

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

6.1: Renewable electricity capacity and generation

Page 63

6.2: Liquid biofuels for transport consumption

Page 64

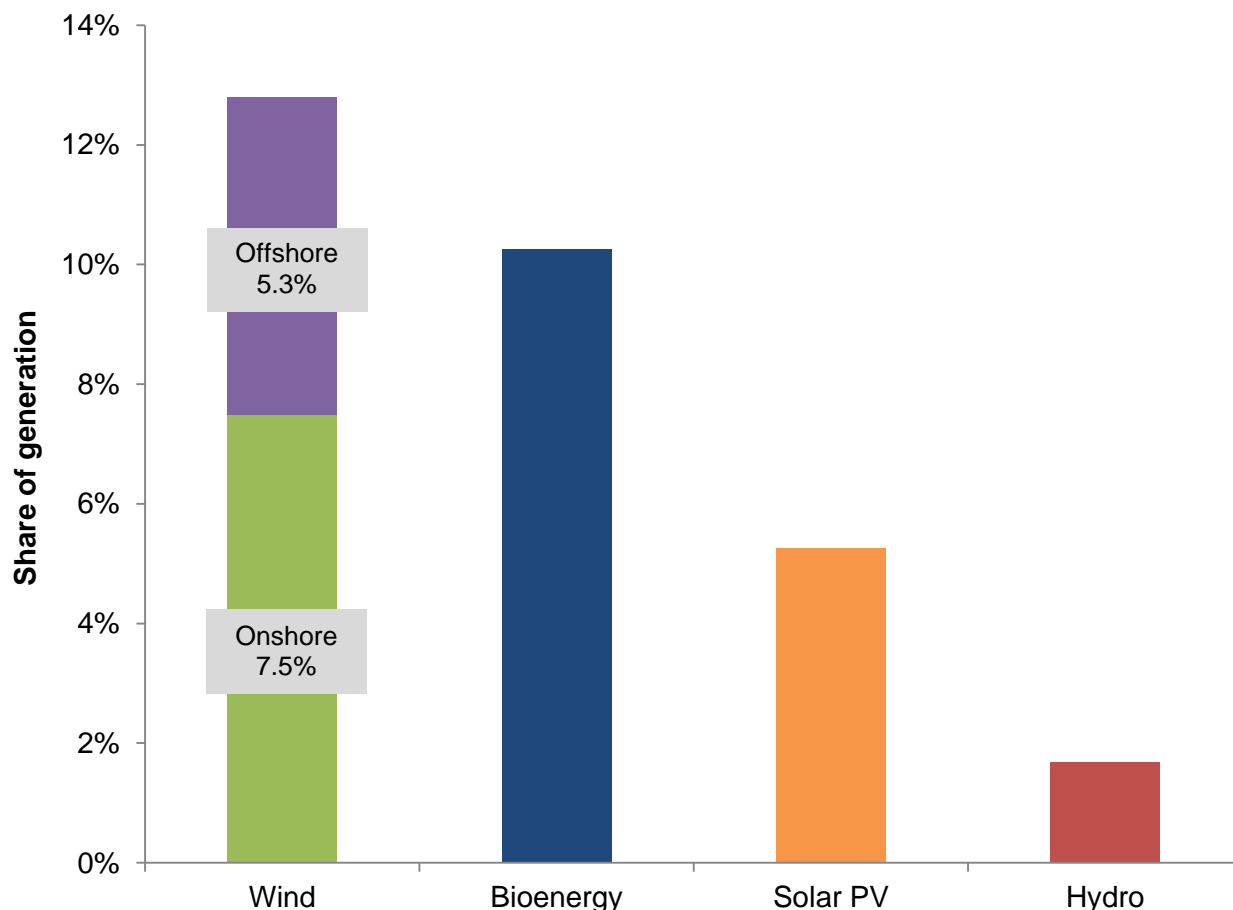
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Chart 6.1 Renewables' share of electricity generation (Table 6.1)

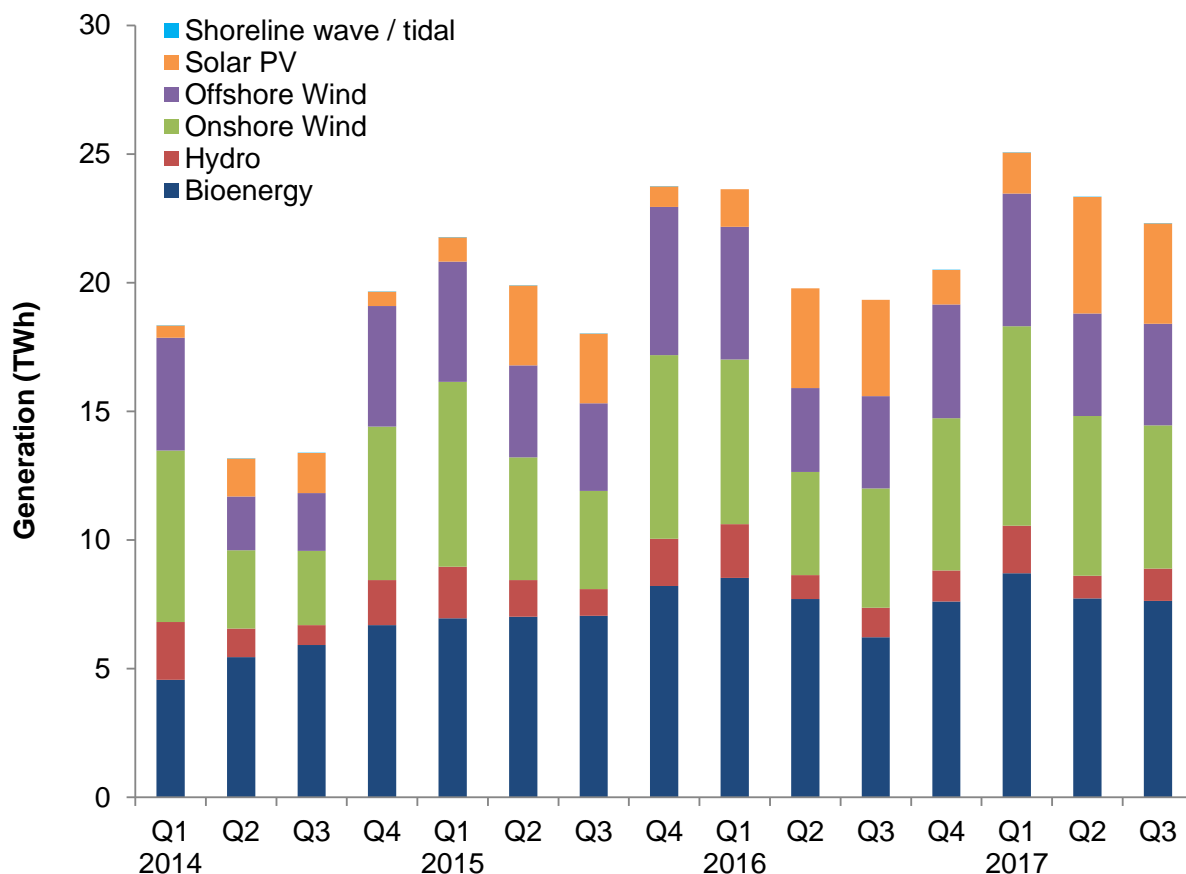
Renewables' share of electricity generation increased from 25.4 per cent in 2016 Q3 to 30.0 per cent in 2017 Q3. However, compared to 2017 Q2, renewables' share was 0.7 percentage points lower.

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 bioenergy¹, 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.

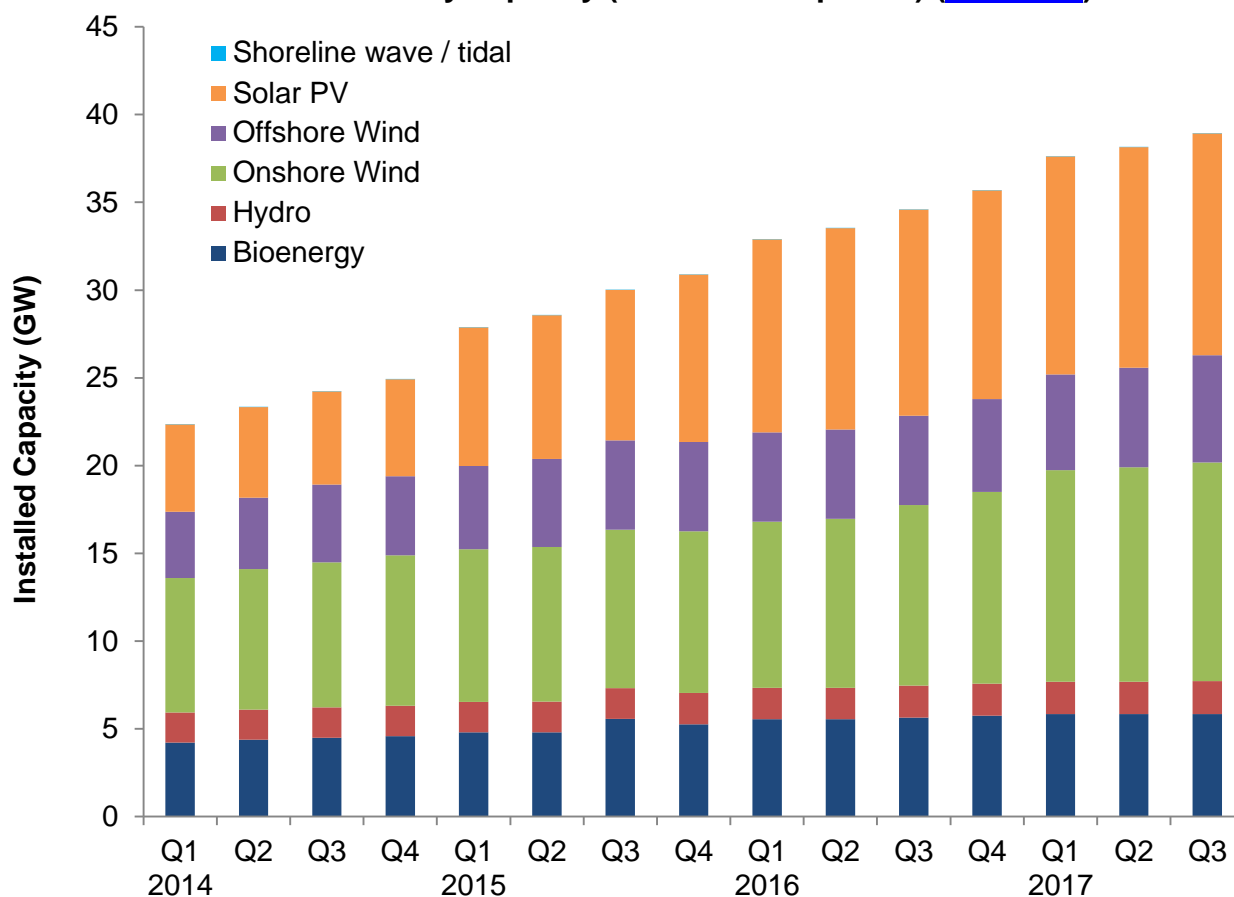
In 2017 Q3, electricity generated from onshore wind increased by 20 per cent, from 4.6 TWh in 2016 Q3 to 5.6 TWh, with generation from offshore wind up by 10 per cent to 3.9 TWh. Large increases in capacity over the year, particularly for onshore wind, more than out-weighted reduced wind speeds during 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.

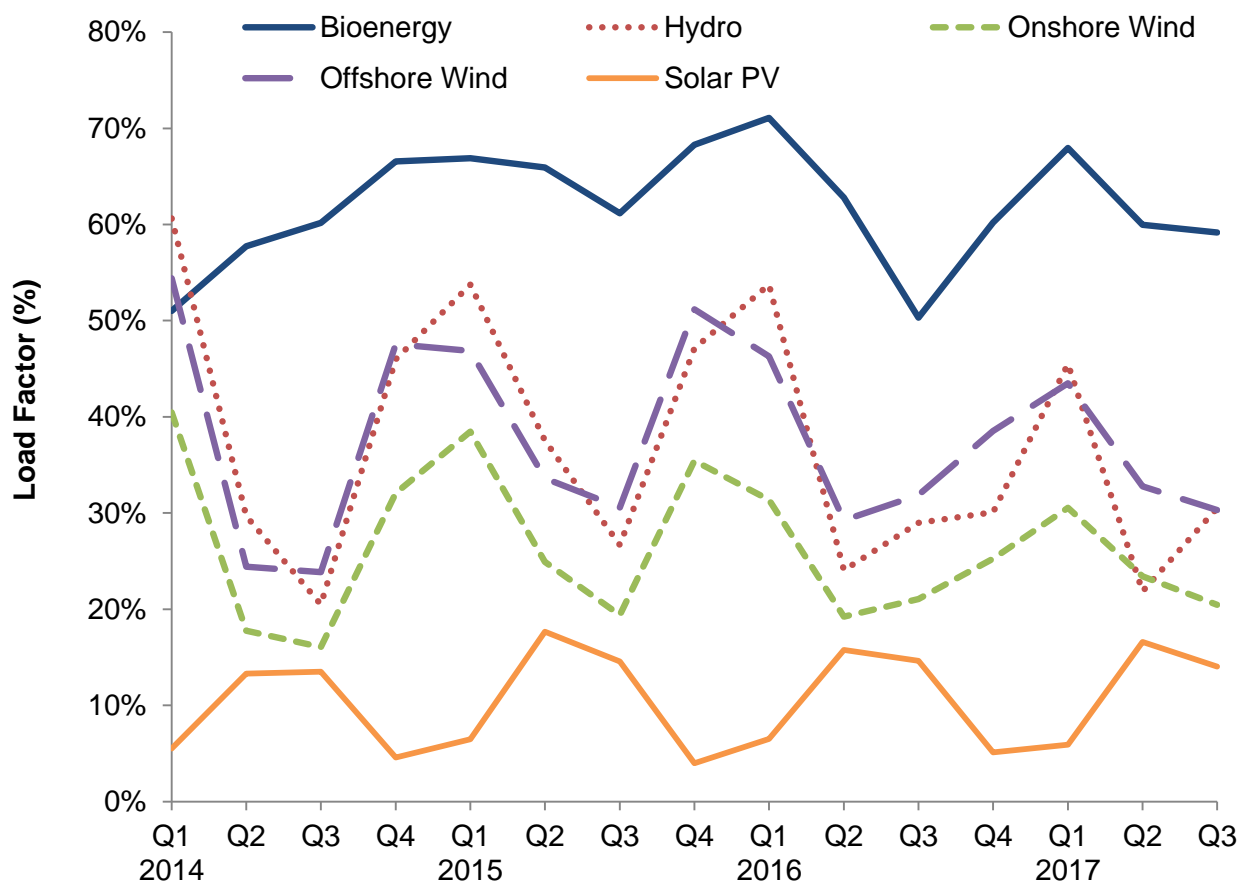
At the end of 2017 Q3, solar PV, at 12.6 GW, represented just over 32 per cent of all renewable capacity, the highest share of renewable technologies. This was followed by onshore wind (32 per cent), offshore wind (16 per cent) and bioenergy (15 per cent).²

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 Bhlairaidh (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)

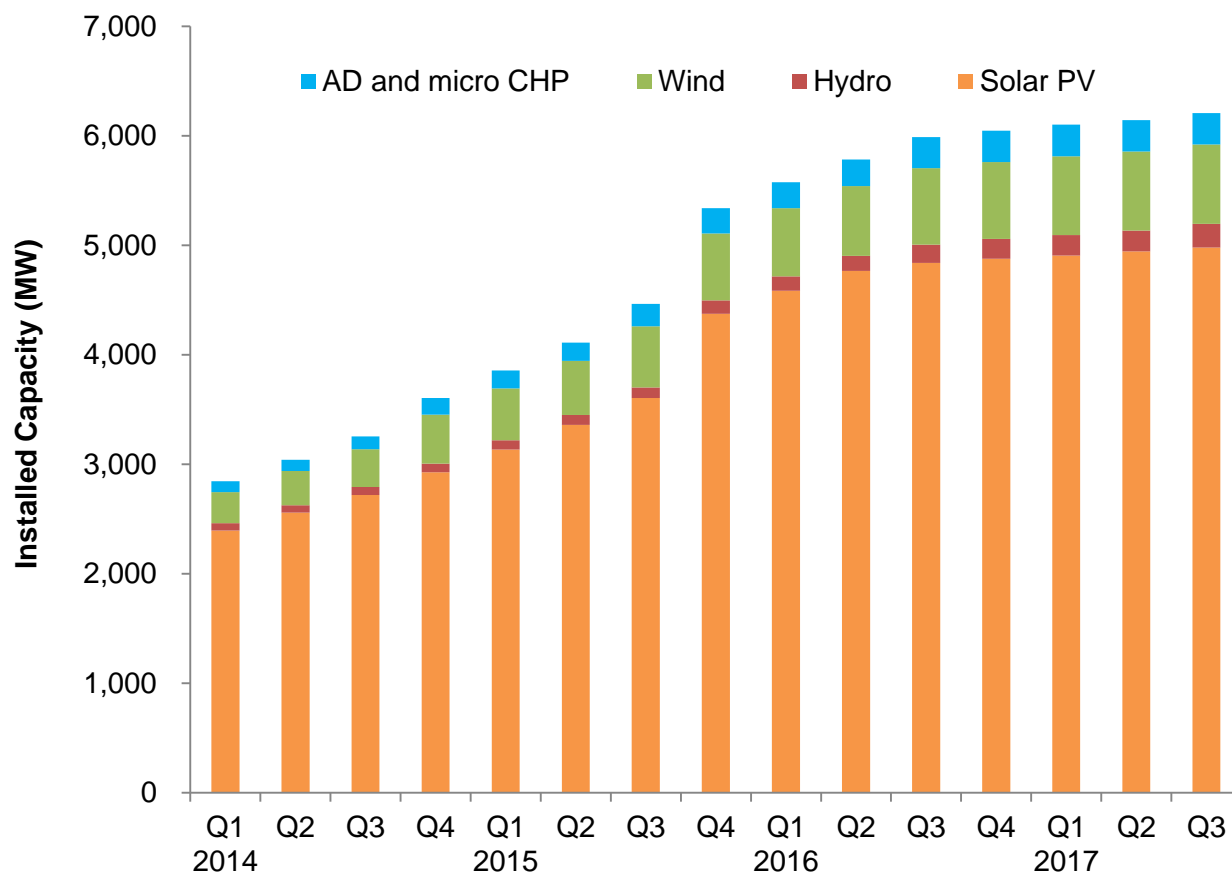
In 2017 Q3, onshore wind's load factor fell by 0.6 percentage points, from 21.0 per cent in 2016 Q3 to 20.4 per cent, due to lower onshore wind speeds. Offshore wind's load factor fell by 1.6 percentage points, from 31.9 per cent in 2016 Q3 to 30.3 per cent in 2017 Q3.³

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) scheme⁴. 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.

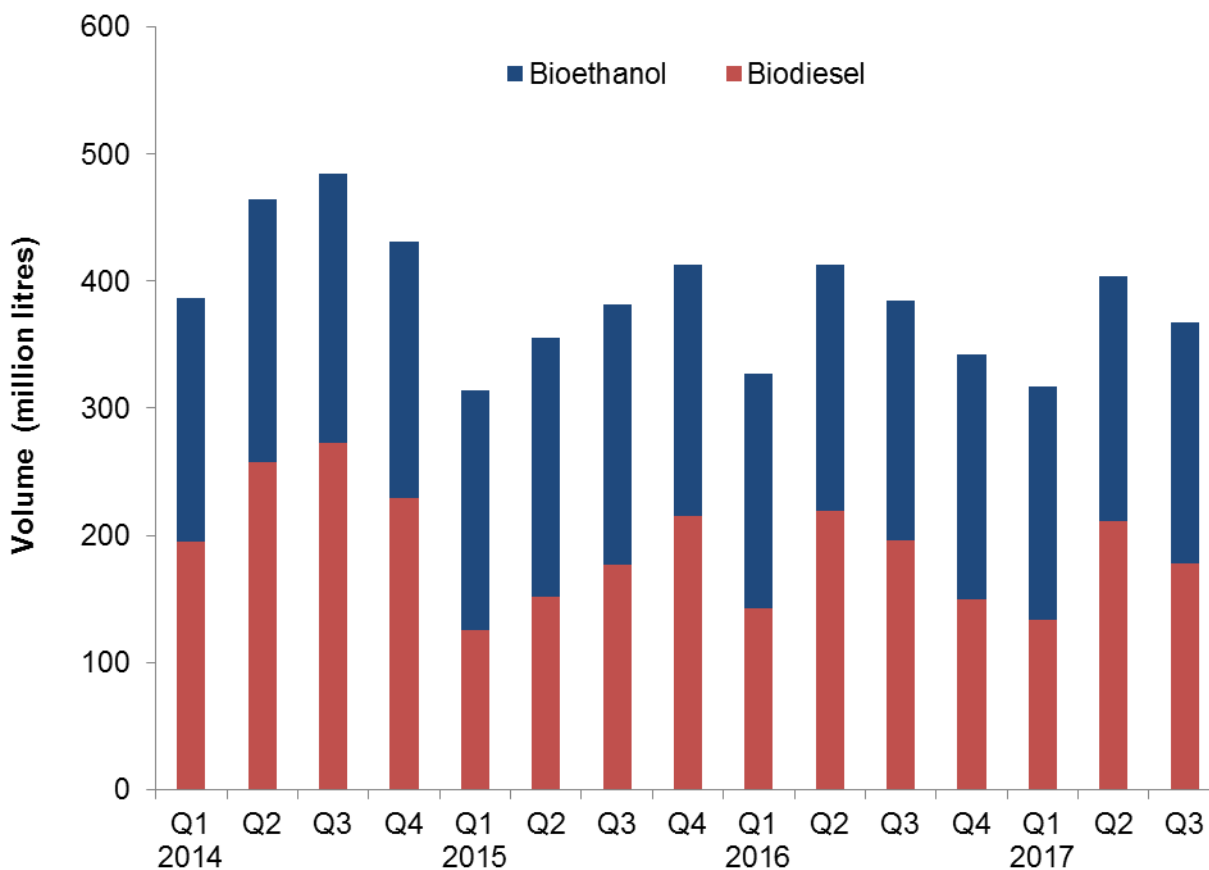
In terms of number of installations, at the end of 2017 Q3, there were over 914,000 installed and eligible for the FiT scheme, a 4.0 per cent increase on the number installed a year earlier.

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	per cent change ¹¹
Cumulative Installed Capacity¹													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	449r	450r	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
Generation⁵													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 Factors¹⁰													
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, hospital 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)													
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)													
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%	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%	-0.1%	-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%	-0.1%	-0.1%	-0.1%	-0.2%	