Analysis of Feed-in Tariff generation data

Introduction

The Feed-in Tariff scheme (FiTs) was launched in April 2010 and is 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 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 2 kW or less.

Since the start of the scheme DECC has published timely data on the number and capacity of installations installed under the scheme. However, little data was available centrally on the actual electricity generated by the installations. In 2013 DECC obtained the meter readings from the energy suppliers for each FIT installation in Great Britain. The data collected covered meter readings submitted in the first 3 years of the FIT scheme (i.e. up 31st March 2013). Meter readings are usually sent to the energy suppliers every 3 months so this resulted in the collection of over 1.5 million meter readings.

The initial analysis carried out on the meter readings produced annual load factors for each technology for FIT year 2 and FIT year 3 (i.e. 2011/12 and 2012/13 financial years) . Analysis has not been carried out for FIT year 1 as the number of installations running for the whole of the year is very small.

The data should be treated as provisional, although basic QA has been carried out, a more detailed look at the data needs to carried out, especially on the larger schemes as their data has a bigger impact on the weighted mean load factor.

Methodology

The meter readings provided were matched to the Ofgem's Central FIT Register (CFR). This contains information on the size and technology of the scheme as well as details such as location.

In order to calculate a load factor for the whole year a meter reading would be required in March of the relevant years (for example for FIT year 3 a meter reading would be required in March 2012 and March 2013). As generators can submit meter readings during any month of the year, selecting just those with March meter readings removes a large number of installations from the analysis. However, given the large number of installations registered on the FIT scheme the number of schemes remaining still provided useful analysis.

Table 1 shows how many installations were registered on the scheme at the beginning of FIT year 2 and how many installations had meter readings in March of the relevant years. Table 2 shows the same data for FIT year 3.

Table 1: Installations included in analysis by technology – FIT year 2

Technology	Commissioned by 1st April 2011	Generation data reported[1]	Valid load factor	% remaining in analysis
Anaerobic Digestion	12	4	4	33
Hydro	226	96	87	38
Micro CHP	183	48	48	26
Solar PV	39,715	12,424	12,165	31
Wind	1602	578	560	35

1 Meter reading reported in March 2011 and March 2012.

Table 2: Installations included in analysis by technology – FIT year 3

Technology	Commissioned by 1st April 2012	Generation data reported[2]	Valid load factor	% remaining in analysis
Anaerobic Digestion	25	16	10	40
Hydro	328	143	127	39
Micro CHP	383	80	80	21
Solar PV	295,378	109,104	107,829	37
Wind	3,068	1,478	1,443	47

2 Meter reading reported in March 2012 and March 2013.

Load factors were calculated in the usual way by comparing generation and capacity. However, for most of the installations the meter readings were not taken exactly 12 month apart therefore the load factor was calculated by taking the reported generation and dividing by the installed capacity multiplied by the number of hours that the installations was operating for. Rather than multiplying by the standard 8,760 hours.

Extreme values were calculated for some installations which can have a large impact when calculating the mean. As such, for each technology a filter was created to remove installations that had extreme values recorded. Table 3 sets out the limits within which the load factor must fall to be included in the analysis. This resulted in the removal of a small number of installations. In 2011/12 286 installations (2%) were removed due to invalid load factors and in 2012/13 1,332 installations (1%) were removed. The 'valid load factor' column in tables 1 and 2 show how many installations were included in the final analysis for each technology.

Table 3: Load factor limits applied to remove extreme values from the analysis

Technology	Lower limit (%)	Upper limit (%)
Anaerobic Digestion	1	100
Hydro	1	90
MicroCHP	1	100
Solar PV	1	25
Wind	1	60

Main Findings

Tables 4 and 5 give the median load factors and the associated percentiles for each technology. These percentiles are also shown in chart 1. Anaerobic digestion is not shown given the small number of installations but had a median load factor of 59.3 in 2012/13.

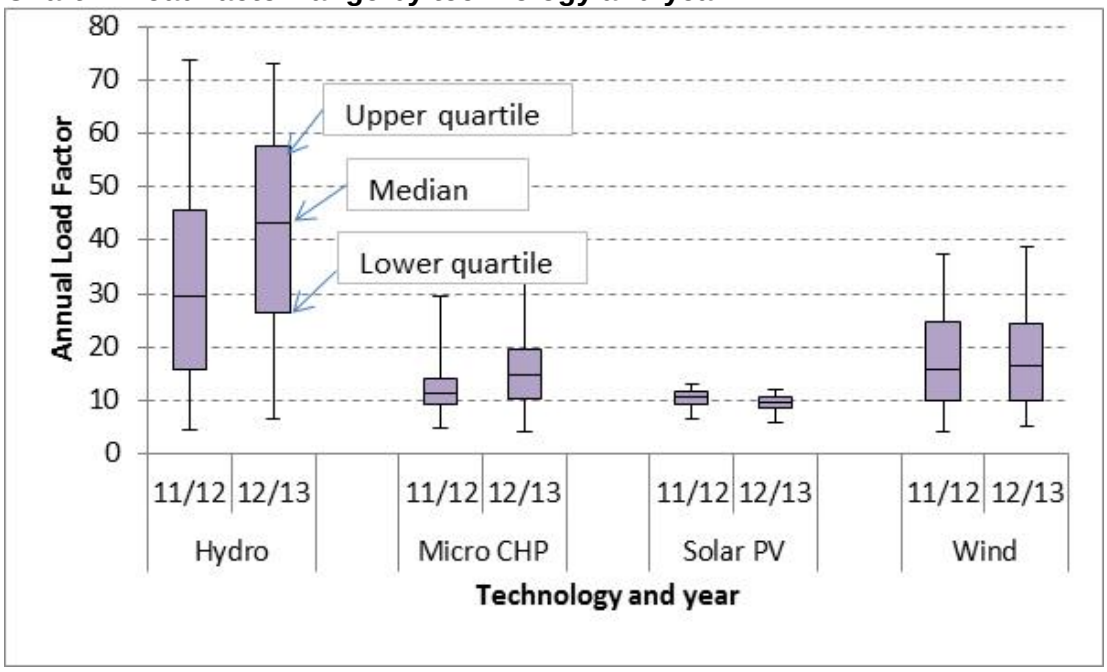
Table 4: FIT Year 2 (2011/12) load factors by technology

		Percentile				
Technology	Count	5th	25th	50th (median)	75th	95th
Hydro	87	4.6	15.9	29.6	45.5	92.9
MicroCHP	48	5.0	9.4	11.2	14.1	29.6
Solar PV	12,165	6.7	9.3	10.5	11.5	13.1
Wind	561	4.3	10.1	15.9	24.7	37.4

Table 5: FIT Year 3 (2012/13) load factors by technology

		Percentile				
Technology	Count	5th	25th	50th (median)	75th	95th
Hydro	127	6.7	26.5	43.1	57.5	72.9
MicroCHP	80	4.2	10.4	14.9	19.4	32.3
Solar PV	107,829	6.0	8.6	9.6	10.5	11.9
Wind	1,443	5.1	10.1	16.3	24.4	38.6

Chart 1: Load factor range by technology and year



Hydro installations had a large range in load factors, although the small numbers mean that these load factors should be treated with caution (along with MicroCHP figures).

The range of load factors for Solar PV schemes was a lot smaller. In 2012/13 90 per cent of schemes had a load factor between 6 and 11.9 per cent and 50 per cent of the schemes

had a load factor between 8.6 and 10.5 per cent. The median load factor in 2011/12 was slightly higher than that seen in 2012/13 (10.5 per cent compared to 9.6 per cent). This ties in with the weather statistics published by DECC[1] where in 2011/12 the average number of sun hours per month was 4.5 compared to 3.7 in 2012/13.

Wind schemes had a larger range with 90 per cent of the load factors falling between 5.1 per cent and 38.6 per cent in 2012/13. The load factors for wind were slightly higher in 2012/13 than in 2011/12.

Table 6 gives the mean load factor for each technology. A weighted mean was also calculated (where the load factor was weighted by the installed capacity).

Table 6: Mean load factor by technology

	2011/12		2012/13	
Technology	Mean	Weighted mean	Mean	Weighted mean
Anaerobic Digestion	-	-	56.5	59.6
Hydro	32.7	25.0	40.9	46.1
MicroCHP	13.6	13.6	15.9	16.1
Solar PV	10.4	10.3	9.5	9.2
Wind	18.0	18.3	18.3	22.3

The median and mean load factors are similar for Solar PV (9.6 and 9.5 respectively in 2012/13) suggesting the data have a normal distribution. The weighted mean for solar PV is also similar to the unweighted mean suggesting large and small sites have similar load factors.

For wind in 2012/13 the weighted mean was higher than the unweighted mean suggesting that larger wind site had higher load factors. This was also true in 2011/12 but the difference between the two measures was very small, largely because the number of larger wind schemes in the analysis was a lot smaller in this year.

Checking how representative the sample is

As seen in tables 4 and 5 the median load factor for Solar PV was almost 1 per cent lower in 2012/13 compared to 2011/12. The number of schemes in the analysis increase substantially between the 2 years and whilst the findings tie-in with the weather statistics it is possible that the change in load factor is due to schemes installed at a later date being installed in less favourable locations. Too check whether this is the case analysis was carried out just on schemes that were present in the analysis for both years. These schemes had a median load factor of 10.5 per cent in 2011/12 and 9.5 per cent in 2012/13, which is in-line with the overall analysis.

Table 7 below shows the proportion of installations from each region included in the analysis. There is a good representation of schemes from all the regions, although the South-West has a slightly higher proportion of their schemes included in the analysis (46 per cent were included in the 2012/13 figures compared to a national average of 37 per cent). The East Midlands and Yorkshire and the Humber were slightly under-represented.

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

Table 7: Regional distribution

Region	Percent from each region included in analysis	
	2011/12	2012/13
East Midlands	28%	28%
East of England	28%	32%
London	29%	36%
North East	28%	32%
North West	32%	35%
South East	34%	38%
South West	37%	46%
West Midlands	34%	34%
Yorkshire and The Humber	19%	28%
Scotland	38%	43%
Wales	30%	43%
Unknown	6%	12%
Total	**31%**	**37%**

Further Analysis

Quarterly load factors for Solar PV installations have been calculated and can be found on the following webpage www.gov.uk/government/collections/feed-in-tariff-statistics under 'Analysis'.

The analysis of FIT generation data can be expanded further and it is planned that regional load factors will be produced. We also intend to use the load factors calculated to produce annual generation figures for each technology.

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