

Renewable energy in 2014

Introduction

This article updates the information on renewable energy published in the June 2014 edition of Energy Trends, and in the 2014 edition of the Digest of UK Energy Statistics. It also presents additional information to that provided in the “Section 6 Renewables” section of this edition of Energy Trends, including an early indication of the UK’s progress against the Renewable Energy Directive, and discusses key policies that impact on the delivery of renewable energy.

Key messages

In 2014, renewable energy provisionally accounted for 7.0 per cent of final energy consumption, as measured using the 2009 Renewable Energy Directive (RED) methodology. This is an increase from the revised 2013 position of 1.4 percentage points, reflecting a significant growth in the contribution of renewable electricity whilst renewable heating and transport contributions also rose. Averaged over 2013 and 2014, The UK has now achieved 6.3 per cent renewable energy, 0.9 percentage points in excess of the interim target which was set at 5.4 per cent (see page 54).

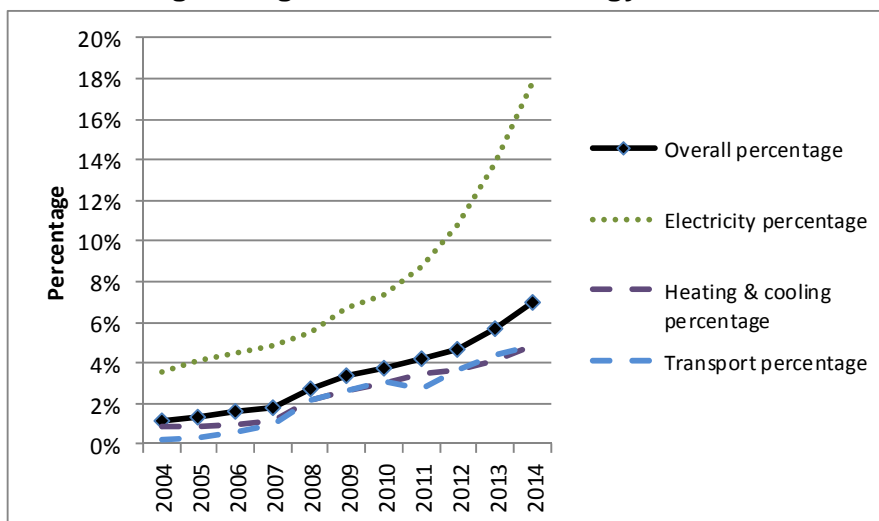
When 2013 progress against the RED was originally reported in 2014, renewable energy was 5.2 per cent of final energy consumption. This has now been revised up to 5.6 per cent following an improvement in methodologies for calculating various sources of renewable heat, the most substantial revision being to domestic wood combustion (see Renewable heat section).

The amount of electricity generated from renewable sources in 2014 was 64,654 GWh, a 21 per cent increase on 2013. Plant biomass generation was the largest contributor to the overall increase in renewable electricity generation; generation increased by 4,176 GWh, 47 per cent. Generation from solar photovoltaics was 4,050 GWh in 2014, more than double the generation in 2013.

Offshore wind increased by 17 per cent and onshore wind by 10 per cent, taking total wind generation to 32,016 GWh. The increases in wind generation were driven by high growth in installed capacity, as wind speeds were similar to 2013. Hydro generation increased by 1,183 GWh (25 per cent) to a record 5,885 GWh, largely due to high rainfall in the main catchment areas (see “The normalisation approach” box for detail on the impact of differing wind and rain patterns).

Generation from wind represented 50 per cent of total renewable electricity generation in 2014, compared with 35 per cent for bioenergy, 9.1 per cent for hydro and 6.3 per cent for solar photovoltaics.

Chart 1: Progress against Renewable Energy Directive



Special feature – Renewable energy in 2014

Renewable electricity generation capacity increased by 4.8 GW (24 per cent) to 24.6 GW. The main sources of this increase were solar photovoltaics (up 2.5 GW, 89 per cent), onshore wind (up 1.0 GW, 13 per cent), offshore wind (up 0.8 GW, 22 per cent), and plant biomass (up 0.3 GW, 15 per cent).

Heat from renewable sources increased by 4.6 per cent during 2014 (to 2,730 ktoe). This includes heat supported by the Renewable Heat Incentive and Renewable Heat Premium Payment schemes.

Renewable biofuels used for transport rose by 14 per cent (to 1,243 ktoe), accounting for 3.9 per cent by volume of road transport fuels in 2014. Bioethanol, as a proportion of motor spirit, increased slightly to 4.6 per cent, whilst biodiesel as a proportion of DERV increased by 0.6 percentage points to 3.4 per cent.

The normalisation approach

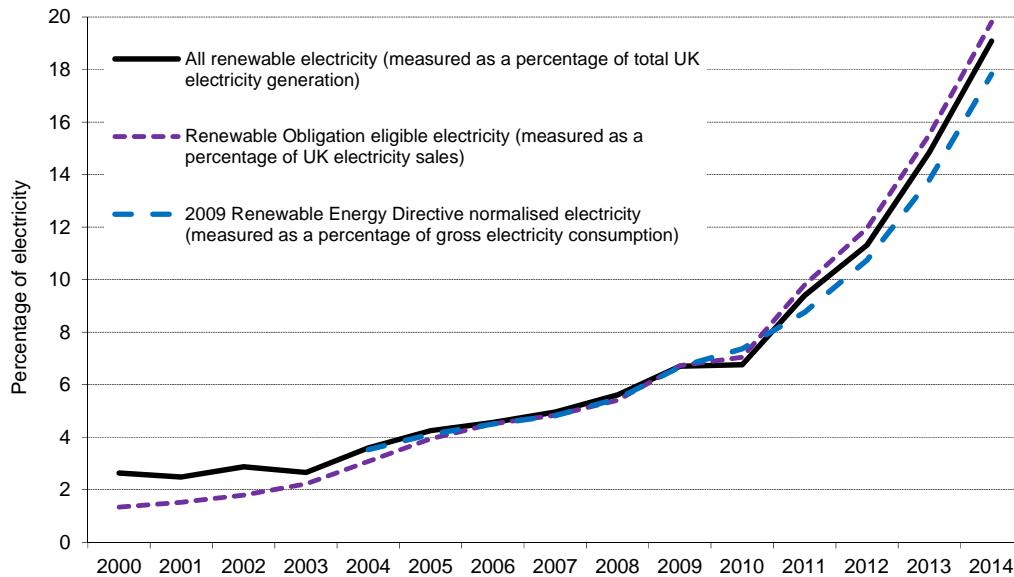
Generation from wind and hydro sources are very dependent on the weather (wind speeds and rainfall). In order to negate the effects of variable generation due to weather differentials from one year to the next, the 2009 Renewable Energy Directive (RED) measure specifies the normalisation of wind and hydro generation. Normalisation is carried out by calculating generation by applying an average load factor to current capacity. For wind, the load factor is calculated as the average of the past five years (including the present one), with current capacity taken as an average of the start and end of year capacity. For hydro, the load factor is the average of the past 15 years, applied to capacity at the end of the current year. The generation figures obtained from this procedure replace the actual generation figures for wind and hydro in the RED calculation.

Renewable electricity targets

Renewable electricity's share of all electricity ranged from 17.8 per cent to 19.8 per cent, under three key measures (RED, Renewables Obligation and International Basis) in 2014. Section 6 of the March 2015 edition of Energy Trends contained provisional estimates for the international and Renewable Energy Directive (RED) measures of the share of electricity obtained from renewable sources. These data have now been revised following receipt of new data, and an additional measure, reflecting the Renewables Obligation (RO) definition, has been added. All measures are shown in Table 1 at the end of this article.

On the "international definition basis" renewables provided 19.1 per cent of the electricity generated in the United Kingdom in 2014, a 4.2 percentage point increase on the 2013 proportion. Total electricity generation from renewables in 2014, as shown in Table 3 at the end of this article, amounted to 64,654 GWh, an increase of 11,377 GWh (21 per cent) on 2013. Chart 2 shows the growth in the proportion of electricity generation from renewable sources and also progress under the RO, which is measured as a proportion of UK electricity sales; the RO measure grew by 4.2 percentage points to 19.8 per cent in 2014.

The RED introduced a further measure, which involves normalising wind and hydro generation over 5 and 15 year periods respectively, and measuring against gross electricity consumption. Similar wind speeds in 2014 compared to 2013 meant that normalised wind generation tended towards the non-normalised generation, whereas higher than average rainfall resulted in normalised hydro generation growing more slowly than the non-normalised measure. In 2014, the normalised electricity component of the Renewable Energy Directive increased by 4.0 percentage points, to 17.8 per cent.

Chart 2: Growth in electricity generation from renewable sources since 2000

The normalised electricity component of the 2009 Renewable Energy Directive measure is also shown in Chart 2; by comparing this line with the non-normalised lines, it illustrates the impact that low wind speeds and little rain had on renewable electricity generation in 2010, and how this was reversed in 2011, returning to more normal levels in 2012. In 2013, normalisation again reduced the impact that high wind speeds had on generation and in 2014, high rainfall resulted in a similar impact.

Renewable electricity generation

The largest absolute increase in generation came from plant biomass, rising by 4,176 GWh to 13,105 GWh, due to increased capacity with the conversion of a second unit at Drax Power Station from coal to dedicated biomass and also several new smaller schemes. This was partially offset by a capacity reduction at Ironbridge.

Generation from solar photovoltaics rose by 2,060 GWh, to 4,050 GWh, an increase of 104 per cent. The majority of the increase was due to new capacity from larger schemes supported by the Renewables Obligation, as well as smaller schemes under the Feed in Tariff. The average sun hours per day were 4.4, just 0.2 higher than in 2013 and in line with the ten year average.

Offshore wind generation increased by 1,933 GWh to 13,404 GWh (17 per cent), partly due to an increase in capacity. Onshore wind generation also increased though to a lesser extent; a 10 per cent increase on 2014 to 18,611 GWh, also mostly due to an increase in capacity; average wind speeds were largely similar in 2014 compared to 2013, at 8.6 knots. Wind speeds varied considerably across 2014, from a record low of 5.5 knots in September 2014, to a high of 13.0 knots in February 2014 (the highest since February 2002).

Generation from hydro, a record, in 2014, increased by 1,183 GWh (25 per cent) on 2013, due to higher rain fall (in the main hydro catchment areas). Average monthly rainfall in 2014 was 1,522 mm compared to 1,322 mm in 2014, an increase of 15 per cent, and 6 per cent higher than the ten year mean.

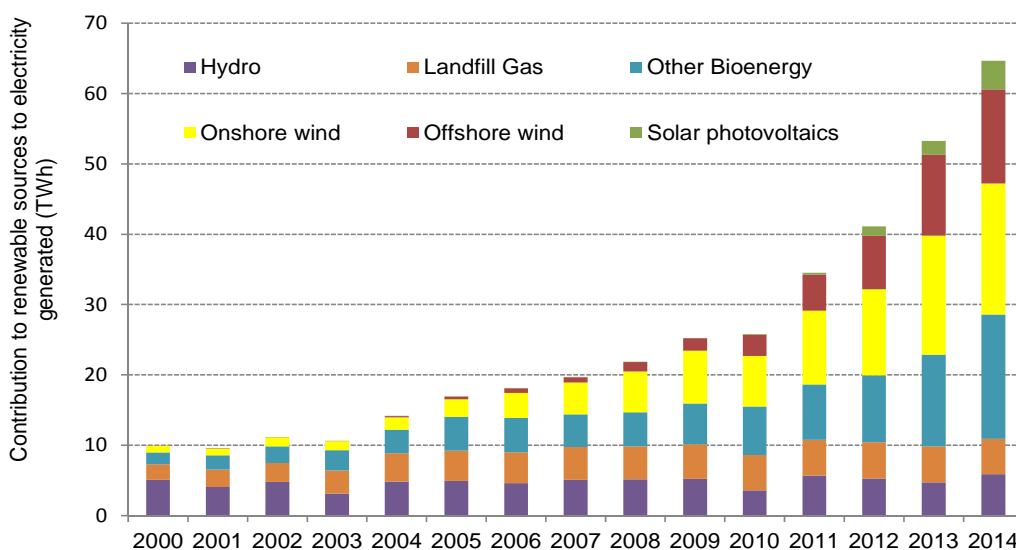
Special feature – Renewable energy in 2014

Other sources showing increases during the year included anaerobic digestion (an increase of 287 GWh, 40 per cent higher), sewage gas increased by 11 per cent to 846 GWh. Landfill gas, however, fell by 115 GWh (2 per cent) to 5,045 GWh.

Onshore wind continued to be the leading individual technology for the generation of electricity from renewable sources during 2014, with 29 per cent of renewables generation coming from this source; a further 21 per cent came from offshore wind, 20 per cent from plant biomass, and 9 per cent from hydro. However the combined generation from the variety of different bioenergy sources accounted for 35 per cent of renewable generation, with plant biomass accounting for over one half of bioenergy generation (58 per cent) and landfill gas accounting for 22 per cent.

Total generation from bioenergy and hydro sources were each 25 per cent higher than in 2013, while wind was 13 per cent higher. Chart 3 shows the growth in generation, by main renewable source, since 2000.

Chart 3: Electricity generation by main renewable source since 2000



Note: Wind includes wave and tidal which in 2014 was 0.002 TWh

Renewable electricity capacity

Total renewable electricity capacity at the end of 2014, as shown in Table 3, amounted to 24,643 MW, compared with 19,801 MW at the end of 2013; this excludes the capacity within conventional generation station that was used for co-firing (16 MW). The largest contributor towards this 24 per cent capacity increase was 2,526 MW from solar photovoltaics, 968 MW from onshore wind, and 805 from offshore wind. Plant biomass capacity increased by 289 MW, with the extra capacity from the conversion of a second unit at Drax power station and several smaller new installations exceeding a reduction in capacity at Ironbridge power station .

In capacity terms, onshore wind accounted for 35 per cent of capacity, followed by solar photovoltaics at 22 per cent. Offshore winds share was 18 per cent, plant biomass 9.1 per cent, hydro was 7.0 per cent, and landfill gas 4.3 per cent.

Load factors

Load factors express the average hourly quantity of electricity generated as a percentage of the average capacity at the beginning and end of the year. Load factors for most technologies are presented in Table 4. As well as the traditionally calculated load factors, additional load factors are also calculated only for those schemes that have operated throughout the calendar year with

an unchanged configuration. These differences are particularly prominent for plant biomass, where the large capacity and operational changes can alter traditionally calculated load factors. Wind speeds and rainfall levels have also had a major impact on load factors.¹

Load factors in 2014, on an unchanged configuration basis, ranged from 26.4 per cent for onshore wind to 70.6 per cent for plant biomass. The load factor for hydro was 38.8 per cent, the highest since 2011.

Renewable heat

Around 20 per cent of renewable sources were used to generate heat during 2014. The four categories of renewable heat production in the United Kingdom are the direct combustion of various forms of bioenergy (94 per cent of the total), active solar heating, geothermal, and heat pumps. Together they produced energy equivalent to 2,730 thousand tonnes of oil equivalent (or 31.7 TWh) in 2014, a 4.6 per cent increase during the year. Using the RED methodology, renewable heat sources accounted for 4.9 per cent of total heat demand in 2014, a 0.7 percentage point increase on 2013.

Renewables used to generate heat have grown in recent years, following a decline up to 2005 as a result of tighter emission controls which discouraged on-site burning of biomass, especially wood waste. Policies such as the Renewable Heat Incentive (RHI) and Renewable Heat Premium Payment (RHPP) schemes are designed to support renewable heat production. Around 4.5 per cent of renewable heat during 2014 was supported through the receipt of RHI payments (123 thousand tonnes of oil equivalent, or 1,427 GWh). Domestic use of wood is the main contributor to renewables used for heat – comprising around 57 per cent of the renewable heat total. Non-domestic use of wood and wood waste, and plant biomass formed the next largest components, at around 17 per cent and 14 per cent respectively. Heat pumps (mainly in the domestic sector) contributed around 4 per cent of the renewable heat total.

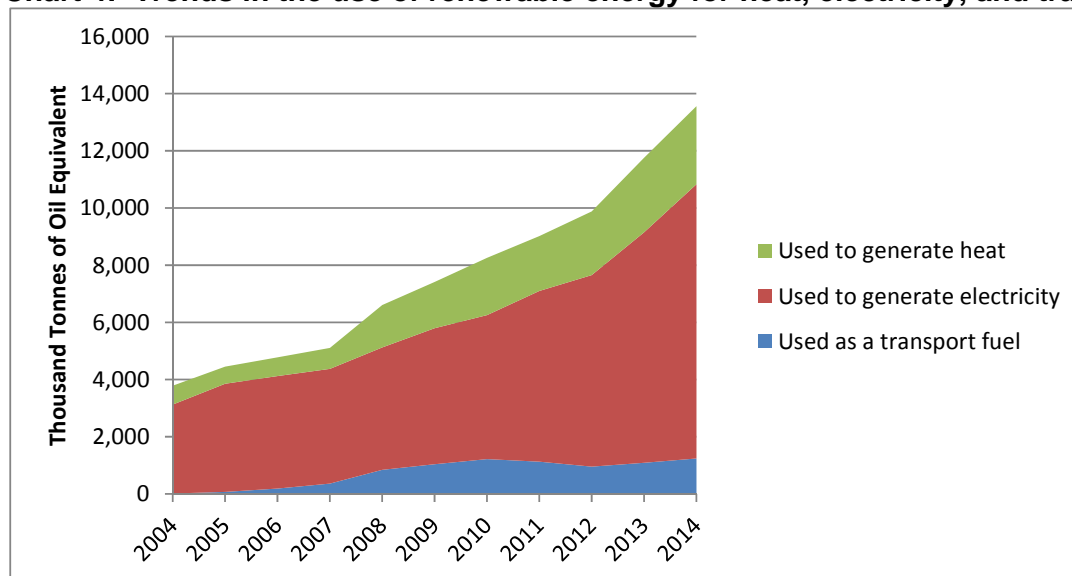
This year, there have been significant revisions to renewable heat estimates. For domestic wood, estimates were previously based on a historic survey; however, this year, a comprehensive survey was conducted to bring the estimate into line with current wood use trends. Other smaller revisions were made to renewable heat estimates and further details will be provided in the Digest of UK Energy Statistics 2015 which will be published on 30 July 2015.

Liquid biofuels for transport

Liquid biofuels for transport comprised around 9 per cent of total renewable sources. Two road transport fuels, biodiesel and bioethanol, are sold blended with diesel and petrol. Figures from HM Revenue and Customs based on road fuel taxation statistics show that 954 million litres of biodiesel and 814 million litres of bioethanol were consumed in 2014; biodiesel consumption was 24.5 per cent higher than in 2013, whilst bioethanol consumption was 0.7 per cent lower. Biodiesel has a higher energy content than bioethanol, meaning that the combined total energy content of these fuels equates to 1,243 thousand tonnes of oil equivalent, 14 per cent higher than in 2013. During 2014, biodiesel accounted for 3.4 per cent of diesel, and bioethanol 4.6 per cent of motor spirit; the combined contribution of biodiesel and bioethanol was 3.9 per cent by volume, 0.3 percentage points higher than in 2013. The Renewable Energy Directive introduced various sustainability criteria for transport biofuels; certain biofuels derived from waste products (for example, waste cooking oil) have extra weighting when monitoring progress against the transport component, but not the overall target, of the Directive.

¹ The load factors reported in Table 4 draw on data on ROCs produced by Ofgem, but at the time that this article was written the ROC data for 2014 were still provisional. In particular this can have an impact on the schemes included in the unchanged configuration definition as new data could include or remove particular schemes. This should be kept in mind if users subsequently reanalyse these results.

Chart 4: Trends in the use of renewable energy for heat, electricity, and transport



All renewable fuels

When renewables used for transport and heat are combined with the use of renewable sources for electricity generation, renewable sources accounted for 7.0 per cent of the United Kingdom's total primary energy requirements in 2014, up from 5.8 per cent in 2013. Use of non-biodegradable wastes accounted for an additional 0.5 per cent of total primary energy. The trends in the use of renewable energy for transport, heat and electricity are shown in Chart 4; data are shown in Table 5 disaggregating the totals by various technologies.

On the basis for measuring progress towards the Renewable Energy Directive (RED), provisionally in the UK during 2013, 7.0 per cent of final energy consumption was from renewable sources. This compares to 5.6 per cent in 2013, and 4.7 per cent in 2012.

In addition to the headline figure, the RED monitors three constituent parts separately, and these are shown in Table 2. It should be noted that the overall figure is not a simple calculation based around the three constituent parts. The finalised 2014 figures for all member states will be published by Eurostat during 2016. The RED introduced interim targets for member states to achieve on their route to attaining the 2020 proportion. The second interim target, across 2013 and 2014, is 5.4 per cent, and this has now been exceeded with an average of 6.3 per cent.

EU Renewable Energy Directive

In March 2007, the European Council agreed to a common strategy for energy security and tackling climate change. An element of this was establishing a target of 20 per cent of the EU's energy to come from renewable sources by 2020. During 2008, a Directive was negotiated on this basis and resulted in the agreement of country "shares" of this target being included in the final 2009 Renewable Energy Directive. For the UK, 15 per cent of **final energy consumption** - calculated on a net calorific basis (i.e. excluding the energy required to evaporate the water content from the fuel; and as opposed to the gross basis that is generally used in presenting data in *Energy Trends* and *the Digest of UK Energy Statistics*), and with a cap on fuel used for air transport - should be accounted for by energy from renewable sources. In reporting against these measures, normalised wind and hydro is used (see "the normalisation approach" box).

UK renewables policy

The United Kingdom has a number of policy measures to further increase renewables deployment. These include:

- Putting in place appropriate financial incentives to bring forward and support the take-up of renewable energy, including the “banded” Renewables Obligation (RO), the Electricity Market Reform (EMR), Feed-in Tariffs (FiTs) for small scale (under 5 MW) electricity generation, the Renewable Heat Incentive (RHI) tariff domestic and non-domestic schemes, the Renewable Heat Premium Payment Scheme (for households), and the Renewable Transport Fuel Obligation (RTFO);
- Identifying and removing the most significant non-financial barriers to renewables deployment, including measures to improve existing grid connection arrangements; and
- Overcoming supply chain blockages and promoting business opportunities in the renewables sector in the UK.

The Renewables Obligation (RO)

The Renewables Obligation² is an obligation on electricity suppliers to source a specific, and annually increasing, proportion of electricity sales from eligible renewable sources, or pay a penalty; this is intended to incentivise an increase in the level of renewable generating capacity and so contribute to our climate change targets.

The Office for Gas and Electricity Markets (Ofgem), which administers the RO, issues **Renewables Obligation Certificates** (ROCs) to qualifying renewables. These certificates may be sold by generators directly to licensed electricity suppliers or traders. ROCs can be traded separately from the electricity to which they relate. Suppliers present ROCs to Ofgem to demonstrate their compliance with the obligation.

When the Obligation was first introduced, 1 ROC was awarded for each MWh of renewable electricity generated. In 2009, ‘banding’ was introduced into the RO, meaning different technologies now receive different numbers of ROCs depending on their costs, relative market maturity, and potential for large scale deployment. A list of technologies eligible for the RO, details of the RO banding review, and the level of ROCs received, is available at:

www.gov.uk/calculating-renewable-obligation-certificates-rocs

Electricity Market Reform (EMR)

EMR will replace the RO in 2017. The reforms tackle the risks and uncertainties of the underlying economics of different forms of electricity generation by offering long term contracts for low carbon energy.

Companies will get, in effect, a fixed and secure price at which they can sell their electricity to consumers. This will allow investors to be confident about the returns of their capital in advance of investing billions into new infrastructure schemes. It will also encourage banks to lend at cheaper rates because the projects are less risky.

Further details of the reforms are available at:

www.gov.uk/government/policies/maintaining-uk-energy-security--2/supporting-pages/electricity-market-reform

Feed-in Tariffs (FiTs)

Feed-in tariffs are a financial support scheme for eligible low-carbon electricity technologies, aimed at small-scale installations with a capacity of less than 5 Megawatts (MW). FiTs support new anaerobic digestion (AD), solar photovoltaic (PV), small hydro and wind, by requiring

² The Renewables Obligation covering England and Wales and the analogous Renewables (Scotland) Obligation came into effect in April 2002. Northern Ireland introduced a similar Renewables Obligation in April 2005.

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electricity suppliers to make payments (generation tariffs) to these generators based on the number of kilowatt hours (kWh) they generate. An additional guaranteed export tariff is paid for electricity generated that is not used on site and exported to the grid. The scheme also supports micro combined heat and power installations with an electrical capacity of 2kW or less, as a pilot programme.

PV installations increased rapidly at the start of the FIT scheme. The rate of increase slowed significantly after August 2012 following tariff reductions introduced after a comprehensive review of the scheme. A depression mechanism was also introduced following the comprehensive review. This cost control mechanism allows solar PV tariffs to decrease every 3 months (depending on deployment levels). Tariffs for Non-PV technologies depress every year (with a six-month contingent depression if deployment is high in the first half of the year).

Tariff changes implemented as a result of the review only affect new entrants to the scheme. Policy information and statistical reports relating to FiTs can be found at:

www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/feed-in-tariffs-scheme and www.gov.uk/government/organisations/department-of-energy-climate-change/series/feed-in-tariff-statistics

The latest tariffs can be found on Ofgem's website:

www.ofgem.gov.uk/environmental-programmes/feed-tariff-fit-scheme/tariff-tables

Renewable Heat Incentive (RHI) and Renewable Heat Premium Payment

The RHI scheme is a government financial incentive scheme introduced to encourage a switch to renewable heating systems in place of fossil fuels. The tariff based scheme is split into two parts:

- The non-domestic RHI scheme which has been open to commercial, industrial, public sector, not for profit and community generators of renewable heat since November 2011.
- The domestic RHI scheme which opened on 9 April 2014 and is available to homeowners, private and social landlords and people who build their own homes.

Further information on this scheme, including details of the technologies, can be found at:

www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi.

The RHPP voucher scheme made one-off payments to householders to help them buy renewable heating technologies. This scheme closed on the 31 March 2014 prior to the introduction of the domestic RHI scheme. Further information on the RHPP can be found at: www.gov.uk/renewable-heat-premium-payment-scheme.

Data and statistical reports relating to both the RHI and RHPP can be found at:

www.gov.uk/government/organisations/department-of-energy-climate-change/series/renewable-heat-incentive-renewable-heat-premium-payment-statistics.

Renewable Transport Fuel Obligation (RTFO)

The Renewable Transport Fuel Obligation introduced in April 2008, placed a legal requirement on transport fuel suppliers (who supply more than 450,000 litres of fossil fuel per annum to the UK market) to ensure that 4.75 per cent (by volume) of their overall fuel sales are from a renewable source by 2013/14, with incremental levels starting from 2.5 per cent (by volume) for 2008/09. The Department for Transport publish policy and statistical reports on the scheme at:

www.gov.uk/government/publications/rtfo-guidance and www.gov.uk/government/organisations/department-for-transport/series/biofuels-statistics

Data collection

The UK collection of renewable energy statistics began in 1989, when all relevant renewable energy sources were identified and, where possible, information was collected on the amounts of energy derived from each source.

The Renewable Energy STATisticS (RESTATS) database now contains 26 years of data from 1989 to 2014 and this database has been used to provide the detailed figures on renewable sources of energy contained within this article and also within the forthcoming 2015 edition of the Digest of UK Energy Statistics, to be published on 30 July 2015.

Regional statistics

A further renewable statistics article will be produced in the September 2015 edition of Energy Trends, containing a regional breakdown of the renewable electricity generation and capacity statistics.

For further information on renewable energy statistics please contact either of the following

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Table 1: Percentages of electricity derived from renewable

	2005	2010	2011	2012	2013	2014
Overall renewables percentage – International basis (Electricity generated from all renewables except non-biodegradable wastes, as a percentage of all electricity generated in the UK)	4.3%	6.8%	9.4%	11.3%	14.8%	19.1%
Percentage on a Renewables Obligation basis (Electricity generated from renewables eligible for the Renewables Obligation as a percentage of electricity sales by licensed suppliers in the UK)	3.9%	7.0%	9.8%	11.9%	15.5%	19.8%
Percentage on a 2009 Renewable Energy Directive basis (<i>Normalised</i> hydro & wind generation combined with actual generation from other sources except non-biodegradable wastes, as a percentage of UK gross electricity consumption, calculated on a net calorific value basis)	4.1%	7.4%	8.8%	10.7%	13.8%	17.8%

Table 2: Progress against the 2009 Renewable Energy Directive

	2005	2010	2011	2012	2013	2014
Percentage of electricity from renewable sources (normalised)	4.1%	7.4%	8.8%	10.7%	13.8%	17.8%
Percentage of heating and cooling from renewable sources	0.9%	3.0%	3.4%	3.7%	4.1%	4.8%
Percentage of transport energy from renewable sources	0.3%	3.1%	2.7%	3.7%	4.4%	4.8%
Overall renewable consumption as a percentage of capped gross final energy consumption using net calorific values (normalised) [not directly calculated from the three percentages above]	1.4%	3.8%	4.2%	4.7%	5.6%	7.0%

Table 3: Capacity of, and electricity generated from, renewable sources

	2012	2013	2014
Installed Capacity (MWe)			
Wind:			
Onshore	5,904	7,519	8,486
Offshore	2,995	3,696	4,501
Shoreline wave / tidal	7	7	9
Solar photovoltaics	1,756	2,851	5,377
Hydro:			
Small scale	218	231	246
Large scale (1)	1,477	1,477	1,477
Bioenergy:			
Landfill gas	1,037	1,043	1,051
Sewage sludge digestion	204	198	208
Energy from waste (2)	517	550	696
Animal Biomass (non-AD)(3)	111	111	111
Anaerobic digestion	119	164	216
Plant Biomass (4)	1,171	1,955	2,244
Total bioenergy and wastes	3,159	4,021	4,526
Total	15,515	19,801	24,623
Co-firing (5)	204	35	16
Generation (GWh)			
Wind:			
Onshore (6)	12,232	16,950	18,611
Offshore	7,603	11,472	13,404
Shoreline wave / tidal (7)	4	6	2
Solar photovoltaics	1,352	1,989	4,050
Hydro:			
Small scale (6)	654	676	832
Large scale (1)	4,631	4,026	5,053
Bioenergy:			
Landfill gas	5,145	5,160	5,045
Sewage sludge digestion	719	761	846
Biodegradable energy from waste (8)	1,774	1,649	1,950
Co-firing with fossil fuels	1,783	309	133
Animal Biomass (3)	643	628	614
Anaerobic digestion	501	722	1,009
Plant Biomass (4)	4,083	8,929	13,105
Total bioenergy	14,648	18,159	22,702
Total generation	41,124	53,277	64,654
Non-biodegradable energy from wastes (9)	1,429	1,481	1,951
Total generation from sources eligible for the Renewable Obligation (10)	33,406	44,948	52,745

(1) Excluding pumped storage stations. Capacities are as at the end of December.

(2) Includes capacity for municipal solid waste, waste tyres, hospital waste, and general industrial waste.

(3) Includes the use of poultry litter and meat & bone.

(4) Includes the use of straw combustion and short rotation coppice energy crops.

(5) This is the proportion of fossil fuelled capacity used for co-firing of renewables based on the proportion of generation accounted for by the renewable source.

(6) Actual generation figures are given where available, but otherwise are estimated using a typical load factor or the design load factor, where known.

(7) Includes electricity from the EMEC test facility.

(8) Biodegradable part only.

(9) Non-biodegradable part of municipal solid waste plus waste tyres, hospital waste and general industrial waste.

(10) See page 54 for definition and coverage.

Table 4: Load factors for renewable electricity generation

	Per cent		
	2012	2013	2014
Load factors - based on average beginning and end of year capacity (1)			
Wind	29.4	32.3	30.2
Onshore wind	26.4	28.9	26.5
Offshore wind	35.8	39.1	37.3
Marine energy (wave and tidal stream)	8.3	9.6	3.2
Solar photovoltaics	11.2	9.9	11.2
Hydro	35.7	31.6	39.2
Hydro (small scale)	35.5	34.4	39.8
Hydro (large scale)	35.7	31.1	39.1
Bioenergy (excludes cofiring and non-biodegradable wastes)	46.9	56.8	60.3
Landfill gas	56.1	56.6	55.0
Sewage sludge digestion	40.7	43.2	47.5
Energy from waste (3)	39.5	35.3	35.8
Animal Biomass (4)	66.2	64.9	63.4
Anaerobic Digestion	60.3	58.3	60.5
Plant Biomass (5)	40.1	65.2	71.2
All renewable technologies (excluding cofiring and non-biodegradable wastes)	32.3	34.3	33.1
Load factors - for schemes operating on an unchanged configuration basis (2)			
Wind	28.1	31.0	30.2
Onshore wind	25.6	27.9	26.4
Offshore wind	34.1	37.6	37.7
Hydro	35.3	31.5	38.8
Hydro (small scale)	36.7	35.2	39.6
Hydro (large scale)	35.1	31.2	38.8
Bioenergy (excludes cofiring and non-biodegradable wastes)	63.5	59.9	65.2
Landfill gas	58.8	57.0	55.3
Sewage sludge digestion	48.0	50.2	49.9
Energy from waste (3)	40.1	34.7	34.8
Animal Biomass (4)	66.2	70.4	63.4
Anaerobic Digestion	60.6	60.7	59.3
Plant Biomass (5)	67.2	61.6	70.6
All renewable technologies (excluding cofiring and non-biodegradable wastes)	36.2	35.5	39.3

(1) Calculated as the average hourly quantity of electricity generated as a percentage of the average capacity at the beginning and end of the year.

(2) Load factors calculated as above but restricted to those schemes that have operated throughout the calendar year with an unchanged configuration.

(3) Calculation is based on biodegradable energy from waste generation but all energy from waste capacity; this reduces the load factor.

(4) Includes the use of poultry litter and meat & bone.

(5) Includes the use of straw combustion and short rotation coppice energy crops.

Table 5: Renewable sources used to generate electricity and heat, and for transport fuels ⁽¹⁾⁽²⁾

Thousand tonnes of oil equivalent

	2012	2013	2014
Used to generate electricity (3)			
Wind:	1,705.5	2,443.8	2,752.9
Onshore	1,051.8	1,457.4	1,600.3
Offshore	653.8	986.4	1,152.6
Shoreline wave/Tidal (4)	0.3	0.5	0.2
Solar photovoltaics	116.3	171.1	348.2
Hydro:	454.4	404.3	506.0
Small scale	56.2	58.1	71.5
Large scale (5)	398.2	346.2	434.5
Bioenergy:			
Landfill gas	1,687.6	1,692.4	1,654.6
Sewage sludge digestion	235.9	249.6	277.4
Municipal solid waste combustion (6)	638.5	564.7	551.1
Co-firing with fossil fuels	400.5	53.7	25.1
Animal Biomass (7)	225.0	226.4	224.8
AD	164.3	236.8	330.8
Plant Biomass (8)	1,062.3	2,009.1	2,912.9
Total bioenergy	4,414.1	5,032.7	5,976.8
Total	6,690.6	8,052.3	9,584.1
Non-biodegradable wastes (9)	520.3	513.1	557.4
Used to generate heat			
Active solar heating	47.8	50.1	52.1
Bioenergy:			
Landfill gas	13.6	13.6	13.6
Sewage sludge digestion	63.7	68.3	67.7
Wood combustion - domestic	1,392.3	1,626.7	1,554.4
Wood combustion - industrial	289.5	342.9	459.4
Animal Biomass (10)	31.5	29.1	34.5
AD	14.5	18.7	43.0
Plant Biomass (11)	276.6	340.9	373.1
Municipal solid waste combustion (6)	29.8	30.1	23.3
Total bioenergy	2,111.5	2,470.2	2,569.1
Geothermal aquifers	0.8	0.8	0.8
Heat Pumps (12)	68.4	88.2	107.6
Total	2,228.4	2,609.3	2,729.6
Non-biodegradable wastes (9)	144.1	155.0	159.3
Renewable sources used as transport biofuels			
as Bioethanol	436.9	462.2	458.8
as Biodiesel	520.9	629.4	783.8
Total	957.8	1,091.6	1,242.7
Total use of renewable sources and wastes			
Solar heating and photovoltaics	164.0	221.2	400.3
Onshore wind	1,051.8	1,457.4	1,600.3
Offshore wind	653.8	986.4	1,152.6
Shoreline wave/Tidal (4)	0.3	0.5	0.2
Hydro	454.4	404.3	506.0
Bioenergy:	6,525.6	7,502.8	8,545.9
Geothermal aquifers	0.8	0.8	0.8
Heat Pumps	68.4	88.2	107.6
Transport biofuels	957.8	1,091.6	1,242.7
Total	9,876.9	11,753.2	13,556.4
Non-biodegradable wastes (9)	664.4	668.1	716.7
All renewables and wastes (13)	10,541.2	12,421.3	14,273.1

(1) Includes some waste of fossil fuel origin.

(2) See paragraphs 6.39 to 6.74 of the 2014 Digest of UK Energy Statistics for technical notes and definitions of the categories used in this table.

(3) For wind, solar PV and hydro, the figures represent the energy content of the electricity supplied but for biomass the figures represent the energy content of the fuel used.

(4) Includes the EMEC test facility

(5) Excluding pumped storage stations.

(6) Biodegradable part only.

(7) Includes electricity from poultry litter combustion and meat & bone combustion

(8) Includes electricity from straw and energy crops.

(9) Non-biodegradable part of municipal solid waste plus waste tyres, hospital waste, and general industrial waste.

(10) Includes heat from farm waste digestion, meat and bone combustion and sewage sludge combustion.

(11) Includes heat from straw, energy crops, paper and packaging.

(12) Includes heat pumps for the first time

(13) The figures in this row correspond to the total demand and total supply figures in Tables 6.1, 6.2 and 6.3.