

Section 6 - Renewables

Key results show:

Renewables' share of electricity generation was 25.0 per cent in 2016 Q3, up 1.3 percentage points on the share in 2015 Q3, due to increasing renewable capacity and more favourable weather conditions for renewable generation (higher wind speeds and rainfall), as well as lower overall electricity generation. **(Chart 6.1)**

Renewable electricity generation was 18.8 TWh in 2016 Q3, an increase of 4.3 per cent on the 18.1 TWh in 2015 Q3, though 21 per cent lower than the peak quarterly generation of 2015 Q4 (23.7 TWh). **(Chart 6.2)**

Onshore wind generation increased by 19.4 per cent, from 3.8 TWh in 2015 Q3 to 4.6 TWh in 2016 Q3. Offshore wind increased from 3.4 TWh to 3.5 TWh, an increase of 3.8 per cent. Solar PV increased by 30 per cent, from 2.7 TWh to 3.5 TWh due to increased capacity. However, generation from bioenergy fell by 14.5 per cent, to 6.1 TWh, due to outages at Drax. **(Chart 6.2)**

Renewable electricity capacity was 33.4 GW at the end of 2016 Q3, a 11.3 per cent increase (3.4 GW) on a year earlier, and a 0.7 per cent (0.3 GW) increase on the previous quarter, with high growth over the year in solar photovoltaics and onshore wind. **(Chart 6.3)**

By the end of 2016 Q3, 5.8 GW of capacity had been installed, and eligible for, the Feed in Tariff scheme, an increase of 30 per cent on a year earlier, constituting approximately 17 per cent of all renewable installed capacity. **(Chart 6.5)**

Liquid biofuels consumption rose by 6.0 per cent, from 382 million litres in 2015 Q3 to 405 million litres in 2016 Q3, driven by a 21 per cent increase in biodiesel. In 2016 Q3, liquid biofuels represented 3.4 per cent of petrol and diesel consumed in road transport, up from 3.3 per cent a year earlier. **(Chart 6.6)**

Relevant tables

6.1: Renewable electricity capacity and generation

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6.2: Liquid biofuels for transport consumption

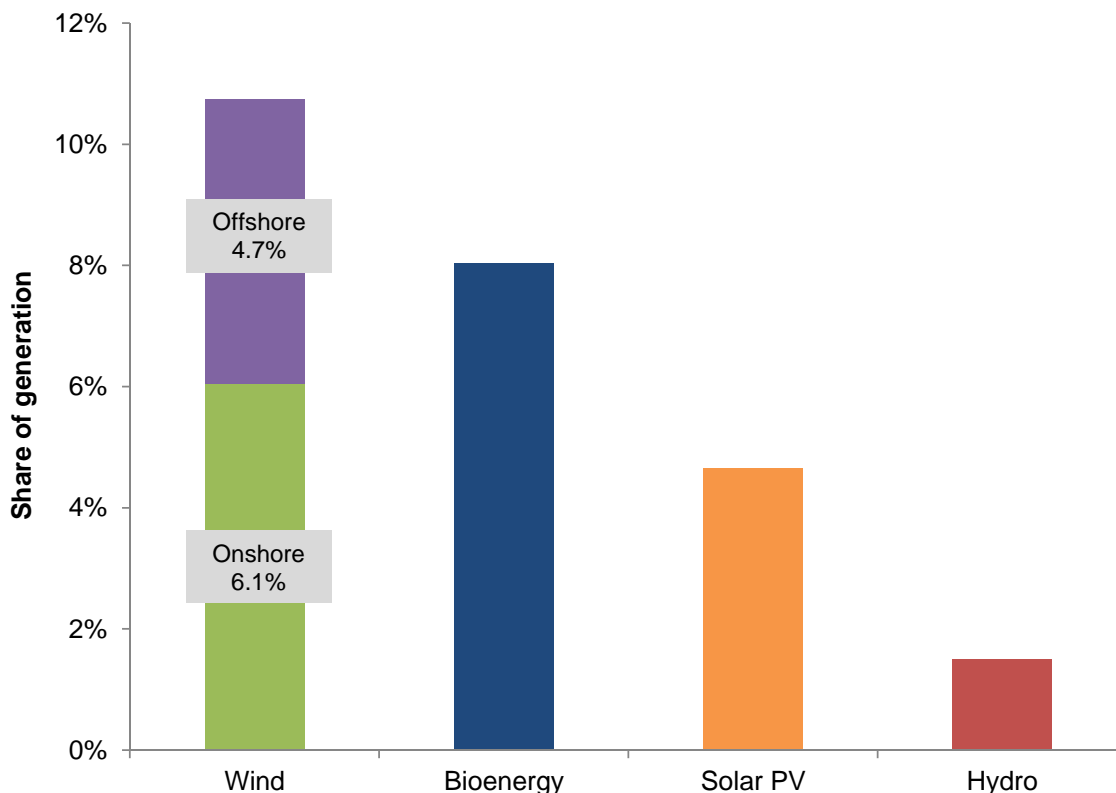
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Chart 6.1 Renewables' share of electricity generation

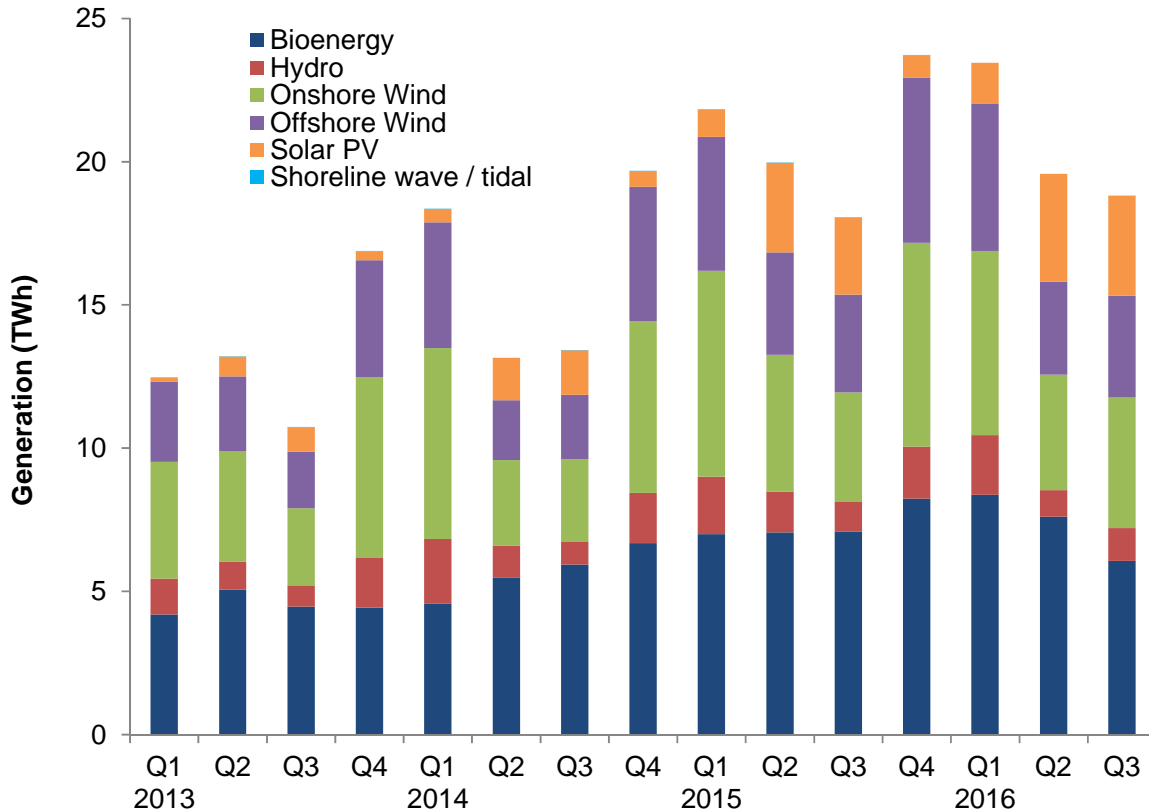
Renewables' share of electricity generation increased from 23.6 per cent in 2015 Q3 to 25.0 per cent in 2016 Q3. However, compared to 2016 Q2, renewables' share was 0.2 percentage points lower.

The increased share on a year earlier reflects the increase in renewables generation in addition to a decrease (1.2 per cent) in total electricity generation.

Total electricity generated from renewables in 2016 Q3 was 18.8 TWh, an increase of 0.7 TWh (4.3 per cent) compared to 2015 Q3, but 21 per cent lower than the record of 23.7 TWh in 2015 Q4.

Overall electricity generation fell by 1.2 per cent (1.0 TWh) from 76.4 TWh in 2015 Q3 to 75.4 TWh in 2016 Q3. This helped to increase the share of renewable generation by 0.3 percentage points.

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

Electricity generated from onshore wind increased by 19.4 per cent between 2015 Q3 and 2016 Q3, from 3.8 TWh to 4.6 TWh, while generation from offshore wind increased by 3.8 per cent, from 3.4 TWh to 3.5 TWh. This is due to a combination of higher wind speeds compared to last year and also increased onshore wind capacity.

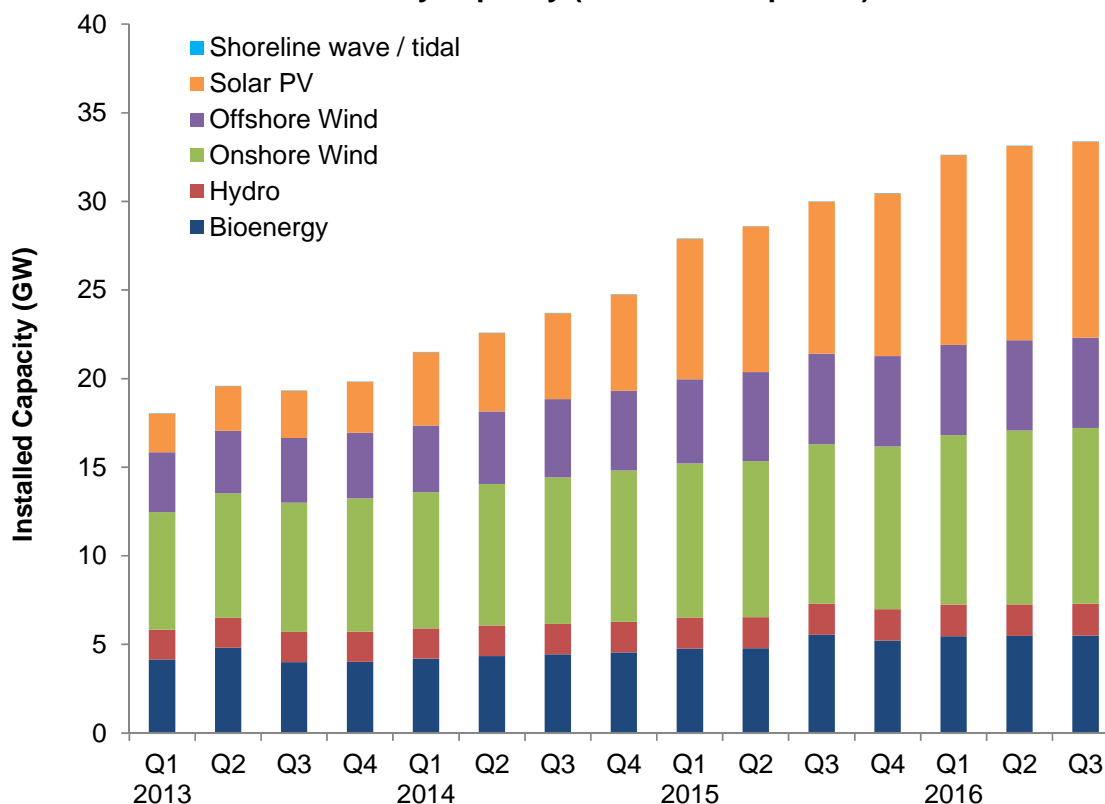
Average wind speeds in 2016 Q3, at 8.3 knots, were the highest for quarter 3 since 2010, and 6.1 per cent (0.5 knots) higher than in 2015 Q3. Wind speeds were especially high in September; at 8.9 knots, these were 29 per cent up on a year earlier - see Energy Trends table 7.2 at: www.gov.uk/government/statistics/energy-trends-section-7-weather.

Generation from solar PV increased by 30 per cent compared to 2015 Q3, from 2.7 TWh to 3.5 TWh, due to increased capacity. In 2016 Q3, hydro generation rose by 10.8 per cent on a year earlier, from 1.0 TWh to 1.1 TWh, with rainfall (in the main hydro areas) up 56 per cent on a year earlier, though much of the increase occurred later in the quarter, in September (the wettest for four years), which experienced four times the amount of rainfall of a year earlier - see Energy Trends table 7.4 at: www.gov.uk/government/statistics/energy-trends-section-7-weather.

Generation from bioenergy¹ in 2016 Q3 fell by 14.5 per cent on a year earlier, from 7.1 TWh to 6.1 TWh. The main driver of this fall was plant biomass, which fell from 4.4 TWh to 3.4 TWh, due to several maintenance outages at the Drax converted units.

In 2016 Q3, bioenergy had a 32 per cent share of generation, with 24 per cent from onshore wind, and 19 per cent from each of offshore wind and solar. Solar photovoltaics and onshore wind saw the largest increase in the share of renewable generation on 2015 Q3, at 3.7 and 3.1 percentage points respectively, while bioenergy's share fell by 7.1 percentage points.

¹ landfill gas, sewage gas, biodegradable municipal solid waste, plant biomass, animal biomass, anaerobic digestion and co-firing (generation only)

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

At the end of 2016 Q3, the UK's renewable electricity capacity totalled 33.4 GW, an increase of 0.7 per cent (0.2 GW) on that installed at the end of 2016 Q2, and up 11.3 per cent (3.4 GW) on that installed a year earlier.

Of the 0.2 GW increase in capacity during 2016 Q3, more than half came from increases in onshore wind capacity, due to the opening of capacity at several new wind farms, including Assel Valley, the first turbines at Dersalloch, further turbines at the Black Law extension, as well as around 29 MW of smaller Feed in Tariff (FiT)-scale schemes. Solar photovoltaics (PV) capacity increased by around 76 MW in 2016 Q3, including around 50 MW from FiT eligible schemes, and 10 MW from small-scale Northern Irish schemes.

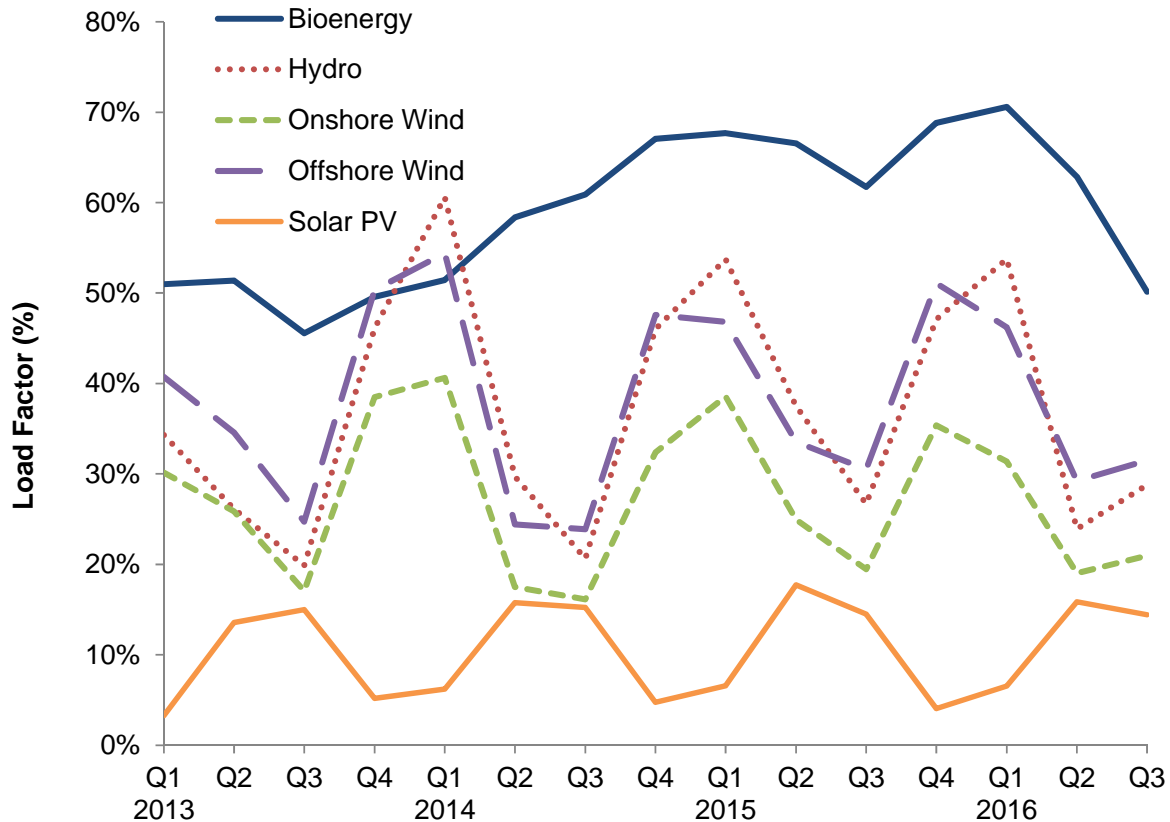
At the end of 2016 Q3, solar PV, at 11.1 GW, was one-third of all renewable capacity, the highest share of renewable technologies. This was followed by onshore wind (30 per cent), bioenergy (16 per cent) and offshore wind (15 per cent).²

Compared with a year ago, 2.5 GW of solar PV has been installed (with most in 2016 Q1, ahead of the Renewables Obligation (RO) closure to grace period-qualifying large and, non-grace period qualifying³, small, solar) and 0.9 GW of onshore wind, with the remaining increases offset by the closure of Ironbridge biomass plant in late 2015 and the (smaller) Beatrice offshore wind farm in early 2016.

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.

³ The Renewables Obligation closed to all large-scale (>5 MW) on 31 March 2015 and small-scale (up to 5 MW) solar on 31 March 2016. Certain installations meeting investment or planning criteria were given year long extensions ("grace periods") to these deadlines, with the commissioning deadline for qualifying small solar sites now 31 March 2017. Further details on RO closure and grace periods are available at:

www.ofgem.gov.uk/environmental-programmes/ro/about-ro/ro-closure

Chart 6.4 Renewable electricity load factors

In 2016 Q3, onshore wind's load factor increased by 1.5 percentage points, from 19.5 per cent in 2015 Q3 to 20.9 per cent. This was an increase of 1.9 percentage points on 2016 Q2.

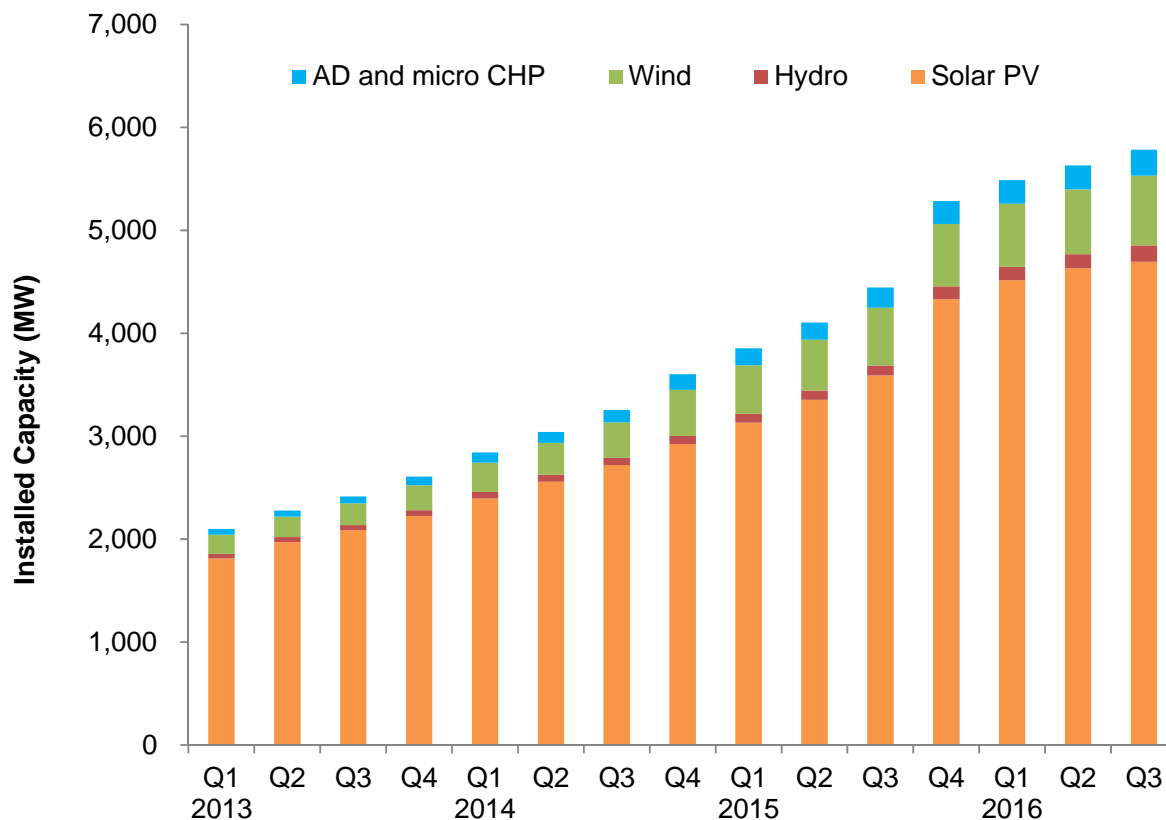
Offshore wind's load factor increased by 1.0 percentage point, from 30.5 per cent in 2015 Q3 to 31.5 per cent in 2016 Q3. This was an increase of 2.3 percentage points on 2016 Q2.

Average onshore wind speeds in 2016 Q3, at 8.3 knots, were the windiest in six years for the quarter, and up 6.1 per cent on a year earlier. September's wind speeds were up 28 per cent (1.9 knots) on a year ago, and the highest for that month for four years.⁴ Compared with 2016 Q2, wind speeds in 2016 Q3 were up 6.9 per cent (0.5 knots).

Hydro's load factor in 2016 Q3 increased by 2.1 percentage points, from 26.7 per cent in 2015 Q3 to 28.8 per cent, due to higher rainfall. Compared with 2016 Q2, hydro's load factor in 2016 Q3 was 4.9 percentage points higher due to 75 per cent more rainfall, with 2016 the driest Q2 since 2010. The full impacts of the increased rainfall may not be seen until Q4, since much of the increase occurred late in the quarter, with September receiving over four times the rainfall of a year earlier, and over 50 per cent more than the final month (June) of 2016 Q2.

For bioenergy, the load factor in 2016 Q3, at 50.1 per cent, was down by 11.6 percentage points on a year earlier, and down by 12.7 percentage points on 2016 Q2, reflecting the maintenance outages at the Drax converted biomass units that ordinarily achieve high load factors.

⁴ 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.

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

At the end of 2016 Q3, 5.8 GW of capacity was installed and eligible for the GB Feed in Tariff (FiT) scheme⁵, a 30 per cent increase on that at the end of 2015 Q3. Much (0.8 GW) of this 1.3 GW increase took place in 2015 Q4, ahead of changes to the FiT scheme in January 2016.

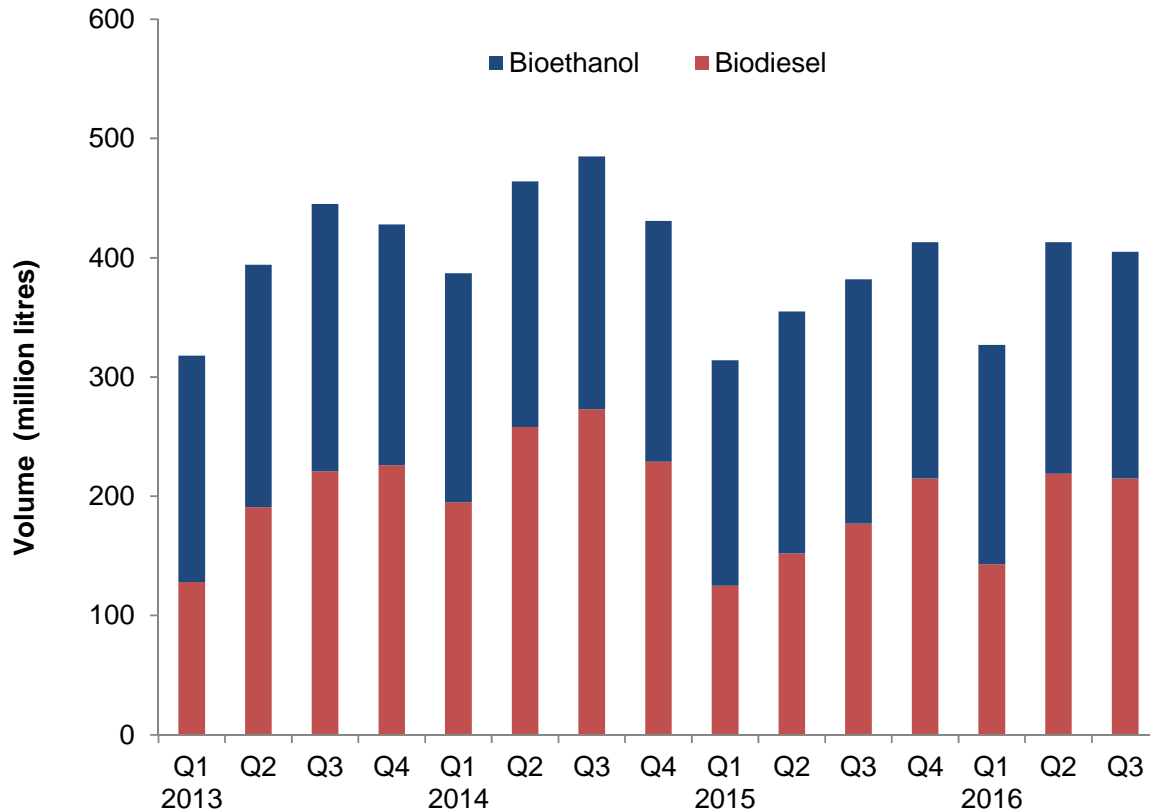
Statistics on Feed in Tariffs can be found at: www.gov.uk/government/collections/feed-in-tariff-statistics

In terms of number of installations, at the end of 2016 Q3, there were over 870,000 installed and eligible for the FiT scheme, a 15 per cent increase on the number installed a year earlier.

Solar PV represents the majority of both installations and installed capacity on FiTs, with, respectively, 99 per cent and 81 per cent of the total. The majority of FiT PV installations, and over half of capacity, are sub-4 kW (mainly retrofitted) schemes, 2.4 GW at the end of 2016 Q3.

Renewable installations eligible for FiTs (all except MicroCHP) represented 17 per cent of all renewable installed capacity.

⁵ 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

In 2016 Q3, 405 million litres of liquid biofuels were consumed in transport, a rise of 6.0 per cent on the total in 2015 Q3 (382 million litres). This was driven by an increase in consumption of biodiesel.

In 2016 Q3, biodiesel accounted for 2.8 per cent of diesel, and bioethanol 4.4 per cent of motor spirit. The combined contribution of the two fuels was 3.4 per cent, 0.1 percentage point higher than 2015 Q3's share.

Bioethanol consumption fell by 7.3 per cent, from 205 million litres in 2015 Q3 to 190 million litres in 2016 Q3. Biodiesel consumption rose by 21 per cent, from 177 million litres to 215 million litres.

In 2016 Q3, biodiesel contributed the largest share of biofuels consumption, unchanged from the previous quarter, with 53 per cent. Bioethanol represented 47 per cent of biofuels consumption.

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Table 6.1. Renewable electricity capacity and generation

	2014	2015	per cent change	2014 3rd quarter	2014 4th quarter	2015 1st quarter	2015 2nd quarter	2015 3rd quarter	2015 4th quarter	2016 1st quarter	2016 2nd quarter	2016 3rd quarter	per cent change ¹¹
Cumulative Installed Capacity ¹													MW
Onshore Wind	8,536r	9,188	+7.6	8,263	8,536	8,708	8,807	9,003	9,188	9,571r	9,812r	9,937	+10.4
Offshore Wind	4,501	5,104	+13.4	4,420	4,501	4,749	5,024	5,104	5,104	5,094	5,094	5,094	-0.2
Shoreline wave / tidal	9	9	+2.9	9	9	9	9	9	9	8	8	8	-9.2
Solar photovoltaics	5,424	9,188	+69.4	4,841	5,424	7,930	8,224	8,581	9,188	10,703r	10,974r	11,050	+28.8
Small scale Hydro	252r	282	+12.0	245	252	261	267	272	282	307r	311r	320	+17.9
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	1,058r	1,061	+0.4	1,057	1,058	1,061	1,061	1,061	1,061	1,062r	1,062r	1,062	+0.1
Sewage sludge digestion	215r	216	+0.4	212	215	215	216	216	216	245r	245r	245	+13.5
Energy from waste	681r	925	+35.9	630	681	826	834	902	925	946r	946r	946	+4.8
Animal Biomass (non-AD) ²	111	111	-	111	111	111	111	111	111	111	111	111	-
Anaerobic Digestion	238r	286	+20.2	207	238	260	263	284	286	331r	335r	346	+21.8
Plant Biomass ³	2,245r	2,619	+16.7	2,225	2,245	2,297	2,298	2,976	2,619	2,772r	2,772r	2,781	-6.5
Total	24,746r	30,465	+23.1	23,695	24,746	27,904	28,592	29,994	30,465	32,625r	33,146r	33,376	+11.3
Co-firing ⁴	15	21	+37.6	15	15	21	21	21	21	10r	10r	10	-51.9
Generation ⁵													GWh
Onshore Wind ⁶	18,562	22,887	+23.3	2,897	6,002	7,182	4,775	3,825	7,106	6,426r	4,028r	4,566	+19.4
Offshore Wind ^{6, 7}	13,404	17,423	+30.0	2,242	4,686	4,676	3,578	3,412	5,757	5,148r	3,251r	3,542	+3.8
Shoreline wave / tidal ⁶	2	2	-10.0	0	1	1	0	0	0	-	-	-	-100.0
Solar photovoltaics ⁶	4,040	7,561	+87.2	1,558	536	951	3,125	2,690	795	1,422r	3,756r	3,507	+30.3
Hydro ⁶	5,893	6,289	+6.7	784	1,753	2,012	1,426	1,028	1,823	2,081r	933r	1,139	+10.8
Landfill gas ⁶	5,045	4,872	-3.4	1,245	1,266	1,240	1,212	1,201	1,220	1,189r	1,138r	1,135	-5.4
Sewage sludge digestion ⁶	846	888	+4.9	212	211	223	231	215	219	232r	249r	236	+9.9
Energy from waste ⁵	1,923	2,782	+44.7	491	486	656	653	736	737	706r	615r	680	-7.6
Co-firing with fossil fuels	133	183	+37.6	37	34	36	36	57	55	51	15r	1	-99.1
Animal Biomass (non-AD) ^{2, 6}	614	648	+5.5	132	162	170	171	142	165	170	164r	143	+1.0
Anaerobic Digestion	1,019	1,429	+40.2	258	286	323	346	364	396	431r	444r	447	+22.9
Plant Biomass ^{3, 6}	13,105	18,587	+41.8	3,565	4,242	4,351	4,409	4,383	5,443	5,599r	4,978r	3,425	-21.9
Total	64,584	83,550	+29.4	13,420	19,665	21,819	19,961	18,053	23,717	23,455r	19,570r	18,821	+4.3
Non-biodegradable wastes ⁹	1,923	2,784	+44.7	491	486	656	653	737	738	707r	615r	681	-7.6
Load Factors ¹⁰													
Onshore Wind	26.4%	29.5%		16.1%	32.4%	38.6%	25.0%	19.5%	35.4%	31.4%r	19.0%r	20.9%	
Offshore Wind	37.3%	41.4%		23.9%	47.6%	46.8%	33.5%	30.5%	51.1%	46.2%r	29.2%r	31.5%	
Solar photovoltaics	11.1%	11.8%		15.2%	4.7%	6.6%	17.7%	14.5%	4.1%	6.5%r	15.9%r	14.4%	
Hydro	39.1%	41.2%		20.6%	46.0%	53.7%	37.5%	26.7%	47.1%	53.8%r	23.9%r	28.8%	
Landfill gas	54.8%	52.5%		53.4%	54.3%	54.2%	52.3%	51.2%	52.1%	51.3%r	49.1%r	48.4%	
Sewage sludge digestion	46.6%	46.9%		45.2%	44.7%	47.8%	48.9%	45.0%	45.8%	46.0%r	46.4%r	43.6%	
Energy from waste	35.8%	39.6%		35.5%	33.6%	40.3%	36.0%	38.4%	36.5%	34.6%r	29.8%r	32.6%	
Animal Biomass (non-AD)	63.4%	66.9%		54.1%	66.4%	71.1%	70.9%	58.1%	67.7%	70.4%r	67.9%r	58.7%	
Anaerobic Digestion	58.0%	62.2%		57.8%	58.1%	59.9%	60.5%	60.3%	63.0%	64.0%r	61.1%r	59.6%	
Plant Biomass	71.2%	87.2%		73.9%	86.0%	88.7%	87.9%	75.3%	88.1%	95.1%r	82.2%r	55.9%	
Total (excluding co-firing and non-biodegradable wastes)	33.0%	34.5%		26.2%	36.7%	38.3%	32.3%	27.8%	35.5%	34.0%r	27.2%r	25.6%	

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.

9. Non-biodegradable part of municipal solid waste plus 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%.

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Table 6.2. Liquid biofuels for transport consumption

	2014	2015	per cent change	2014 3rd quarter	2014 4th quarter	2015 1st quarter	2015 2nd quarter	2015 3rd Quarter	2015 4th Quarter	2016 1st quarter	2016 2nd quarter	2016 3rd Quarter p	per cent change ¹
Volume (million litres)													
Bioethanol	812	795	-2.1	212	202	189	203	205	198	184	194	190	-7.3%
Biodiesel	955	669	-29.9	273	229	125	152	177	215	143	219	215	21.5%
Total biofuels for transport	1,767	1,464	-17.1	485	431	314	355	382	413	327	413	405	6.0%
Energy (thousand toe)													
Bioethanol	458	448	-2.1	120	114	107	114	116	112	104	109	107	-7.3%
Biodiesel	785	550	-29.9	224	188	103	125	145	177	117	180	177	21.5%
Total biofuels for transport	1,242	998	-19.7	344	302	209	239	261	288	221	289	284	8.7%
Shares of road fuels													
Bioethanol as per cent of Motor Spirit	4.6%	4.6%		4.8%	4.6%	4.6%	4.6%	4.7%	4.5%	4.5%	4.4%	4.4%	
Biodiesel as per cent of DERV	3.4%	2.3%		3.9%	3.1%	1.8%	2.1%	2.4%	2.9%	2.0%	2.9%	2.8%	
Total biofuels as per cent of road fuels	3.9%	3.2%		4.2%	3.7%	2.9%	3.0%	3.3%	3.5%	2.9%	3.4%	3.4%	

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

Bioethanol as per cent of Motor Spirit
Biodiesel as per cent of DERV
Total biofuels as per cent of road fuels

% change on quarter in previous year (-ve value is decrease)

-0.1%	0.1%	0.1%	0.1%	-0.1%	0.0%	-0.1%	-0.2%	-0.2%
0.6%	-0.1%	-1.1%	-1.6%	-1.4%	-0.3%	0.2%	0.8%	0.4%
0.3%	0.0%	-0.7%	-1.0%	-0.9%	-0.2%	0.0%	0.4%	0.1%