

Section 5 - Electricity

Key results show:

Provisional 2017

UK electricity demand fell -1.8 per cent in 2017, from 357 TWh in 2016 to 350 TWh. Final consumption was 1.9 per cent lower than in 2016 due to warmer weather (+0.3 degrees Celsius, on average) and improved energy efficiency measures. Domestic consumption fell by 2.6 per cent. **(Table 5.2 and Chart 5.5)**

Supply matched demand with indigenous generation down 1.0 per cent from 339 TWh to 336 TWh. Net imports dropped 15.6 per cent from 17.5 TWh to 14.8 TWh as repairs to the UK-France interconnector went into Q1 2017 and French nuclear outages in Q4 2017 led to high French electricity prices and increased UK exports. **(Chart 5.4)**

Low carbon generation (from nuclear and renewable sources) comprised more than half of UK generation for the first time in 2017, reaching a record high 50.4 per cent share. This was 4.7 percentage points higher than the 45.7 per cent share in 2016, driven by increased renewable capacity and more favourable weather conditions. Nuclear generation has remained broadly stable in recent times, 20.9 per cent in 2017. **(Chart 5.3)**

Gas' share of generation dropped to 40 per cent from 42 per cent, though this was still the second highest annual share since 2011 as gas continued to displace coal-fired generation. Coal's share of generation fell further to 6.7 per cent, from 9.0 per cent in 2016 and 22 per cent in 2015, as many coal plants have closed or converted to biomass. Furthermore, production favours supply from gas as the carbon price per GWh is higher for coal. **(Chart 5.1)**

Quarter 4 2017

Total renewables' share of generation increased to 30 per cent, compared to 22 per cent in Q4 2016. Wind and solar generation overtook nuclear in Q4 2017 to be the UK's second highest source of electricity for the first time. This was due to increased wind and solar capacity and higher wind speeds in Q4 2017, combined with lower nuclear generation. **(Chart 5.2)**

Coal's share of generation was stable at 9 per cent compared to Q4 2016, with gas' share down to 39 per cent from 45 per cent. Nuclear's share fell 2 percentage points to 18 per cent due to outages. In total, low carbon electricity accounted for almost half of generation - a record high for Q4 - although down 5.6 percentage points on Q3 2017 due to seasonal differences in electricity consumption. **(Chart 5.1).**

Electricity generated in the fourth quarter of 2017 fell by 1.4 per cent from 93.0 TWh a year earlier to 91.7 TWh. Final consumption in the fourth quarter of 2017 decreased by 0.9 per cent on a year earlier, and domestic sales decreased by 1.2 per cent, as a result of the comparatively warmer weather. **(Chart 5.6)**

Relevant tables

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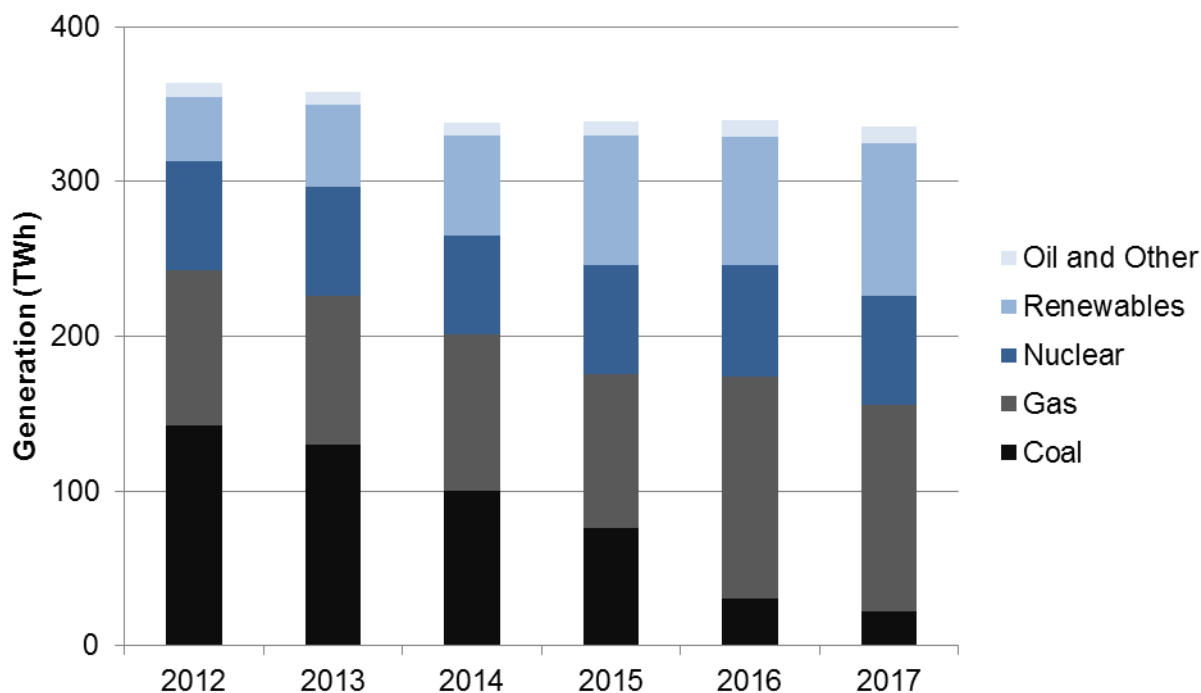
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Chart 5.1 Electricity generated by fuel type (Table 5.1)

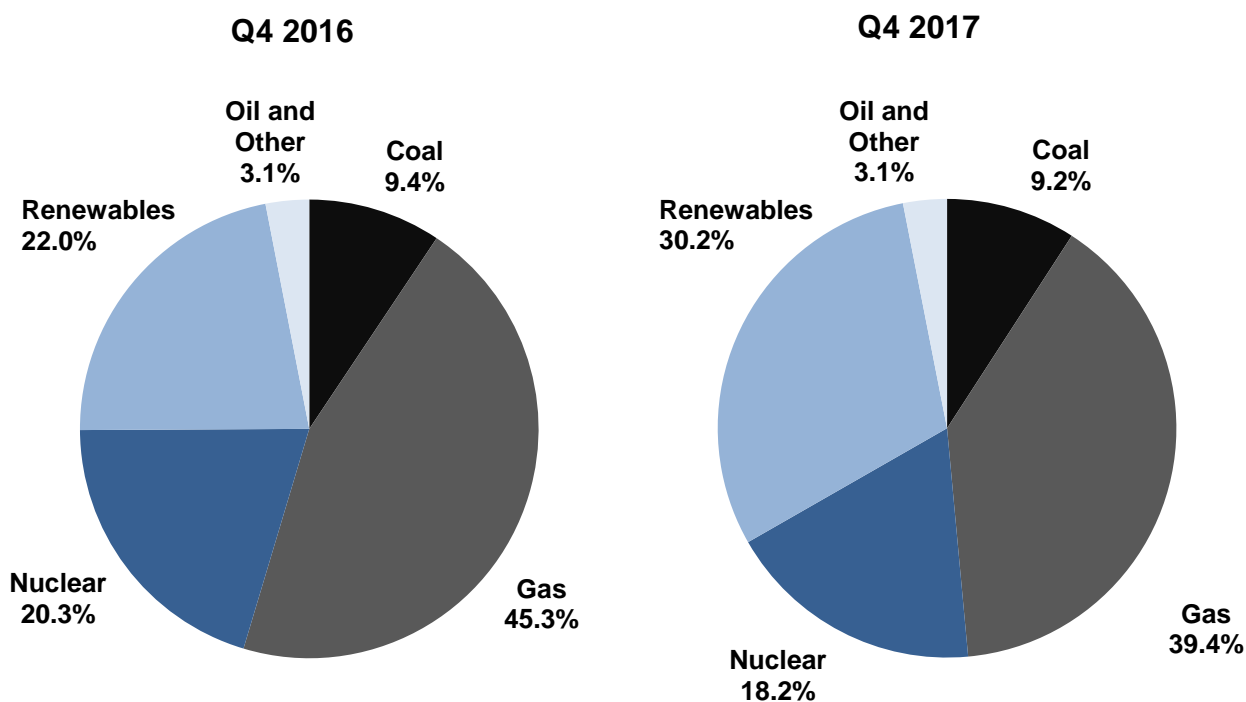


In 2017, total electricity generated continued the gradual declining trend seen in recent years, falling 1.0 per cent from 339 TWh in 2016 to 336 TWh. This was largely due to warmer weather (the daily average temperature in 2017 was 0.3 degrees warmer than 2016), as well as improved energy efficiency measures.

Over the past five years the generation mix has shifted further away from fossil fuels. Coal-fired generation fell 84 per cent compared to 2012, from 143 TWh to 22.6 TWh, its lowest level in this time series as coal plants closed or were converted to high-range co-firing plants (85-100% biomass). Some of the drop in coal was replaced by gas-fired generation, which increased from 100 TWh in 2012 to 143 TWh in 2016 as production costs favoured supply from gas. The increase in the carbon price in April 2016 meant that the carbon price per GWh was lower for gas than coal. Gas fired-generation fell back to 133 TWh in 2017 (-7.0 per cent compared to 2016) with an increase in generation from renewable sources. Nuclear generation fell by 1.9 per cent from 71.7 TWh to 70.3 TWh, the same as in 2015.

Generation from renewables (hydro, wind, solar and bioenergy) increased 19 percent from 83.2 TWh in 2016 to a record high of 98.9 TWh in 2017. The rise was driven by capacity increases in recent years as weather conditions for both wind and solar generation were both slightly below the ten year UK average. Average wind speeds were 4.8 per cent higher at 8.8 knots in 2017 compared to 2016, but still 0.1 knots below the ten year mean. Average daily sun hours were stable at 4.2 hours in 2017 compared to 2016, 0.2 hours below the ten year mean. Hydro generation rose 10 per cent from 5.4 TWh to 5.9 TWh; however, this was still below 2015's record 6.3 TWh.

The generation mix in 2017 was 6.7 per cent from coal (-2.3 pp on 2016), 40 per cent gas (-2.5 pp), 21 per cent nuclear (stable), 29 per cent renewables (+4.9 pp) and 3.2 percent from other sources (stable).

Chart 5.2 Shares of electricity generation ([Table 5.1](#))

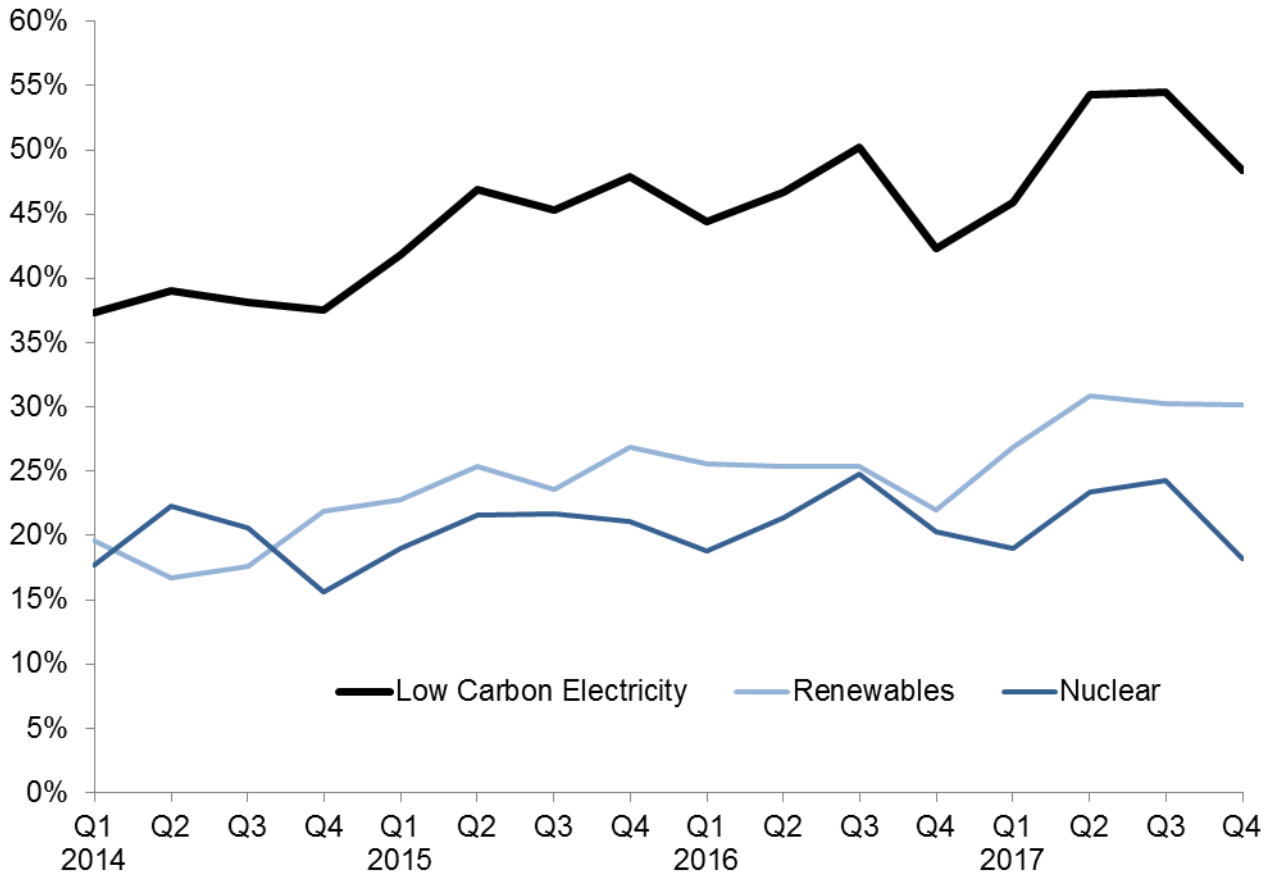
Total renewables' share of generation increased to 30 per cent, compared to 22 per cent in Q4 2016. Wind and solar generation overtook nuclear in Q4 2017 to be the UK's second highest source of electricity for the first time. This was due to increased wind and solar capacity and higher wind speeds in Q4 2017, combined with lower nuclear generation.

Coal-fired generation fell by 4 per cent from 8.7 TWh in 2016 Q4 to 8.4 TWh though its share was broadly stable at 9.2 per cent. Coal-fired plants operated over the colder months to meet increased seasonal demand. Gas fired generation saw the biggest drop in share, down 5.9 percentage points from 45 per cent in 2016 Q4 to 39 per cent in 2017 Q4. Generation from nuclear stations was down 12 per cent, from 18.9 TWh to 16.7 TWh and comprised 18 per cent (down 2.1 pp) of generation for Q4 2017. This is the lowest proportion of generation since Q4 2014, and was due to outages.

See Chapter 6 (Renewables) and table 6.1 for a more detailed breakdown of renewable generation.

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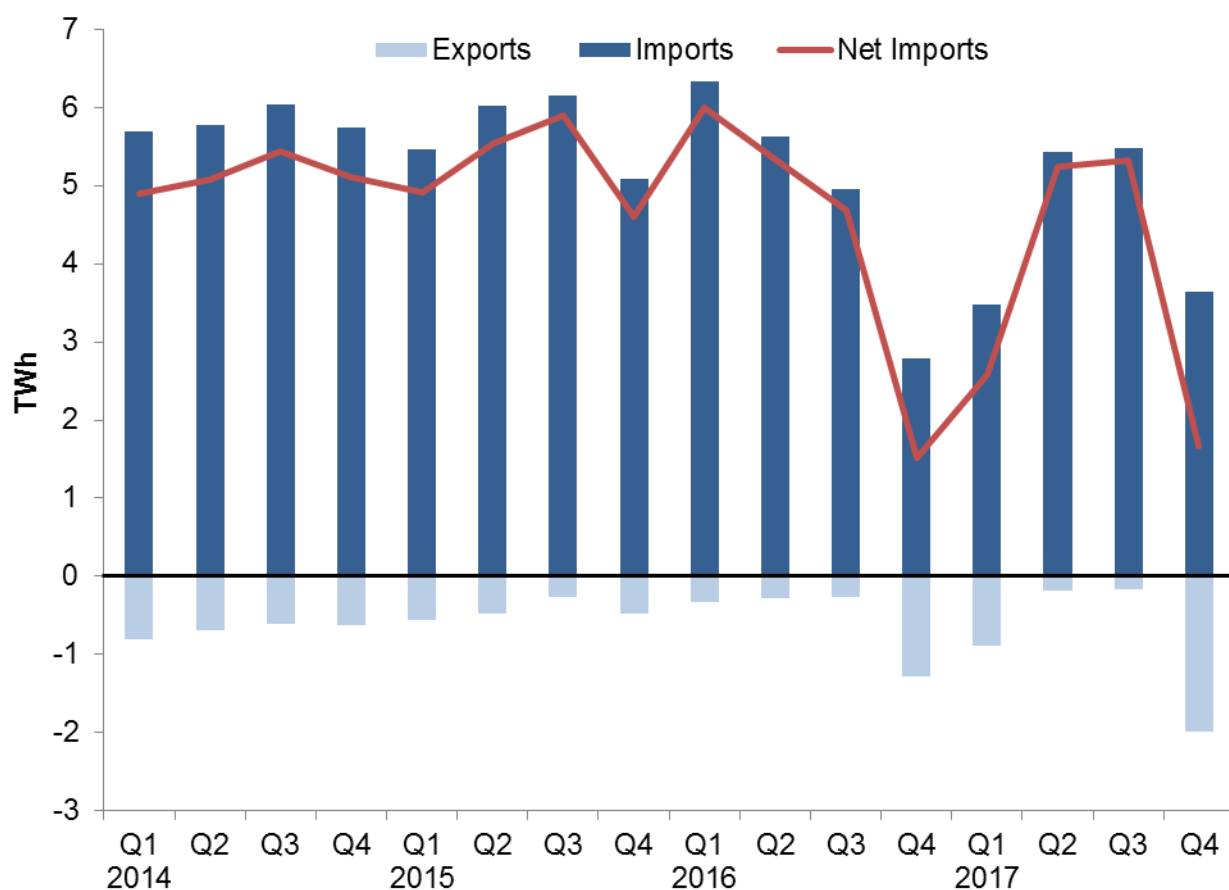
Chart 5.3 Low carbon electricity's share of generation ([Table 5.1](#))



More than half of electricity generation was low carbon (from nuclear and renewable sources) for the first time in 2017, reaching a record high 50.4 per cent share of generation. This was 4.7 percentage points higher than the 45.7 per cent share in 2016. Low carbon generation was driven by favourable weather conditions for renewables as well as increased capacity. Nuclear generation has remained fairly constant in recent times.

Low carbon electricity's share of generation increased from 42.3 per cent in 2016 Q4 to 48.4 per cent in 2017 Q4, due to a large rise in renewables generation compared with 2016 Q4. Average wind speed was 9.5 knots in Q4 2017 compared to 7.6 knots in the same period of the previous year.

Chart 5.4 UK trade in electricity (Table 5.6)



Net imports were down 15.6 per cent in 2017 compared to 2016, to 14.8 TWh, as damage to the French interconnector in Q4 2016 halved its capacity; repairs continued into the first quarter of 2017. Outages in French nuclear plants in Q4 2017 led to high French electricity prices. Consequently imports of electricity fell by 8.5 per cent in 2017 compared to the previous year, whilst exports increased by 49 per cent. Net imports accounted for 4.5 per cent of UK electricity supplied in 2017 (down 0.7 percentage points on 2016).

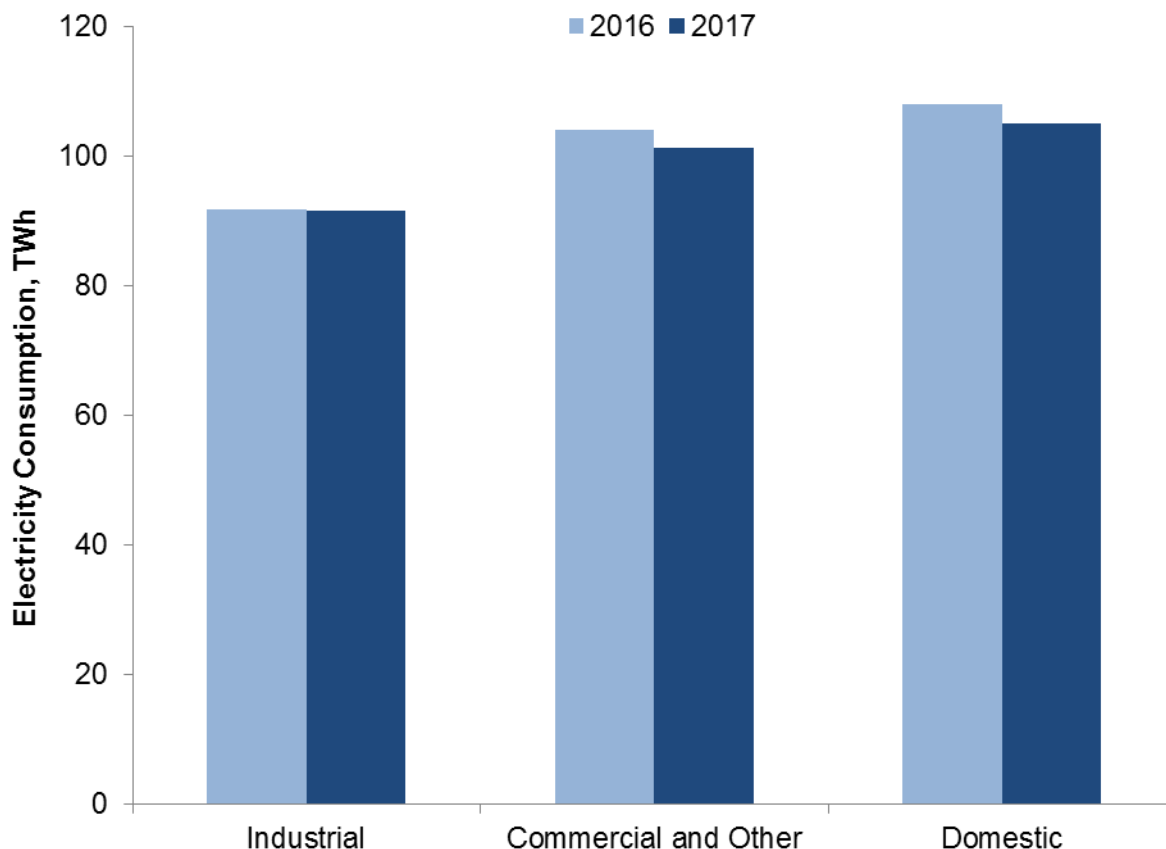
Interconnectors enable the UK to trade electricity with France, the Netherlands and Ireland. The UK was a net importer from all three countries in 2016 and 2017. In 2017, over half of imports came from France (52 per cent) with the balance from Netherlands (39 per cent) and Ireland (9 per cent). The French share was down from the previous year (56 per cent) with Netherlands up (from 38 per cent) and Ireland up (from 6 per cent).

In 2017 the UK net imports from France were 7.2 TWh, with 6.9 TWh from Netherlands and 0.8 TWh from Ireland.

For the most recent quarter, the UK imported 1.7 TWh in Q4 2017 compared to 1.5 TWh in Q4 2016 and 4.6 TWh in Q4 2015. It has been a net importer of electricity in each quarter since Q2 2010. Since France has supplied the majority of UK imports in recent years the high French prices in Q4 2017 and the damage to the UK-France interconnector in Q4 2016 underlie the drops compared to Q4 2015.

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Chart 5.5 Electricity final consumption (annual) (Table 5.2)

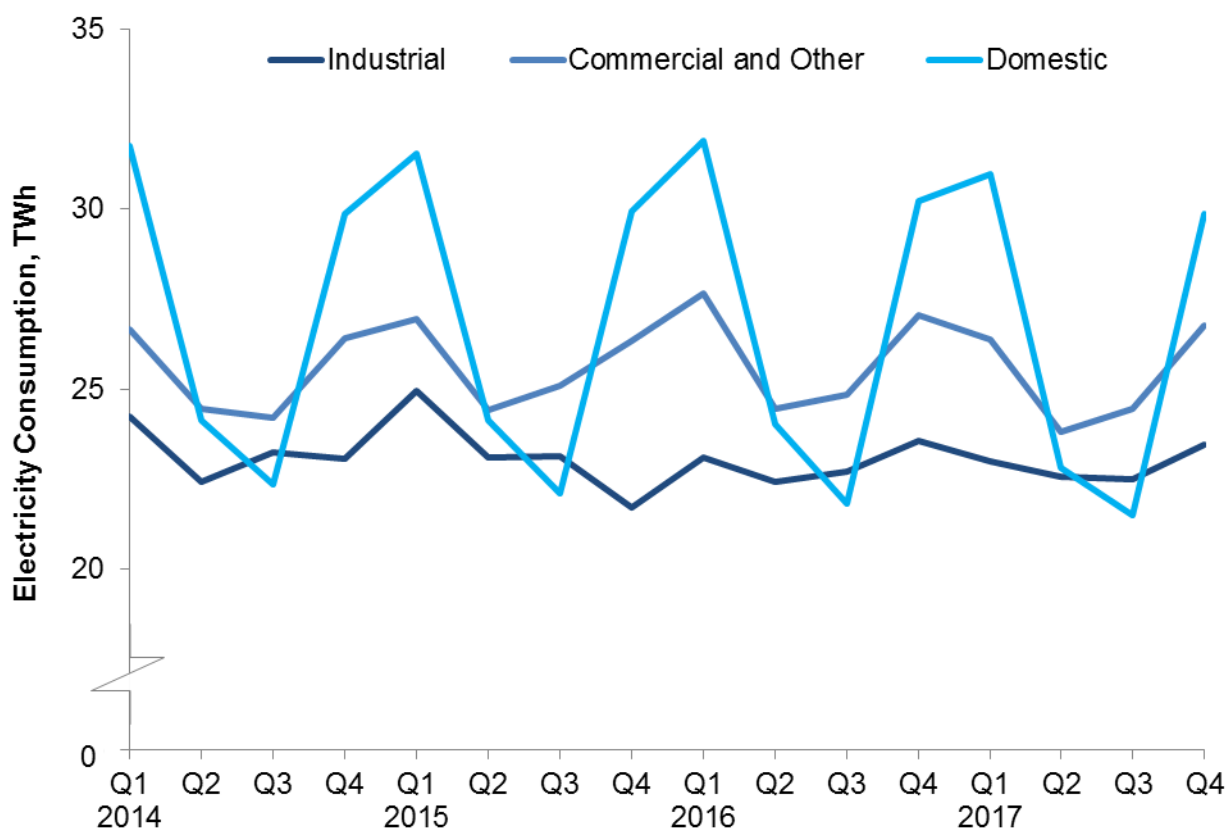


In 2017, final consumption of electricity decreased by 1.9 per cent on the previous year, from 303.8 TWh in 2016 to 298.1 TWh. All quarters in 2017 had a decrease in electricity consumption compared to the same quarter in 2016.

In 2017, domestic use decreased to 105.1 TWh, a 2.6 per cent decrease compared to 2016. For the industrial sector, including iron and steel industries, the decrease was much lower at 0.3 per cent reducing electricity consumption to 91.5 TWh in 2017. Similar to the domestic sector, electricity consumption by commercial and other users decreased by 2.5 per cent, from 104.0 TWh in 2016 to 101.4 TWh in 2017. Commercial and other users include commercial, transport and other final users.

In 2017, temperatures were 0.3 degrees Celsius warmer than in 2016 at 10.6 degrees Celsius – see Energy Trends table 7.1 at:

www.gov.uk/government/statistics/energy-trends-section-7-weather

Chart 5.6 Electricity final consumption (quarterly) (Table 5.2)

In 2017, final electricity consumption decreased by the lowest amount in Q4 in relation to 2016. In Q4 2017, final electricity consumption decreased by 0.9 per cent, from 80.9 TWh in Q4 2016 to 80.1 TWh in Q4 2017.

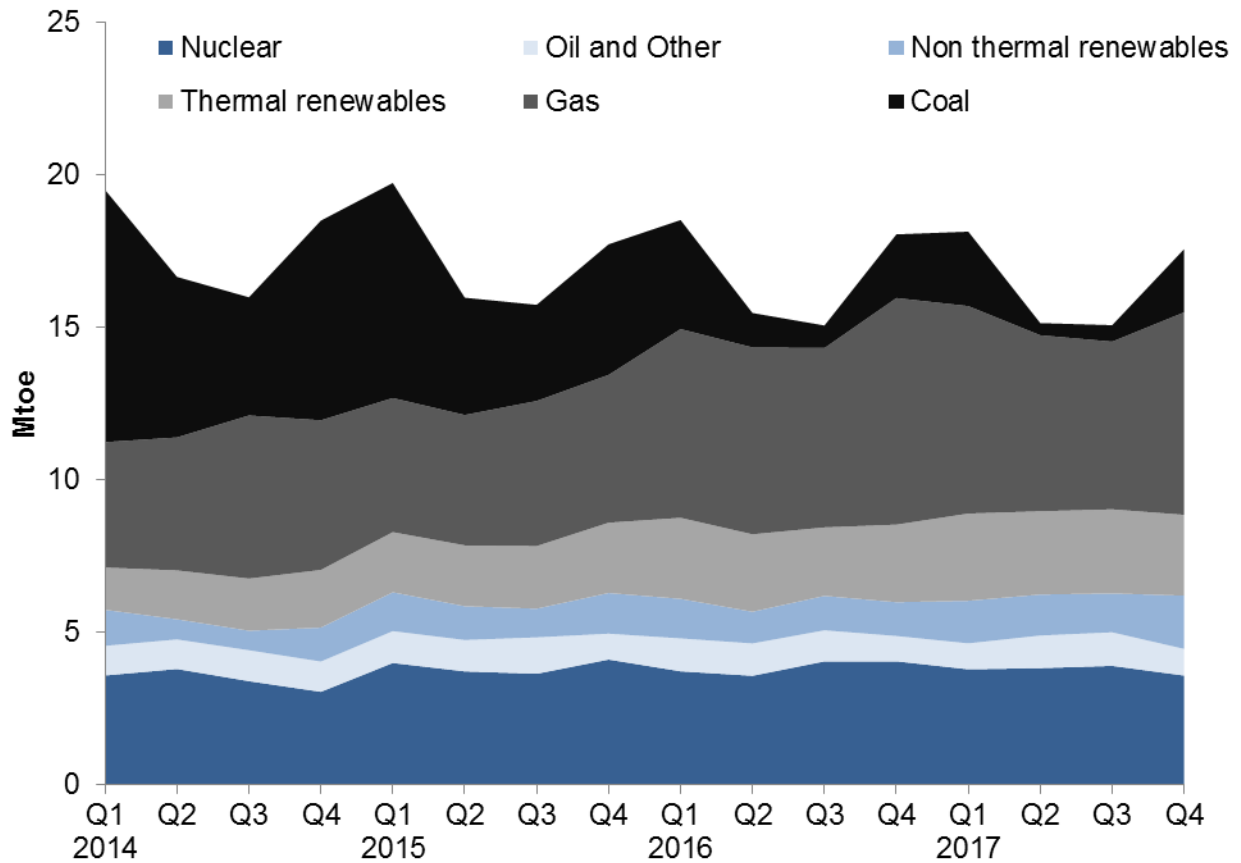
Domestic use decreased by 1.2 per cent, from 30.2 TWh in Q4 2016 to 29.9 TWh in Q4 2017. This decrease was likely a result of the warmer average temperature of Q4 2017 compared to Q4 2016. For the industrial sector (including iron and steel), consumption decreased by 0.5 per cent to 23.5 TWh in Q4 2017 compared to 23.6 TWh. For commercial and other users, consumption decreased to 26.8 TWh in Q4 2017 compared to 27.1 TWh in Q4 2016, a decrease of 1.0 per cent.

The decrease in the industrial sector in Q4 2017 was the smallest sector decrease, in comparison to 2016.

The average temperature was 0.3 degrees Celsius warmer in the fourth quarter of 2017 compared to the same period a year earlier – see Energy Trends table 7.1 at: www.gov.uk/government/statistics/energy-trends-section-7-weather.

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Chart 5.7 Fuel used for electricity generation ([Table 5.1](#))



Fuel used by generators in 2017 fell 1.8 per cent, from 67.1 mtoe in 2016 to 66.0 mtoe (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, gas use was 3.6 per cent lower than in 2016. Coal use during 2017 was 28 per cent lower than a year earlier, while nuclear sources fell by 1.9 per cent over the same period.

The chart above shows the how fuel use varies seasonally. In recent years the majority of coal use for electricity generation has shifted to cover periods of peak demand over the winter season. Fuel used by generators in 2017 Q4 fell 2.7 per cent compared to the same quarter in 2016, from 18.1 mtoe in 2016 Q4 to 17.6 mtoe.

In 2017 Q4, gas use was 11 per cent lower than in 2016 Q4. Coal use during the quarter was 0.8 per cent lower than a year earlier, while nuclear sources fell by 11.6 per cent due to outages.

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Table 5.1. Fuel used in electricity generation and electricity supplied

	2016	2017 p	per cent change	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter	2017 4th quarter p	per cent change ¹
FUEL USED IN GENERATION													
All generating companies													
	Million tonnes of oil equivalent												
Coal	7.54	5.46	-27.6	4.28	3.58	1.13	0.74	2.09	2.44r	0.40	0.54	2.07	-0.8
Oil	0.58	0.87	+48.7	0.17	0.11	0.15	0.16	0.16	0.17r	0.16	0.25r	0.29	+74.5
Gas	25.63	24.72	-3.6	4.85	6.19	6.13	5.88	7.43	6.81	5.77	5.50r	6.64	-10.6
Nuclear	15.41	15.12	-1.9	4.11	3.73	3.58	4.05	4.06	3.79	3.83	3.91	3.59	-11.6
Hydro	0.46	0.51	+10.2	0.16	0.18	0.08	0.10	0.10	0.16	0.08	0.11	0.17	+62.1
Wind and Solar ²	4.11	5.25	+27.8	1.18	1.12	0.96	1.03	1.00	1.24r	1.27	1.17r	1.58	+57.1
Bioenergy ³	9.99	11.00	+10.1	2.31	2.66	2.54	2.25	2.55	2.86r	2.73r	2.76r	2.65	+4.1
Other fuels	1.90	1.76	-7.5	0.28	0.46	0.45	0.45	0.54	0.45	0.46	0.39	0.45	-16.5
Net imports	1.51	1.27	-15.6	0.40	0.52	0.46	0.40	0.13	0.22	0.45	0.46	0.14	+9.7
Total all generating companies	67.14	65.95	-1.8	17.73	18.53	15.48	15.07	18.06	18.15r	15.15r	15.08r	17.57	-2.7
ELECTRICITY GENERATED													
All generating companies													
	TWh												
Coal	30.71	22.58	-26.5	17.48	14.69	4.58	2.72	8.72	10.46r	1.56	2.17	8.40	-3.8
Oil	1.84	2.19	+19.1	0.55	0.34	0.56	0.44	0.50	0.74r	0.26r	0.62r	0.57	+14.2
Gas	143.36	133.34	-7.0	26.20	34.11	34.49	32.67	42.10	36.97r	30.98r	29.27r	36.12	-14.2
Nuclear	71.73	70.34	-1.9	18.69	17.34	16.66	18.86	18.87	17.64	17.83	18.17	16.69	-11.6
Hydro (natural flow)	5.39	5.94	+10.2	1.83	2.09	0.94	1.15	1.21	1.81r	0.88	1.28r	1.97	+62.1
Wind and Solar ²	47.79	61.09	+27.8	13.69	13.02	11.13	11.96	11.67	14.45r	14.73r	13.57r	18.33	+57.1
- of which, Offshore ⁶	16.41	20.89	+27.3	5.76	5.15	3.25	3.58	4.42	5.15r	3.98	3.95	7.80	+76.4
Bioenergy ³	30.04	31.83	+5.9	8.22	8.52	7.70	6.22	7.60	8.78r	7.86r	7.79r	7.39	-2.8
Pumped Storage	2.96	2.87	-2.9	0.71	0.76	0.69	0.69	0.82	0.79	0.69	0.64	0.75	-7.9
Other fuels	5.57	5.69	+2.1	1.11	1.40	1.30	1.34	1.53	1.42r	1.35r	1.42r	1.51	-1.7
Total all generating companies	339.40	335.87	-1.0	88.49	92.27	78.04	76.06	93.03	93.07r	76.14r	74.93r	91.73	-1.4
ELECTRICITY SUPPLIED ⁴													
All generating companies													
	TWh												
Coal	29.14	21.42	-26.5	16.58	13.94	4.34	2.58	8.28	9.92r	1.48	2.06	7.96	-3.8
Oil	1.67	1.81	+8.5	0.50	0.30	0.51	0.40	0.46	0.67r	0.25r	0.57r	0.32	-31.3
Gas	140.84	130.89	-7.1	25.73	33.56	33.87	32.07	41.34	36.31r	30.42r	28.74r	35.43	-14.3
Nuclear	65.15	63.89	-1.9	16.98	15.75	15.13	17.13	17.14	16.03	16.20	16.51	15.16	-11.6
Hydro	5.35	5.88	+10.0	1.82	2.07	0.93	1.14	1.20	1.80r	0.87	1.27r	1.95	+62.1
Wind and Solar ²	47.79	61.09	+27.8	13.69	13.02	11.13	11.96	11.67	14.45r	14.73r	13.57r	18.33	+57.1
- of which, Offshore ⁶	16.41	20.89	+27.3	5.76	5.15	3.25	3.58	4.42	5.15r	3.98	3.95	7.80	+76.4
Bioenergy ³	26.02	27.65	+6.3	7.15	7.41	6.69	5.34	6.58	7.66r	6.83r	6.76r	6.40	-2.7
Pumped Storage (net supply) ⁵	-1.07	-1.00	-6.4	-0.25	-0.27	-0.26	-0.23	-0.30	-0.29	-0.25	-0.21	-0.25	-16.1
Other fuels	5.16	5.17	-	1.03	1.30	1.20	1.25	1.42	1.31r	1.26r	1.31	1.29	-9.5
Net imports	17.55	14.81	-15.6	4.60	6.00	5.35	4.68	1.51	2.59	5.24	5.32	1.66	+9.7
Total all generating companies	337.59	331.62	-1.8	87.83	93.08	78.88	76.33	89.30	90.45r	77.03r	75.89r	88.24	-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

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Table 5.2 Supply and consumption of electricity

													GWh
	2016	2017 p	Per cent change	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	2016 4th quarter	2017 1st quarter	2017 2nd quarter	2017 3rd quarter	2017 4th quarter p	Per cent change ¹
SUPPLY													
Indigenous production	339,398	335,865	-1.0	88,489	92,267	78,039	76,062	93,029	93,073	76,137r	74,926r	91,729	-1.4
Major power producers ^{2,3}	289,985	284,617	-1.9	77,438	80,565	65,450	63,025	80,945	80,683	62,973r	61,787r	79,174	-2.2
Auto producers	46,453	48,376	+4.1	10,337	10,940	11,900	12,345	11,268	11,599	12,471r	12,502r	11,804	+4.8
Other sources ⁴	2,959	2,872	-2.9	714	762	689	693	815	791	694	636	751	-7.9
Imports	19,699	18,032	-8.5	5,080	6,334	5,622	4,951	2,792	3,476	5,423r	5,487	3,646	+30.6
Exports	2,153	3,217	+49.4	480	331	275	268	1,279	888	179r	165	1,984	+55.2
Transfers	-	-	-	-	-	-	-	-	-	-	-	-	-
Total supply	356,943	350,680	-1.8	93,088	98,271	83,386	80,745	94,543	95,661	81,381r	80,248r	93,390	-1.2
Statistical difference	194	261		455	85	186	120	26	-360r	18r	290r	313	
Total demand	356,749	350,420	-1.8	92,633	98,356	83,200	80,625	94,568	96,021r	81,363r	79,957r	93,078	-1.6
TRANSFORMATION	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy industry use ⁵	26,631	26,026	-2.3	7,154	6,974	6,297	6,273	7,087	6,959r	6,230r	6,211r	6,626	-6.5
Losses	26,323	26,343	+0.1	7,499	8,713	6,016	4,969	6,624	8,751r	5,922r	5,318r	6,352	-4.1
FINAL CONSUMPTION	303,795	298,050	-1.9	77,979	82,669	70,886	69,383	80,857	80,311r	69,211r	68,428r	80,100	-0.9
Iron & steel	2,847	2,832	-0.5	875	708	703	707	730	714r	702r	685r	730	-
Other industries	88,961	88,699	-0.3	20,827	22,387	21,728	22,000	22,845	22,268r	21,880r	21,813r	22,738	-0.5
Transport	4,669	4,669	-	1,129	1,167	1,167	1,167	1,167	1,167r	1,167r	1,167r	1,167	-
Domestic	107,971	105,114	-2.6	29,947	31,904	24,014	21,831	30,222	30,952r	22,822r	21,489r	29,851	-1.2
Other final users	99,347	96,736	-2.6	25,202	26,502	23,274	23,679	25,892	25,210r	22,639r	23,274r	25,613	-1.1
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 Multifuel 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 refineries, nuclear fuel production and gas and electricity supply) .