step has been added since 2015, to remove any installations from the analysis where more than one generation meter is attached. This step has only been applied to FIT year five to seven data; previously produced statistics have not been revised. Please note that full QA on data from all installations has not been possible.

Table 1 shows how many installations were registered on the Central Feed-in Tariff Register at the start of FIT year seven and how many installations had meter readings in March 2016 and 2017. As generators can submit meter readings throughout the year, of the 784,414 schemes registered for FiTs at the start of the year, only around 16 per cent were found to have meter readings in both

[1] The article published in December 2014 can be found at the following link: www.gov.uk/government/statistics/energy-trends-december-2014-special-feature-article-feed-in-tariff-load-factor-analysis
[2] See this link for the full FIT statistics collection: www.gov.uk/government/collections/feed-in-tariff-statistics
[3] The article published in September 2014 can be found at the following link: www.gov.uk/government/statistics/energy-trends-september-2014-special-feature-article-analysis-of-feed-in-tariff-generation-data

March 2016 and March 2017, required to produce this analysis. Extreme load factor values were further excluded (as in previous years' analysis), although only accounting for around 92 (0.1%) of installations. The column 'Valid load factor' in Table 1 indicates how many installations were included in the final analysis for each technology for the annual generation data. Anaerobic Digestion data has been included in the main results, but this data must be treated with caution as the number of installations remains low.

Table 1: Installations included in analysis by Technology – FIT Year 7

Technology	Commissioned by 1st April 2016	Generation Data Reported*	Valid load factor	% remaining in analysis
Anaerobic digestion	351	45	44	13%
Hydro	883	98	98	11%
Micro CHP	529	41	41	8%
Photovoltaic	775,289	126,410	126,323	16%
Wind	7362	2,003	1,999	27%
All Technologies	**784,414**	**128,597**	**128,505**	**16%**

* Meter reading in March 2016 and March 2017.

Results

Table 2 gives the weighted mean and median load factors as well as associated percentiles for each technology. Chart 1 presents this data across all available years (FITs years two to seven), highlighting the large range present for Hydro compared to other technologies.

Table 2: FIT Year 7 (2016/2017) load factors by technology

Technology	Count	Mean	Weighted mean	Percentile				
				5th	25th	50th (median)	75th	95th
Anaerobic digestion	44	77.8	71.4	26.2	66.3	86.0	94.3	97.6
Hydro	98	37.7	36.5	10.8	25.8	34.3	46.6	74.1
Micro CHP	41	12.6	12.6	5.8	8.6	11.2	15.4	25.8
Photovoltaic	126,323	9.9	9.9	7.1	9.0	10.1	10.9	12.0
Wind	1,999	18.4	24.6	5.3	10.3	17.0	24.6	36.8

The median load factor for Solar PV in 2016/17 was lower than the preceding three years at 10.1%. This small decrease can be attributed to the small decrease in average daily sun hours from 4.3 hours to 4.2 hours[4] (see Table 3).

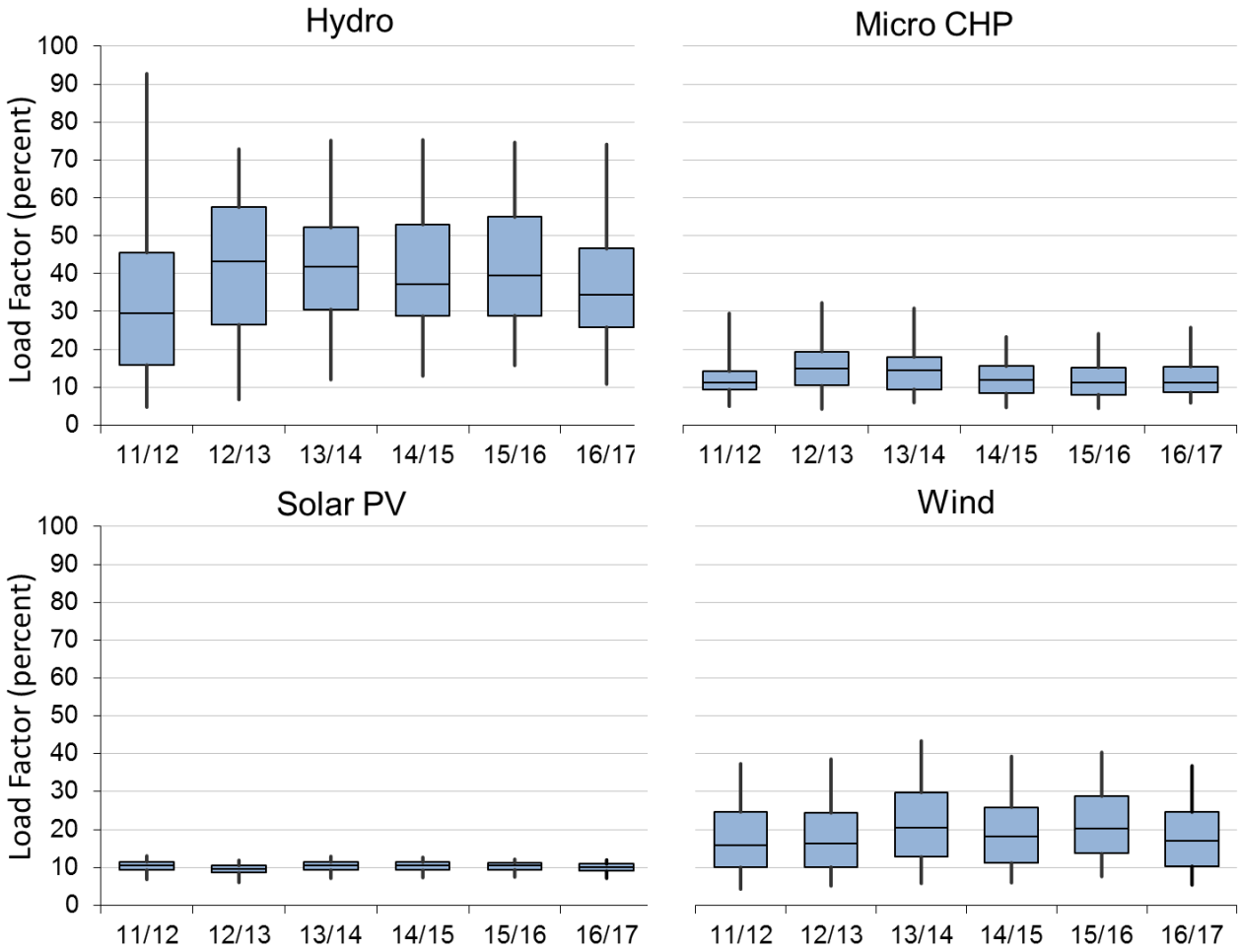
Table 3: Solar PV load factors and average sun index

Year	Median load factor	Average daily sun hours
2011/12	10.5	4.5
2012/13	9.6	3.7
2013/14	10.4	4.5
2014/15	10.4	4.5
2015/16	10.4	4.3
2016/17	10.1	4.2

[4] Average daily sun hours taken from Energy Trends section 7: weather, table 7.3 "Average daily sun hours and deviations from the long term mean (ET 7.3)" www.gov.uk/government/statistics/energy-trends-section-7-weather. Note that data for 2016/17 is provisional and subject to revision.

Chart 1: Load factor range by technology and year

Lines indicate range from 5th to 95th percentile. Boxes indicate range from lower to upper quartile (25th to 75th percentile) with median indicated.



As in previous years, the weighted mean load factor for Wind installations is higher than the mean (see Table 2), and this difference has generally increased over the time-series, possibly reflecting the increase in the number of higher performing larger wind schemes in the analysis. The relationship between average daily wind speed[5] and load factor for wind installations is less clear than between sun hours and solar load factors (see Table 4). For 2016/17 the median load factor decreased to 17.0% compared to 20.3% in 2015/16. This decrease reflects the reduction in wind installations, from 2,120 in 2015/16 to 1,999 in 2016/17, and the reduction in average wind speed (see Table 4).

[5] Average wind speed taken from Energy Trends section 7: weather, table 7.2 " Average wind speed and deviations from the long term mean (ET 7.2)" www.gov.uk/government/statistics/energy-trends-section-7-weather. Note that data for 2016/17 is provisional and subject to revision.

Table 4: Wind load factors and average wind speed

Year	Median load factor	Average wind speed (knots)
2011/12	15.9	9.2
2012/13	16.3	8.0
2013/14	20.5	9.3
2014/15	18.1	8.6
2015/16	20.3	9.2
2016/17	17.0	8.2

Solar PV Load Factors

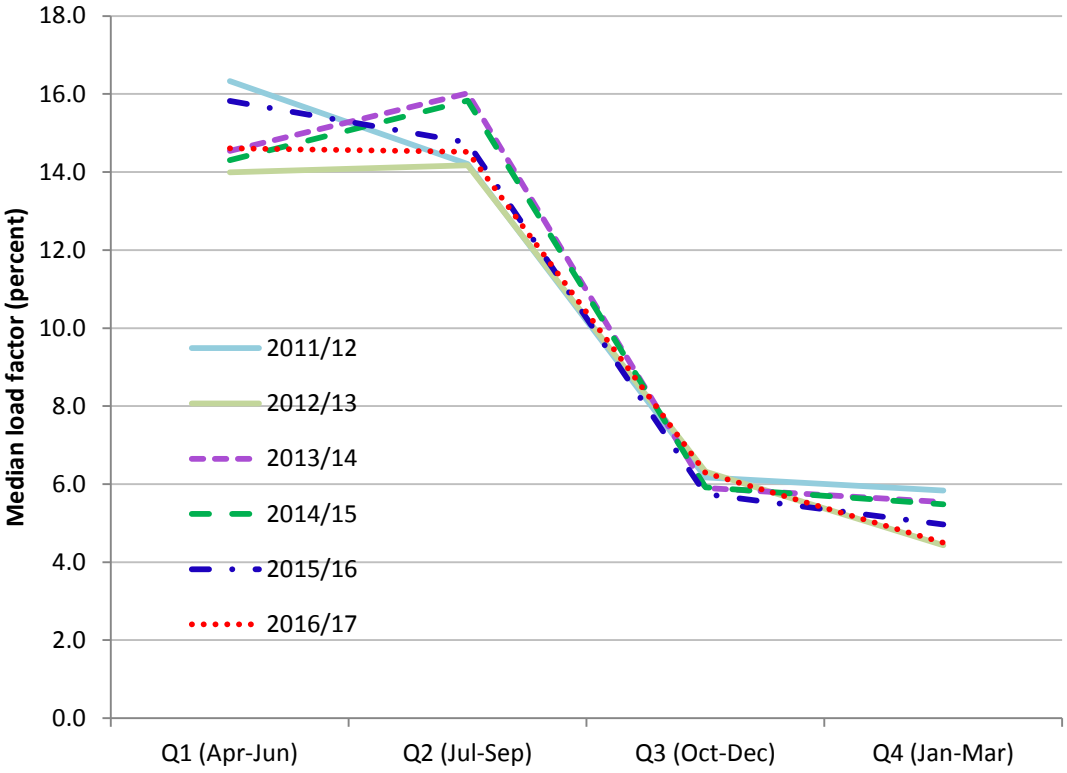
The number of Solar PV installations continues to slowly increase but – based on 2016/17 alone - there appears to be some evidence from our analysis that the load factor of installations decreases over time. When schemes are installed, their productivity may vary across time since the solar panels may degrade, losing efficiency. Newly installed schemes can benefit from technological improvements, but there is also a potential concern that early solar adopters used the most favourable sites, making newer sites less efficient. *However*, this could be countered by the increased share of larger, optimally oriented and unshaded, solar farms (as opposed to household schemes) in more recent years. Table 5 gives the data from all the installations in the FIT year seven analysis, broken down by calendar year commissioned.

Table 5: Solar PV Load Factors in FIT Year 7 by year commissioned

Year Commissioned	Count	Weighted Mean load factor
2010 and earlier	5,683	9.7
2011	54,274	9.9
2012	40,613	9.8
2013	19,144	9.9
2014	5,555	10.2
2015	940	10.2
2016	114	9.7

Quarterly load factors for Solar PV installations are available in the accompanying excel workbook and are presented graphically in Chart 2. These show an expected association between load factor and daily hours of sunshine, where the quarters mainly covering Autumn and Winter have the lowest load factors. This chart also highlights that the lower annual load factors seen in FIT year three (2012/13) for Solar PV are driven by lower load factors in all quarters except quarter three (Q3), and those in FIT year seven (2016/17) driven by low sun levels and load factors in the summer quarters (Q1 and Q2).

Chart 2: Quarterly PV load factors by FIT year



Regional Solar PV Load Factors

Solar PV Factors for each Government Office Region have been published for FIT years two to six and are updated with data from year seven in Table 4. Chart 3 highlights that the lowest load factors are seen in Scotland, while the highest are seen in the South West. Load factors in year three (2012/13) are lower than in other years, which are explained by the average daily sun hours also dropping for that year (see Table 3). For year seven (2016/17), the load factors are lower than in the preceding three years, reflecting the decrease in average daily sun hours. London again has a lower load factor than the South East which may be due to pollution or particles settling on the panels or because panels are shaded by tall buildings nearby.

Chart 3: Regional Solar PV load factors for FITs years 2-7

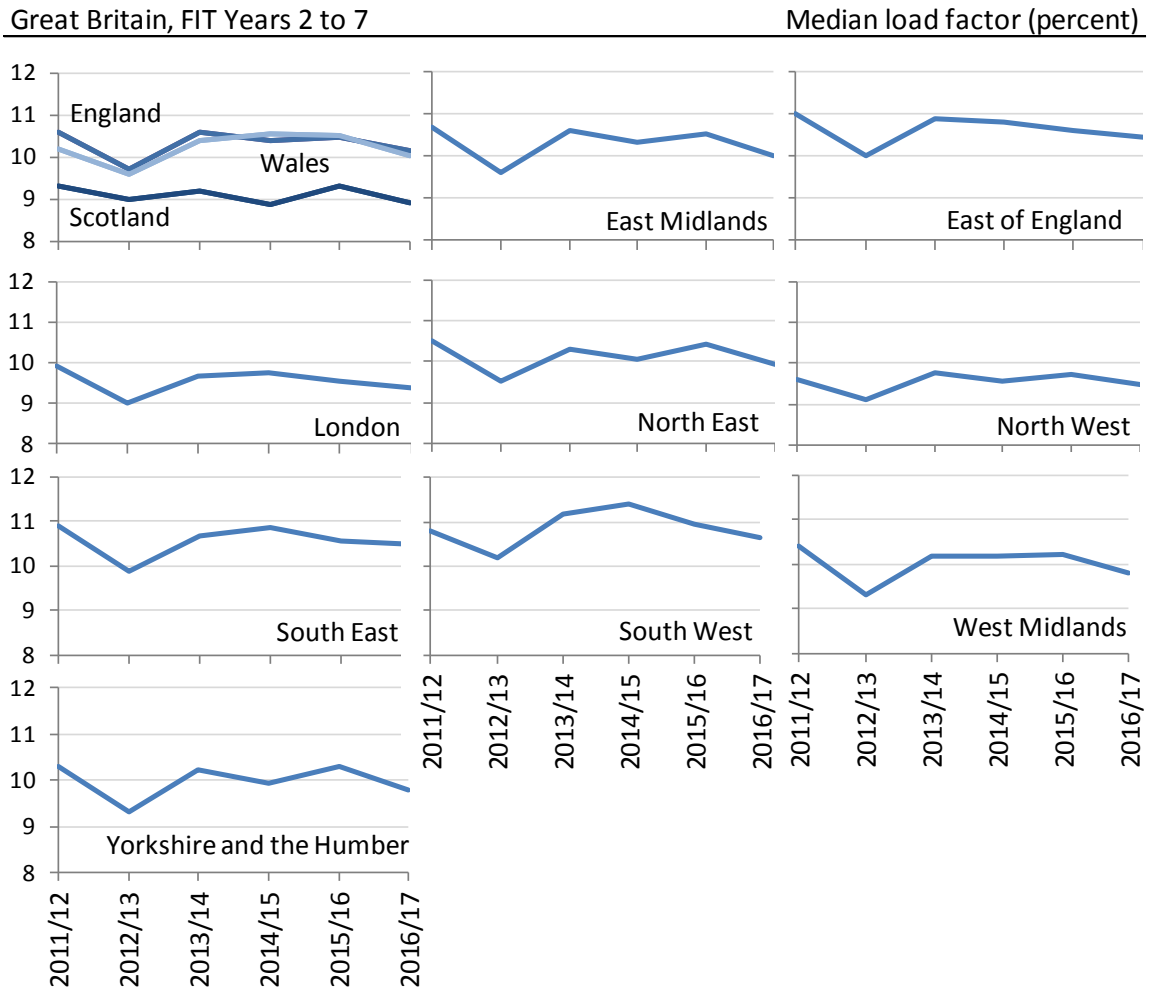


Table 6: Regional Solar PV load factors for FITs years 2-7

Region	FIT Year 2 (2011/12)		FIT Year 3 (2012/13)		FIT Year 4 (2013/14)		FIT Year 5 (2014/15)		FIT Year 6 (2015/16)		FIT Year 7 (2016/17)	
	Count	Median	Count	Median	Count	Median	Count	Median	Count	Median	Count	Median
East Midlands	855	10.7	7,520	9.6	12,936	10.6	18,735	10.3	13,489	10.5	11,548	10.0
East of England	1,465	11.0	10,521	10.0	16,306	10.9	21,247	10.8	16,917	10.6	14,308	10.5
London	523	9.9	3,283	9.0	4,117	9.7	4,996	9.8	3,813	9.6	3,240	9.4
North East	224	10.5	3,460	9.5	5,805	10.3	8,023	10.1	6,444	10.4	5,595	9.9
North West	718	9.6	8,867	9.1	13,024	9.8	17,360	9.5	13,689	9.7	11,546	9.5
South East	2,764	10.9	17,378	9.9	23,235	10.7	25,994	10.9	18,955	10.6	15,632	10.5
South West	2,649	10.8	24,445	10.2	31,965	11.2	36,938	11.4	29,331	11.0	25,715	10.6
West Midlands	974	10.4	7,139	9.3	11,118	10.2	15,312	10.2	12,013	10.2	10,219	9.8
Yorkshire and the Humber	798	10.3	7,292	9.3	11,299	10.2	18,507	9.9	15,058	10.3	12,826	9.8
England	**10,970**	**10.6**	**89,905**	**9.7**	**129,805**	**10.6**	**167,112**	**10.4**	**129,709**	**10.5**	**110,629**	**10.2**
Scotland	**508**	**9.3**	**7,722**	**9.0**	**11,531**	**9.2**	**11,363**	**8.9**	**6,802**	**9.3**	**5,731**	**8.9**
Wales	**645**	**10.2**	**9,882**	**9.6**	**13,643**	**10.4**	**15,100**	**10.5**	**11,614**	**10.5**	**9,946**	**10.0**

Regional Wind Load Factors

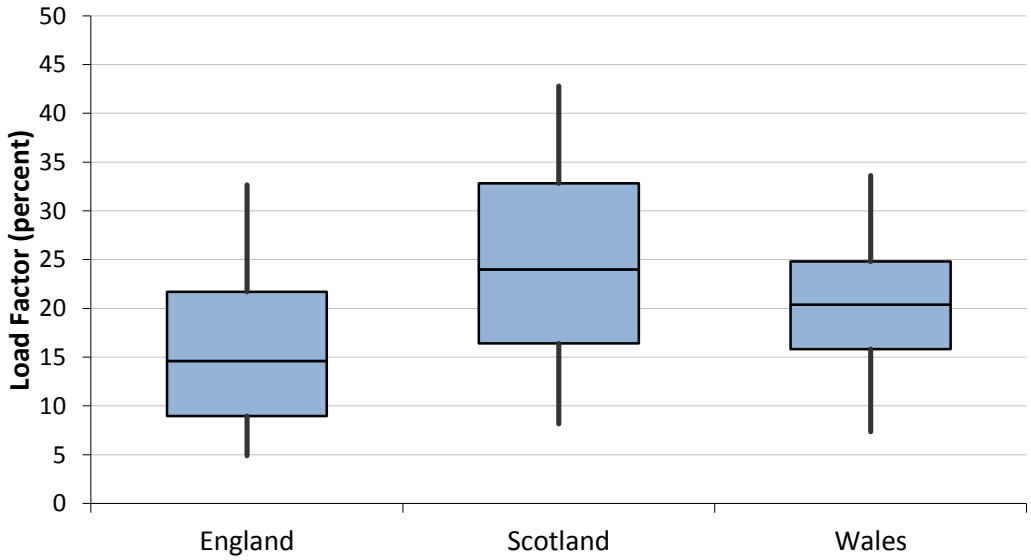
Similar to the regional solar load factors, we have also produced regional load factors for Wind schemes for FIT years five to seven; these are presented in Table 7. Data from London and the South East has been aggregated as there was a low number of installations within these regions with a valid load factor. Chart 4 summarises this data for England, Scotland and Wales, showing that the highest Wind load factors are found in Scotland.

Table 7: Regional Wind load factors for FITs years 5 to 7

Region	FIT Year 5 (2014/15)		FIT Year 6 (2015/16)		FIT Year 7 (2016/17)	
	Count	Median	Count	Median	Count	Median
East Midlands	134	14.4	123	17.5	134	13.6
East of England	453	10.0	405	13.0	361	8.6
London and South East	30	14.8	23	12.1	18	10.2
North East	84	16.5	73	17.5	67	14.2
North West	133	19.0	137	23.6	129	18.9
South West	318	19.6	296	25.7	276	20.7
West Midlands	63	13.6	63	17.1	63	13.6
Yorkshire and the Humber	319	18.9	318	20.8	321	17.0
England	**1,534**	**14.8**	**1,438**	**18.2**	**1,369**	**14.6**
Scotland	**743**	**24.8**	**469**	**25.6**	**436**	**24.0**
Wales	**190**	**20.0**	**178**	**24.4**	**192**	**20.4**

Chart 4: Wind regional load factors for FITs year 7 by country

Lines indicate range from 5th to 95th percentile. Boxes indicate range from lower to upper quartile (25th to 75th percentile) with median indicated.



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Fuel Mix Disclosure – proposed methodology change for residuals

Introduction

The Department for Business, Energy and Industrial Strategy (BEIS) publishes the annual 'fuel mix disclosure data table' as defined in The Electricity (Fuel Mix Disclosure) Regulations 2005. Electricity suppliers in Great Britain are required to use this table to calculate the fuel mix for the residual portion for which they do not hold generator declarations or Renewable Energy Guarantee of Origin (REGOs). The tables and methodology documents are available at: www.gov.uk/government/collections/fuel-mix-disclosure-data-tables.

Key points

- The proposed method expands the survey pool from the six largest to the ten largest suppliers.
- Under the proposed method all renewable generation for which REGOs are held would be deducted to reduce double counting.
- Compared to the current method, the 2016/17 renewables percentage in the residual fuel mix would fall from 29.4 per cent to 18.0 per cent.

Issues

The current BEIS methodology calculates the residual mix from data supplied by the six largest electricity suppliers; however, the electricity market has changed since the methodology was developed and the portion of the market covered has decreased. In 2005 the suppliers surveyed supplied 92 per cent of UK electricity; this had fallen to 75 per cent in 2016 as smaller suppliers entered the market. The generation mix also shifted significantly with renewables' share increasing from 4 per cent in 2005 to 25 per cent in 2016.

1) The fall in coverage of the survey makes the sample less representative, increasing the margin of error.
2) Under the current method renewable electricity supplied by companies other than the six largest can be double counted. For example, a small supplier may hold REGOs to cover half of its supply and be required to use the published residual mix for the remainder. As its REGOs are already included in the residual mix this portion would be double counted.

GB Fuel Mix Methodology – current method

1) Data requests are sent to the six largest electricity suppliers[1] requesting the following:

Supply for which REGOs or Generator Declarations held, by fuel (all MWh)	
Coal	
Natural Gas	
Nuclear	
Renewable	
Other	
Total for which REGOs or generator declarations are held	
Residual (supply for which REGOs or generator declarations are not held	
Total supplied	
Total purchased for supply (inc. loss factor) (MWh) calculated by BEIS[2]	

[1] npower, E.on, British Gas, EDF Energy, SSE and Scottish Power.

[2] Total purchased for supply (inc. loss factor) (MWh) is calculated for each major energy supplier and aggregated as a total for all major energy suppliers as follows:
*(Total non-renewable supplied for which REGOs or generator declaration held * loss factor) + Total supplied by renewables for which REGOs or generator declaration held*

2) The data returns are then aggregated to give the total amount of electricity supplied by fuel source for which REGOs or generator declarations are held.
3) The total UK fuel mix is calculated on a financial year basis using BEIS's published statistics. Data for the UK are published in Table 5.1 of our quarterly publication, Energy Trends (the version used in the 2016/17 fuel mix was Energy Trends June 2017). The tables can be found here: www.gov.uk/government/statistics/electricity-section-5-energy-trends
4) The UK data are then converted to cover Great Britain only[3].
5) Imported electricity is also allocated to a fuel type using fuel mix data for France, Netherlands and Ireland, sourced from Eurostat.
6) The data are expressed as a percentage of the total supply in Great Britain. Each percentage is multiplied by the 'Total purchased for supply (incl. loss factor)' to give the total electricity supplied for each fuel source. The difference between this and the actual figures reported by the major electricity suppliers gives the GB residual fuel mix, which is then expressed in percentage terms.

GB Fuel Mix Methodology – proposed changes

1) The ten largest suppliers will be surveyed, expanding the pool from the top six currently surveyed. This increases the coverage from 75 per cent to around 90 per cent of GB electricity supplied.
2) The electricity supply represented by all redeemed REGOs will be deducted from the renewables residual. This will reduce double counting of renewables.
3) Imports in the residual mix will be accounted for using EU Guarantees of Origin (GoOs) recognised by Ofgem, non-EU GoOs claimed by suppliers, and other generator declarations. The remainder will be ascribed in accordance with the European residual mix figures published by AIB[4].
4) Exported REGOs will be accounted for in the residual calculation. Whilst current volumes are low, this will help future-proof the methodology.

Table 1: Residual fuel mix 2016/17 – current method vs proposed method

Energy source	Current method (%)	Proposed method (%)
Coal	13.5	14.7
Natural Gas	41.4	48.0
Nuclear	11.3	14.5
Renewables	29.4	18.0
Other Fuels	4.4	4.8

Source: BEIS

User feedback

We welcome all feedback from users on these proposals. If you have any comments or queries, please contact Stephen Ashcroft or Matt Laycock using the contact details below by 28th February 2018. We plan to update the methodology document at the end of March 2018 before the next residual mix is published in August 2018.

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[3] The Northern Ireland Fuel Mix comes from monthly returns sent in by electricity companies based in Northern Ireland.
[4] www.aib-net.org/facts/european_residual_mix

Domestic energy consumption by energy efficiency and environmental impact, 2015

Introduction

This article aims to compare domestic energy consumption by using data from both the National Energy Efficiency Data-framework and Energy Performance Certificates.

The analysis confirms the natural expectation that, generally, households that are less energy efficient and less environmentally friendly tend to use more gas and electricity. However, this is not always the case with 'Band G' properties (the least efficient and least environmentally friendly) tending to use less energy than the band D-F properties. These less intuitive results can partly be explained by the fact that very few of these properties use gas as the main heating fuel, but there may be other factors in play.

About Energy Performance Certificates

Energy Performance Certificates were first introduced in England and Wales in 2007. Certificates are needed whenever a property is built, sold or rented. EPCs are now also required prior to a property having a measure through the Green Deal[1], Renewable Heat Incentive (RHI) or Feed in Tariffs (FiTs)[2].

An EPC contains:

- information about a property's energy use and typical energy costs; and
- recommendations about how to reduce energy use and save money.

The Reduced Data Standard Assessment Procedure (RDSAP)[3] is used to assess and compare the energy and environmental performance of dwellings with results included in the EPC. RDSAP assigns a score to a property based on how much energy a dwelling will consume based on standard assumptions about occupancy and behaviour. It quantifies a dwelling's performance in terms of: energy use per unit floor area, a fuel-cost-based energy efficiency rating (the Energy Efficiency Rating) and emissions of CO2 (the Environmental Impact Rating).

The energy efficiency ratings are grouped into bands from A (most efficient with lower running costs) to G (least efficient and higher running costs). Similarly, the environmental impact rating is also grouped into bands A (very environmentally friendly, lower CO2 emissions) to G (not environmentally friendly, higher CO2 emissions).

Number of EPC's

A total of 14.4 million EPC's covering domestic properties have been lodged on the Domestic Register between 2008 and the period ending 31 December 2015[4]. At the end of March 2015, there were around 25 million dwellings in England and Wales[5]. Figure 1 shows the number of EPCs lodged in each year from 2008 to the end of 2015.

[1] www.gov.uk/government/publications/green-deal-deciding-on-the-best-energy-saving-home-improvements-for-you

[2] www.gov.uk/government/publications/feed-in-tariffs-and-grants

[3] www.gov.uk/standard-assessment-procedure.

[4] www.gov.uk/government/statistics/energy-performance-of-buildings-certificates-in-england-and-wales-2008-to-december-2015 . Some properties may have had more than one EPC during the period; therefore there will be fewer than 14.4 million individual properties with an EPC.

[5] Live tables on dwelling stock published by the Department for Communities and Local Government: www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants.

Figure 1: Number of EPCs by year, for all dwellings in England and Wales, DCLG

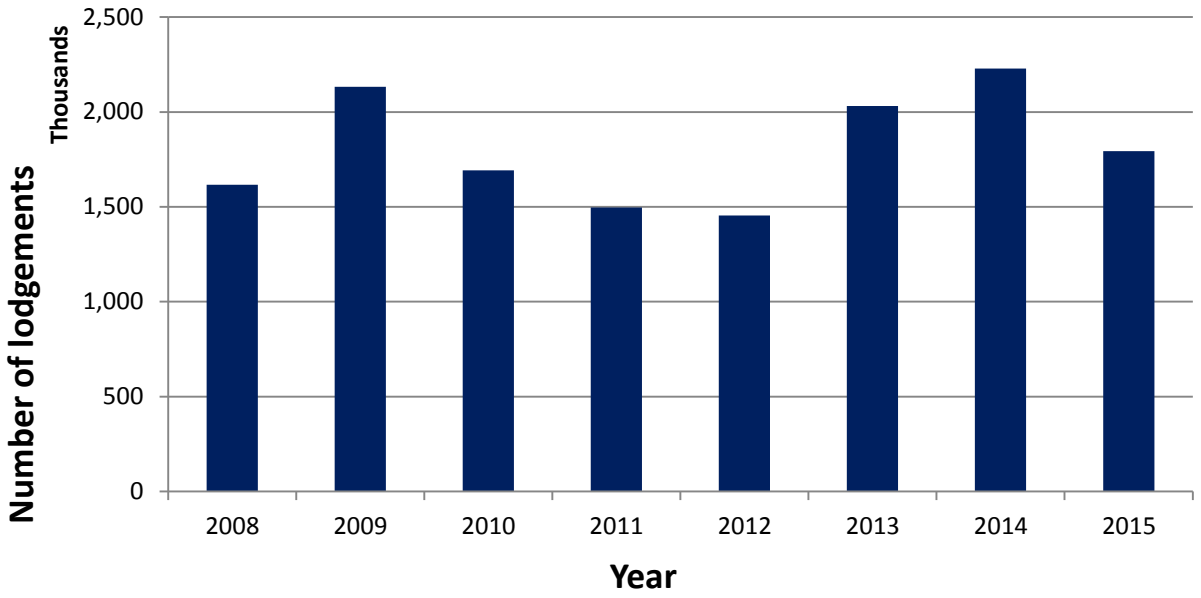
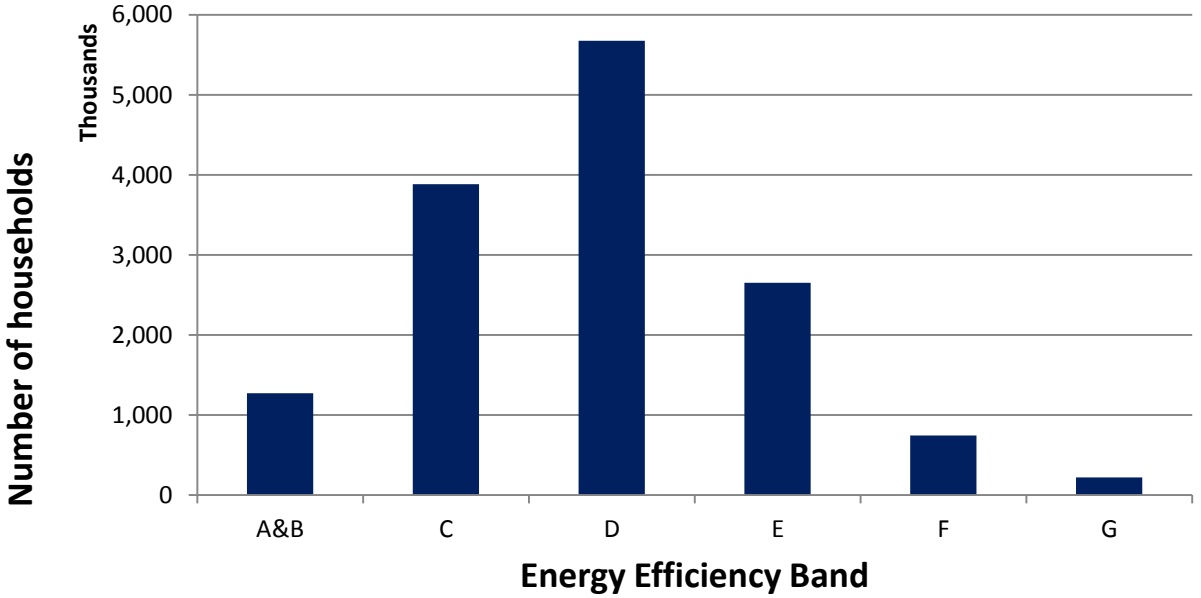


Figure 2 shows the energy efficiency band of properties in England and Wales, based on data from Energy Performance of Buildings Certificates[4]. Further information on this data is available on the Department for Communities and Local Government (DCLG) Website[6].

The figure shows that the most common energy efficiency band for data up until the end of 2015 is D, with 5.7 million households or 39 per cent of all households in England and Wales in this band. Few properties are in bands A and G; therefore results presented for these groups will be subject to greater uncertainty and should be treated with caution.

Figure 2: Properties in England and Wales by energy efficiency band, DCLG



[6] General information, including how to find EPCs for individual properties is available here: www.gov.uk/buy-sell-your-home/energy-performance-certificates. A sample EPC including explanation of content is here: www.gov.uk/government/uploads/system/uploads/attachment_data/file/49997/1790388.pdf.

Special feature - Energy consumption and EPC's

This report provides provisional estimates of typical gas and electricity consumption and fuel prices by energy efficiency band and environmental impact band (consumption figures are estimates only).

The results are produced based on the same methodology as that used for the headline NEED results[7], using the full dataset on properties and energy consumption. Approximately 14 million properties included in the EPC open dataset[8] have been used, which have all had an EPC in England and Wales between the introduction of EPCs in 2007 and 31 December 2015. The EPC data for each property has been matched to other sources of data used in NEED analysis, including meter point gas and electricity consumption data and property attribute data. Unlike with the headline NEED results, Experian data has been used in place of Valuation Office Agency data for the property attribute information.

The accompanying data tables to this report can be found at:
www.gov.uk/government/publications/energy-trends-december-2017-special-feature-article-domestic-energy-consumption-by-energy-efficiency-and-environmental-impact-2015

The data tables now include fuel price estimates based on average variable unit price (£/kWh) and average fixed cost (£/year) [9]. The average variable unit price represents the energy costs directly associated with varying energy consumption. The average fixed cost represents the energy costs which do not vary with consumption, such as standing charges. When there are two unit prices, this includes the difference between the two prices, multiplied by the split level.

As EPCs are required in a very specific group of properties, the dataset used for analysis is not representative of the population of dwellings in England and Wales. For example, properties built since 2008 are more likely to be included in the dataset, and there are likely to be a higher proportion of more energy efficiency properties in the EPC data. Results for consumption have not been weighted to reflect the housing stock in England and Wales. Therefore, estimates presented here reflect the properties in the EPC sample.

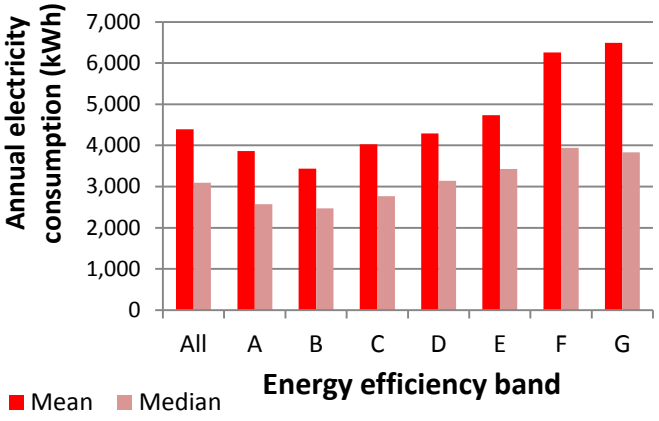
Results

Consumption by energy efficiency band

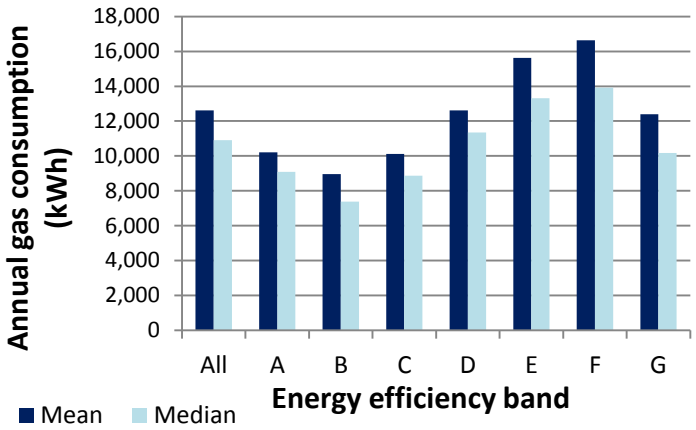
Figure 3 shows the average annual consumption by energy efficiency band for gas and electricity.

Figure 3: Average annual consumption by energy efficiency band, 2015

a) Electricity



b) Gas



[7] www.gov.uk/government/publications/domestic-national-energy-efficiency-data-framework-need-methodology

[8] https://epc.opendatacommunities.org/#register

[9] This is published in the Quarterly Energy Prices publication: www.gov.uk/government/collections/quarterly-energy-prices

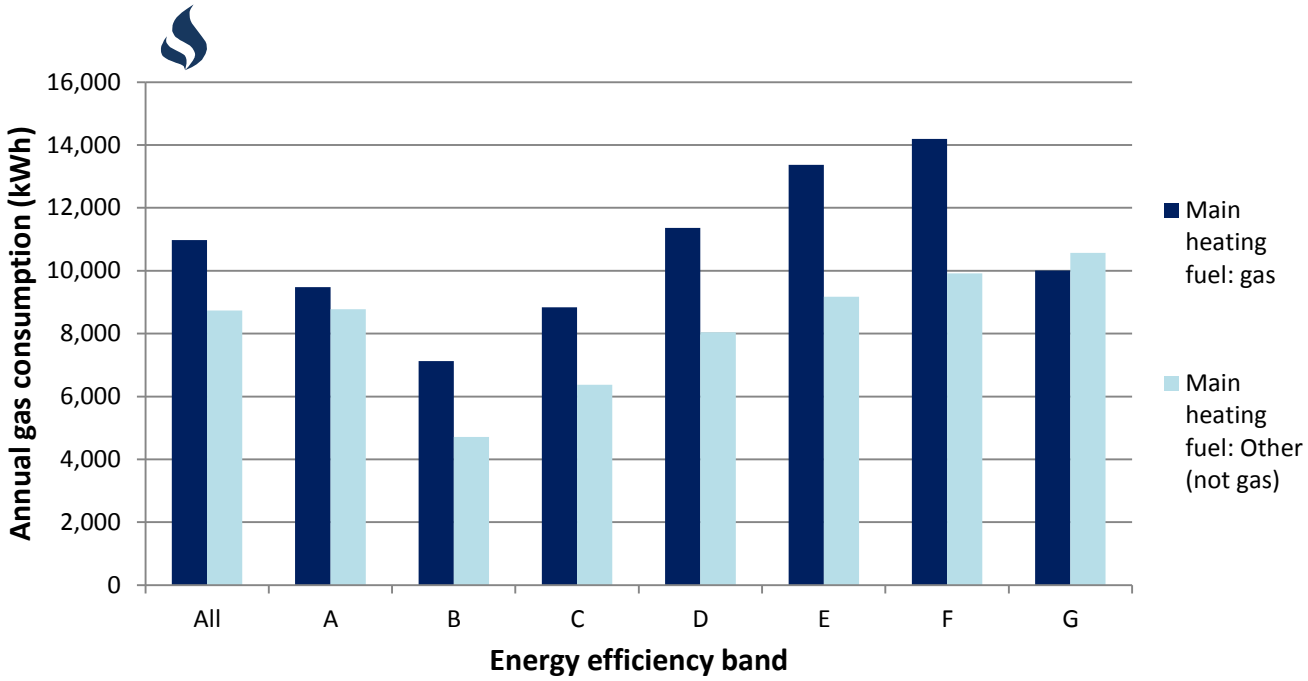
Both charts show that generally the mean and median consumption is higher for properties assessed as being less energy efficient. However, this is not always the case. For electricity and gas, the typical (median) consumption for properties assigned to band A is higher than for band B. For gas, the typical consumption for properties in band G (10,200 kWh) is lower than bands D (11,300kWh), E (13,300kWh) and F (13,900 kWh). These results are likely due to the small number of properties in band A, B and G, as shown in figure 2.

Energy consumption across EPC band reflects energy prices across these bands in 2015. Band F shows the highest energy bills for gas at £710 and band G for electricity at £950, on average. Band B showed the lowest average energy prices for both gas and electricity at £420 and £540, respectively.

Figure 3 above shows gas and electricity consumption in isolation, they do not take into account consumption of other fuels. The less intuitive results shown for typical gas consumption in band G households can partly be explained by the main heating fuel for properties in this category. All properties included in figure 3b have a gas consumption recorded as valid in 2015, that is, between 100 and 50,000 kWh[10], but not all of them use gas as the main heating fuel. Of the properties included in this analysis, EPC data shows that 86 per cent of properties with a valid gas consumption in 2015 used gas as the main heating fuel. However, for band G properties, only 12 per cent used gas as the main heating fuel. It is also possible that more band G households have a secondary heating fuel, and therefore have a lower requirement for gas.

Figure 4 shows the typical (median) gas consumption, for each energy efficiency band, for properties with a valid gas consumption for which gas is the main heating fuel in 2015. This is compared to properties where the main heating fuel was not gas in 2015.

Figure 4: Median annual gas consumption by energy efficiency band and main heating fuel, 2015



As can be seen from Figure 4 properties that do not use gas as the main heating fuel have the highest typical gas consumption in band G (10,600 kWh). This is 6 per cent more than the typical gas consumption of properties in band G that do use gas as the main heating fuel (10,000 kWh). As mentioned previously, this may be due to more band G properties having a secondary heating fuel. For energy efficiency bands B to F, properties that use gas as the main heating fuel show

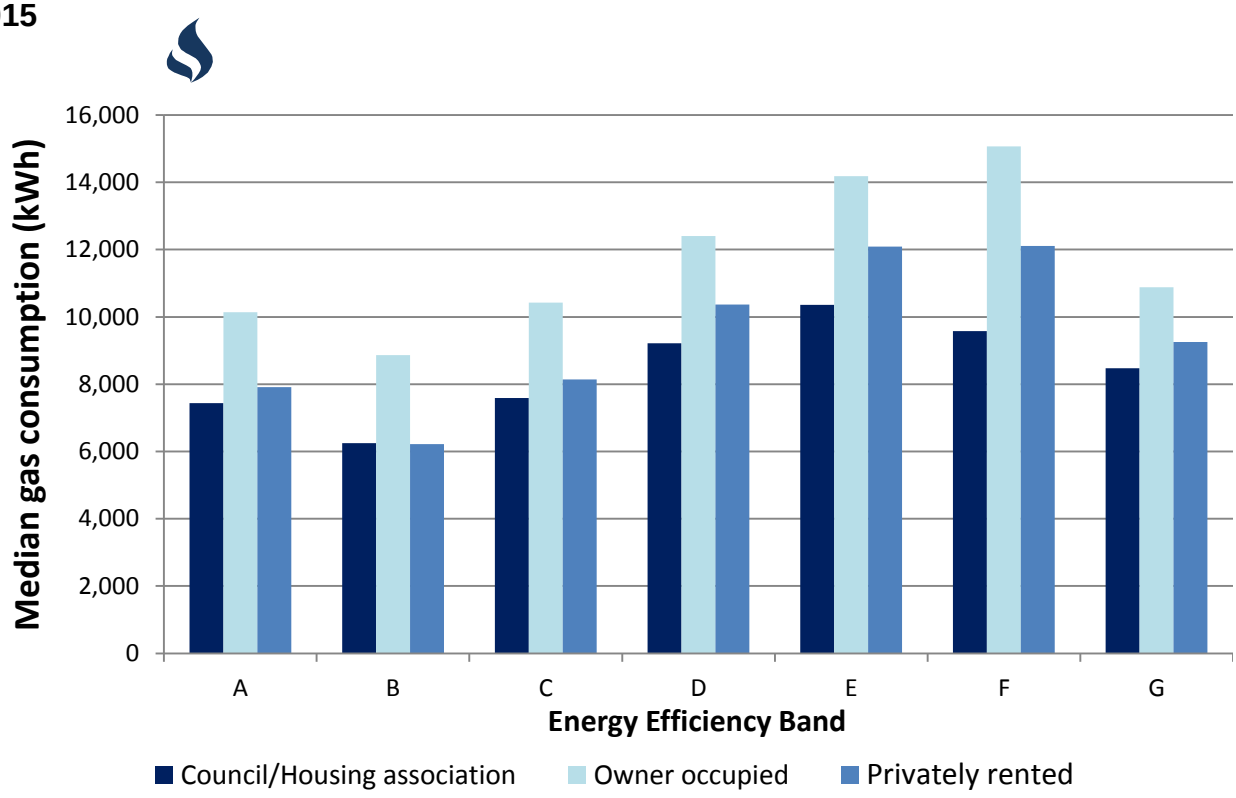
[10] Gas consumption is considered valid if it is between 100 and 50,000 kWh (inclusive). Electricity consumption is included as valid if it is between 100 and 25,000 kWh.

between 39 and 51 per cent more gas consumption than properties that do not use gas as the main heating fuel.

In contrast to findings on 2012 data (published in 2014), behaviours of household occupants are unlikely to account for differences in energy consumption across EPC bands in 2015. The previous data for 2012 showed that the demographics of occupants in band A properties differed from those in bands B and C, which may have accounted for the differences in energy consumption. For example, 60 per cent of band A properties were owner occupied, relative to 36 per cent in band B and 46 per cent in band C in 2012. It was shown that within these groups properties in band A had a higher consumption than properties in band B.

In 2015, despite median gas consumption being the highest for owner occupied band F properties, at 15,100 kWh, the modelled data from Experian shows that the proportions by tenure are similar across bands. Therefore, tenure is unlikely to account for the differences in gas consumption across these bands (seen in Figure 3). Across EPC bands owner occupied properties account for 38 to 42 per cent of properties, Council/housing association between 26 and 30 per cent of properties and 29 to 33 per cent of Privately rented properties. This shows very similar proportions of tenure across EPC bands (see figure 5 below).

Figure 5: Median annual gas consumption by energy efficiency band and tenure, 2015

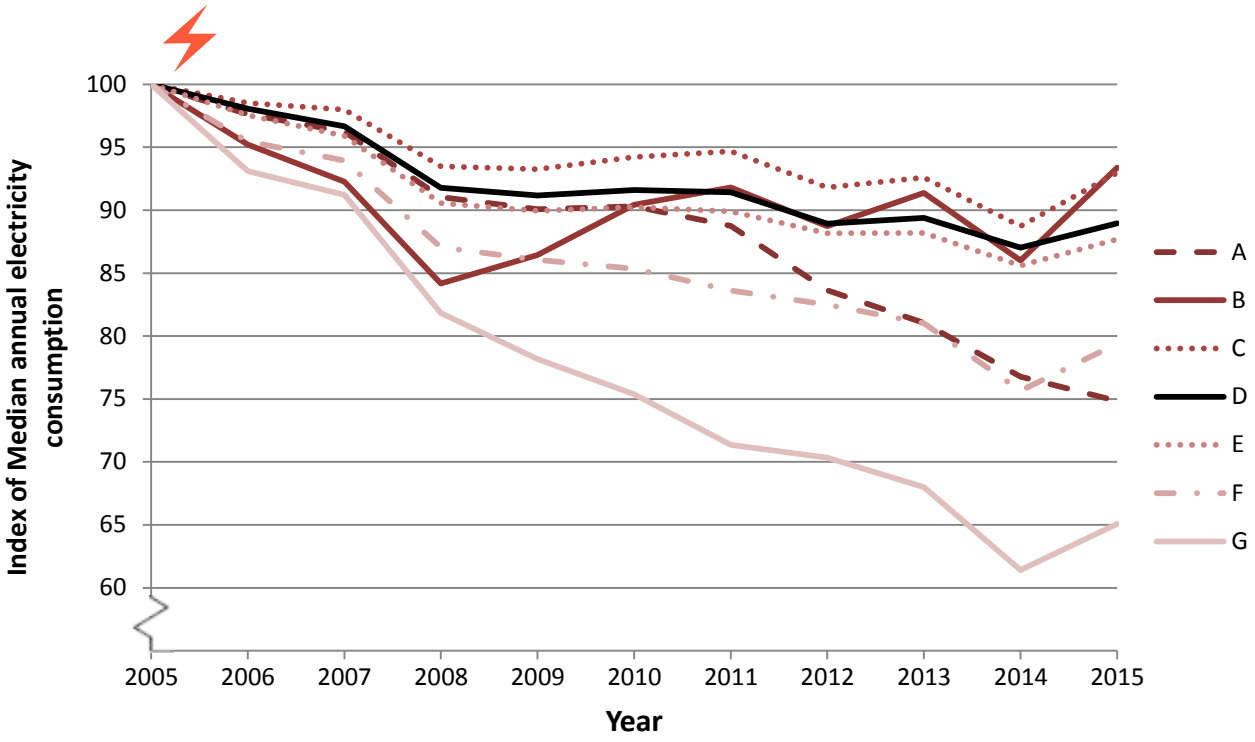


The modelled Experian data also shows that Property Type is unlikely to account for differences in gas or electricity consumption. Very few properties of any type fall within bands of extreme high or low energy efficiency. That is, less than 1 per cent of all properties fall within EPC band A and just over 1 per cent band G. In addition to this, a large proportion of semi-detached, 48 per cent, and of terraced properties, 47 per cent, fall within EPC band D. As a result, the property types across EPC bands do not reflect the energy consumption seen in figure 3.

The smaller sample of properties in bands A and G mean there is more uncertainty around the estimates and this may explain the results seen. Further work is required to understand to what extent these findings can be explained by the behaviours of occupants or whether there is another cause.

Figure 6 shows how typical energy consumption has changed over time for properties in different energy efficiency bands.

Figure 6: Median annual electricity consumption by energy efficiency band, 2005-2015 (2005 indexed at 100)

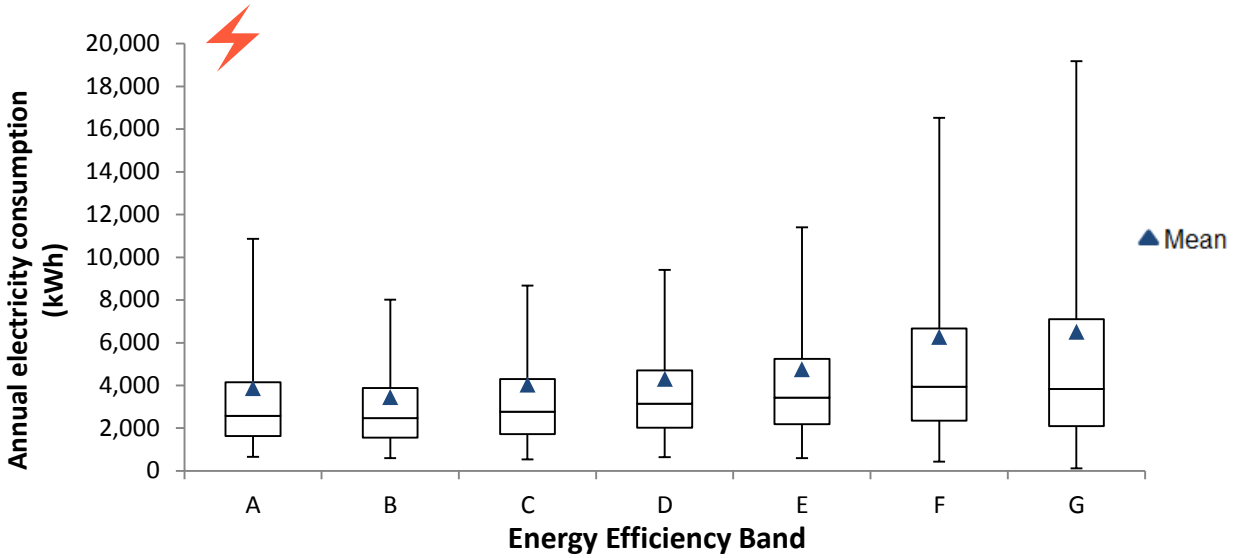


Properties in band G have had a greater reduction in consumption between 2005 and 2015 than properties in other bands. Median electricity consumption in band G reduced by 35 per cent over this period, compared to 19 per cent for all properties and 25 per cent for the group with the next biggest reduction (band A). This could in part be due to properties becoming more energy efficient during the period[11].

The focus on median and mean consumption masks the variation in consumption for different households. As with other results from NEED, there is variation in consumption for properties in each energy efficiency band. Figure 7 below shows the variation more clearly. It shows the mean, median, upper and lower quartiles and 5th and 95th percentiles.

[11] Some properties may have changed energy efficiency band between 2005 and 2015. Properties are included in the energy efficiency band given on the most recent EPC for the property, as at the end of December 2015.

Figure 7: Annual electricity consumption by energy efficiency band 2015



It is clear that within each band there is a range of consumption, and that the range is greater for less efficient properties. The inter quartile range (difference between the upper and lower quartiles) for band G properties is 5,000 kWh compared to 2,300kWh for band B properties.

Consumption by environmental impact band

This section provides information on energy consumption by environmental impact band, grouped by bands A (most environmentally friendly) to G (least environmentally friendly). While the energy efficiency band takes into account the cost of fuel bills, the environmental impact band only considers the impact on the environment. So, for example, a property moving from conventional panel heaters to a storage heating system may be considered more energy efficient but less environmentally friendly. The property has an improved energy efficiency rating because the storage heaters are cheaper to run as they can use low-rate night time electricity. However, the amount of electricity required by a storage heater system is greater and therefore the environmental impact rating would be higher.

Figure 8 shows the mean and median electricity and gas consumption by environmental impact band for 2015.

Figure 8: Average annual consumption by energy environmental impact band, 2015

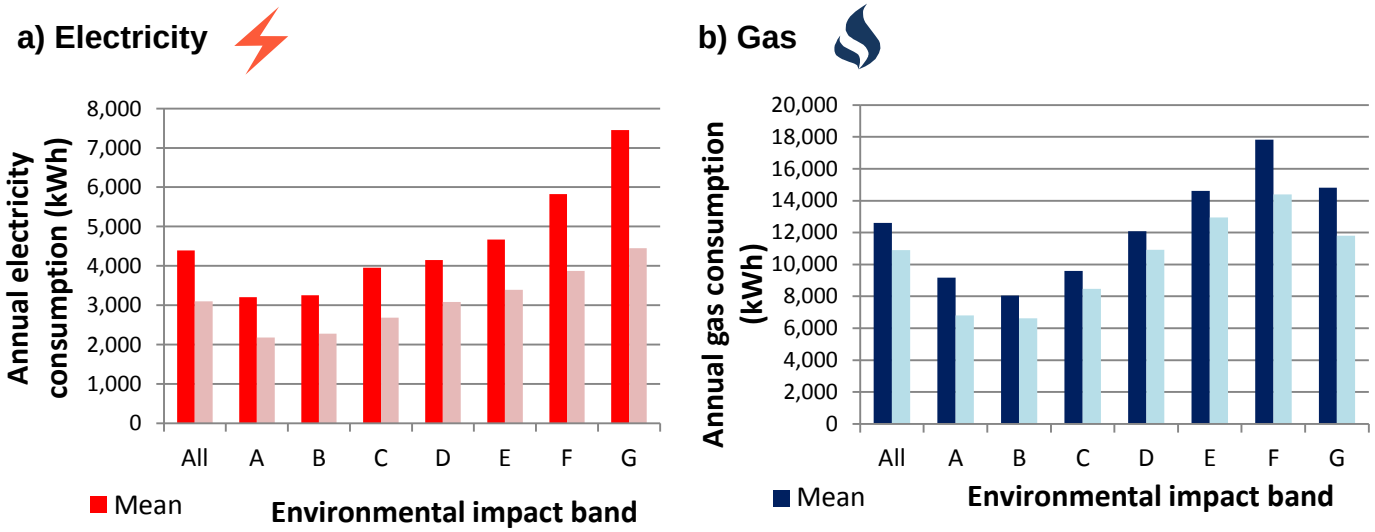


Figure 8 shows a very similar picture to the equivalent charts for energy efficiency band (figure 3). In general, average consumption is greater for properties with a poorer environmental impact rating, with the exception of band A for gas and electricity and band G for gas. As with energy efficiency band, the lower consumption in band G for gas is being influenced by the main heating fuel. Only 34 per cent of properties in band G use gas as the main heating fuel, compared to at least 67 per cent for bands A to F.

Energy efficiency band compared with environmental impact band

This section compares typical consumption for properties by energy efficiency band and environmental impact band. Figure 9 shows median annual electricity consumption for both ratings.

Figure 9: Median annual electricity consumption by energy efficiency band and environmental impact band, 2015

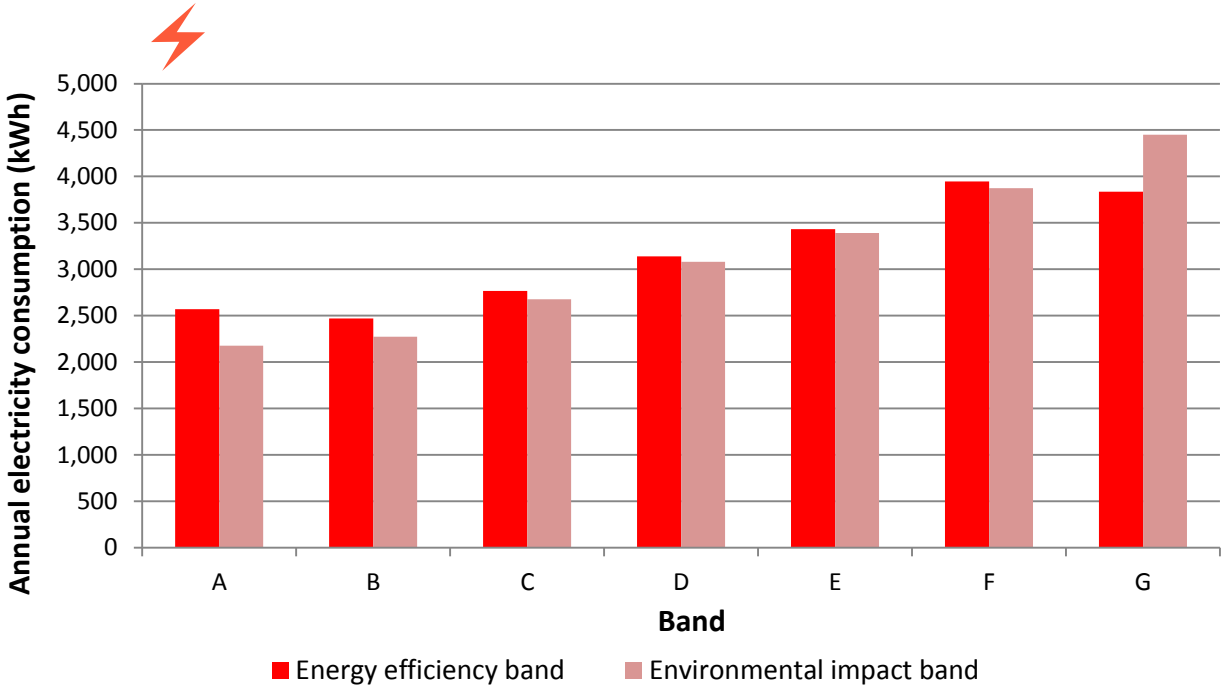
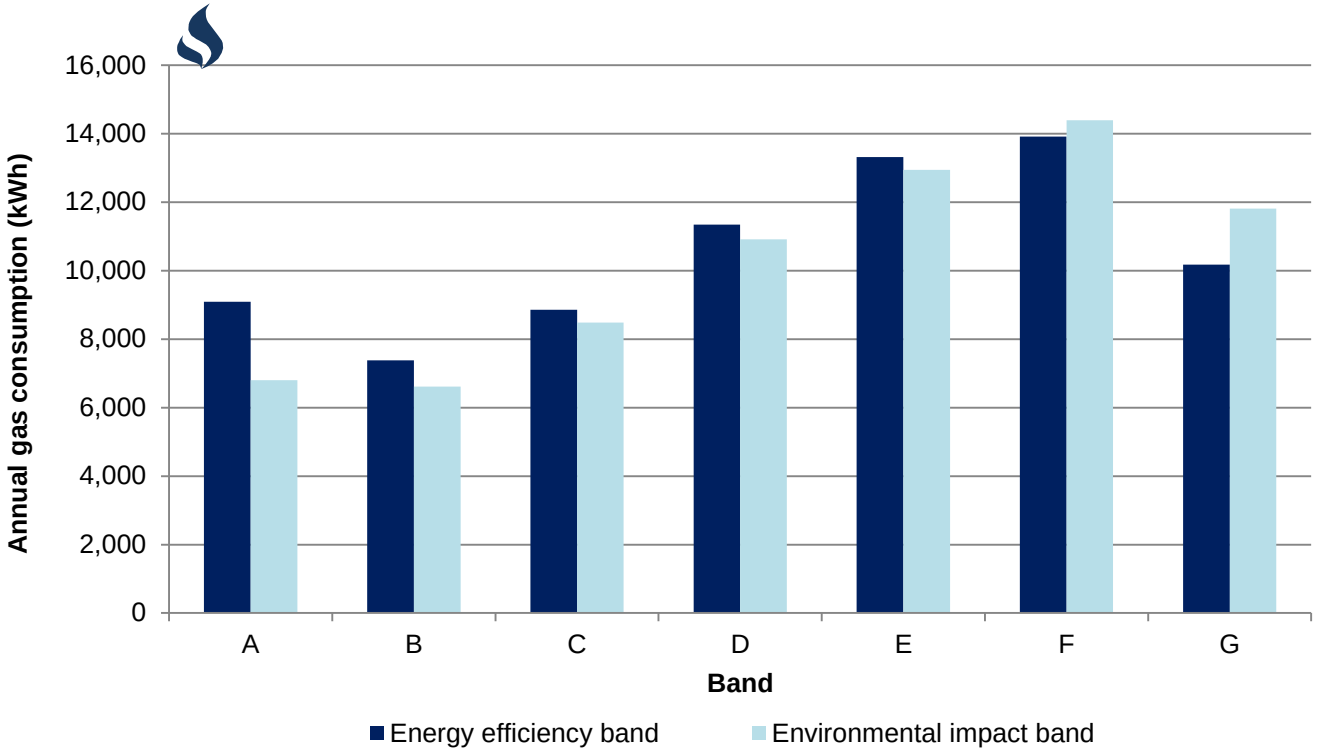


Figure 9 shows that for bands A to F consumption for properties in the specified environmental impact band is slightly lower than properties in the same named energy efficiency band. For band G the opposite is seen. Median consumption for properties with environmental impact band G is 16 per cent higher than for properties in energy efficiency band G. These findings reflect the difference in the way the two measures are calculated. The energy efficiency band takes into account the costs of the fuel used while the environmental impact band only considers the impact on the environment. This means that properties could be in a worse energy efficiency band if a more expensive fuel is used to heat the property (e.g. oil) even with the same impact on the environment.

Figure 10 compares median gas consumption by energy efficiency band and environmental impact band.

Figure 10: Median annual gas consumption by energy efficiency band and environmental impact band, 2015



Similar to electricity consumption shown in figure 8, the typical gas consumption for any given environmental impact band is lower than the typical gas consumption for the equivalent energy efficiency band for most bands. However, the median gas consumption for properties with environmental impact band F is 3 per cent and G 16 per cent higher than for properties in energy efficiency band F and G, respectively. These findings are a result of the difference in the way the two measures are calculated and reflect the fact that 16 per cent of properties with valid gas consumption in energy efficiency band F and 12 per cent in band G use gas as the main heating fuel, compared to 67 per cent and 34 per cent for properties with environmental impact band F and G, respectively.

Summary

This analysis sets out results for energy consumption by energy efficiency band and environmental impact rating in 2015. This has been made possible by the use of energy performance certificate data. This analysis now also includes figures on fuel prices, to help better understand the impact on energy bills of consumption and energy efficiency in homes in England and Wales.

The analysis confirms the natural expectation that, generally, households that are less energy efficient and less environmentally friendly tend to use more gas and electricity. However, this is not always the case with 'Band G' properties (the least efficient and least environmentally friendly) tending to use less energy than the band D-F properties. These less intuitive results can partly be explained by the fact that very few of these properties use gas as the main heating fuel, but there may be other factors in play.

Access to the EPC data provide a wealth of possibilities for future analysis and the preliminary findings have highlighted a number of areas which would benefit from further investigation. The EPC dataset enables others to undertake analysis themselves using record level data.

Any insights or comments resulting from this analysis would be welcomed and can be provided by email to: energyefficiency.stats@beis.gov.uk.

Or by completing our Survey: www.surveymonkey.co.uk/r/ZNPC2QT

Recent and forthcoming publications of interest to users of energy statistics

Smart Meters quarterly statistics

This quarterly publication provides estimates of the number of Smart Meters installed and operating in homes and businesses in Great Britain. The latest release, covering estimates of the number of Smart Meters deployed up to the end of September 2017, was published on 30 November 2017 at: www.gov.uk/government/collections/smart-meters-statistics

Household Energy Efficiency statistics

This series presents statistics on the Energy Company Obligation (ECO), Green Deal and homes insulated. The headline release presents monthly updates of ECO measures and quarterly updates of in-depth ECO statistics, carbon savings and the Green Deal schemes. The latest release was published on 21 December 2017 at:
www.gov.uk/government/collections/household-energy-efficiency-national-statistics

Sub-national electricity consumption, 2016

This factsheet looks at electricity consumption by consuming sector for Great Britain, and Regional/devolved administration areas, together with some commentary relating to local authority trends. The data analysed in this factsheet are based on the aggregation of Meter Point Administration Number (MPAN) readings throughout Great Britain as part of BEIS's annual meter point electricity data exercise. The data cover the electricity year between 26 January 2016 and 25 January 2017. These data follow on from the results produced from similar exercises carried out for 2005 to 2015. The latest release was published on 21 December 2017, at:
www.gov.uk/government/collections/sub-national-electricity-consumption-data.

Sub-national gas consumption, 2016

This factsheet looks at gas consumption by consuming sector for Great Britain, and Regional/devolved administration areas, together with some commentary relating to local authority trends. The data analysed in this factsheet are based on the aggregation of Meter Point Reference Number (MPRN) readings throughout Great Britain as part of BEIS's annual meter point gas data exercise. The data cover the gas year between 1 October 2015 and 30 September 2016 and are subject to a weather correction factor. In the domestic sector, gas consumption is predominately used for heating purposes and as a result usage is driven by external temperatures and weather conditions. The weather correction factor enables comparisons of gas use over time, controlling for weather changes. These data follow on from the results produced from similar exercises carried out for 2005 to 2015. The latest release was published on 21 December 2017, at:
www.gov.uk/government/collections/sub-national-gas-consumption-data.

Sub-national electricity and gas consumption at LSOA, MSOA and IGZ level, 2016

This publication comprising a series of Excel spreadsheets provides details of domestic and non-domestic electricity and gas consumption at Lower Super Output Area (LSOA), Middle Super Output Area (MSOA) and Intermediate Geography Zone (IGZ) for 2016. The data will be published on 25 January 2018 for electricity at:
www.gov.uk/government/statistics/lower-and-middle-super-output-areas-electricity-consumption
and gas at:
www.gov.uk/government/statistics/lower-and-middle-super-output-areas-gas-consumption

Greenhouse Gas Emissions final 2016 statistics

This publication provides final estimates of UK greenhouse gas emissions going back to 1990. Estimates are presented by source in February of each year and are updated in March of each year to include estimates by end-user and fuel type. Final 2016 UK greenhouse gas emissions statistics will be published on 6 February 2018 at:
www.gov.uk/government/collections/final-uk-greenhouse-gas-emissions-national-statistics

Greenhouse Gas Emissions provisional 2017 statistics

This publication provides the latest annual provisional estimates of UK greenhouse gas emissions based on provisional inland energy consumption statistics as published in Energy Trends. A quarterly emissions time series will also be included within this publication. Provisional 2017 UK greenhouse gas emissions statistics will be published on 29 March 2018 at:
www.gov.uk/government/collections/provisional-uk-greenhouse-gas-emissions-national-statistics

Explanatory notes

General

More detailed notes on the methodology used to compile the figures and data sources are available on the BEIS section of the GOV.UK website.

Symbols used in the tables

.. not available
- nil or not separately available
p provisional
r revised; where a column or row shows 'r' at the beginning, most, but not necessarily all, of the data have been revised.
e estimated; totals of which the figures form a constituent part are therefore partly estimated

Notes to tables

- Figures for the latest periods and the corresponding averages (or totals) are provisional and are liable to subsequent revision.
- The figures have not been adjusted for temperature or seasonal factors except where noted.
- Due to rounding the sum of the constituent items may not equal the totals.
- Percentage changes relate to the corresponding period a year ago. They are calculated from unrounded figures but are shown only as (+) or (-) when the percentage change is very large.
- Quarterly figures relate to calendar quarters.
- All figures relate to the United Kingdom unless otherwise indicated.

- Further information on Oil and Gas is available from The Oil & Gas Authority at: www.ogauthority.co.uk/

Conversion factors

1 tonne of crude oil =	7.55 barrels
1 tonne =	1,000 kilograms
1 gallon (UK) =	4.54609 litres
1 kilowatt (kW) =	1,000 watts
1 megawatt (MW) =	1,000 kilowatts
1 gigawatt (GW) =	1,000 megawatts
1 terawatt (TW) =	1,000 gigawatts

All conversion of fuels from original units to units of energy is carried out on the basis of the gross calorific value of the fuel. More detailed information on conversion factors and calorific values is given in Annex A of the Digest of United Kingdom Energy Statistics.

Conversion matrices

To convert from the units on the left hand side to the units across the top multiply by the values in the table.

To:	**Thousand toe**	**Terajoules**	**GWh**	**Million therms**
From	**Multiply by**			
Thousand toe	1	41.868	11.630	0.39683
Terajoules (TJ)	0.023885	1	0.27778	0.0094778
Gigawatt hours (GWh)	0.085985	3.6000	1	0.034121
Million therms	2.5200	105.51	29.307	1

To:	**Tonnes of oil equivalent**	**Gigajoules**	**kWh**	**Therms**
From	**Multiply by**			
Tonnes of oil equivalent	1	41.868	11,630	396.83
Gigajoules (GJ)	0.023885	1	277.78	9.4778
Kilowatt hours (kWh)	0.000085985	0.003600	1	0.034121
Therms	0.0025200	0.105510	29.307	1

Note that all factors are quoted to 5 significant figures

Abbreviations

ATF	Aviation turbine fuel
CCGT	Combined cycle gas turbine
DERV	Diesel engined road vehicle
LNG	Liquefied natural gas
MSF	Manufactured solid fuels
NGLs	Natural gas liquids
UKCS	United Kingdom continental shelf

Sectoral breakdowns

The categories for final consumption by user are defined by the Standard Industrial Classification 2007, as follows:

Fuel producers	05-07, 09, 19, 24.46, 35
Final consumers	
Iron and steel	24 (excluding 24.4, 24.53 and 24.54)
Other industry	08, 10-18, 20-23, 24.4 (excluding 24.46), 24.53, 24.54, 25-33, 36-39, 41-43
Transport	49-51
Other final users	
Agriculture	01-03
Commercial	45-47, 52-53, 55-56, 58-66, 68-75, 77-82
Public administration	84-88
Other services	90-99
Domestic	Not covered by SIC 2007

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