

Estimating generation from Feed in Tariff installations

Introduction

Since its introduction, in April 2010, the total capacity of installations confirmed under the Great Britain (GB) Feed in Tariff (FiT) scheme has risen to 2.1 GW (as at the end of 2013 Q3), 11 per cent of all UK renewable electricity capacity (19.1 GW). With this contribution to the UK's energy mix, it is essential, therefore, that the output of these installations (in terms of generation, consumption and exports) is being fully captured in DECC's energy statistics. With published data limited in its coverage, frequency and timeliness, DECC has produced a method to estimate generation, consumption and exports for these installations. This article outlines the data sources, methods and assumptions used in order to produce these figures.

Data source

Data on generation and exports from FiT installations are currently collected on a financial year basis by Ofgem from FiT licensees. The data are published in Ofgem's annual FiT report¹, as well as in DECC's annual FiT generation table², around nine months following the end of the financial year. Information is not available on sector or location. Furthermore, generation and exports are included only for those installations that received payments during that year, with data omitted for many installations that were operational during that period³. In order to produce comprehensive quarterly figures, including sector and regional breakdowns, for a better assessment of renewable generation, DECC has to estimate generation for FiT installations.

DECC publishes data on installations confirmed on the Central Feed in Tariff Register (CFR) around one month in arrears⁴. The underlying data, provided by Ofgem, includes information, at installation level, on technology (solar photovoltaics, hydro, wind, anaerobic digestion and micro CHP), capacity, location, sector (domestic, community, commercial and industrial), and commissioning date. This is the main data source used for estimating generation from FiT schemes.

Methodology summary

Initially, DECC estimated FiTs generation at technology level, by applying monthly technology specific load factors to an average of cumulative capacity commissioned at the start and end of the month. However, given the speed of uptake, and the availability of site level information, a more robust approach would be to estimate generation at site level. The overall approach is therefore to estimate monthly generation for individual installations on the CFR, with regard to the hours available for operation and the typical load factor, given the technology and location of each installation. From this, an estimate is made of how much of this generation is consumed by each sector and how much is exported to the public distribution system (PDS).

Generation methodology

For each installation, the maximum amount of generation in each month (in kWh) that could be produced is calculated by multiplying the installed capacity (in kW) by the maximum number of operational hours for each month, given by the number of hours in one day multiplied by the number of days in the month (for example August would be 24*31). This is only calculated for months following a site's commissioning date, with the maximum number of operational hours for the first month of operation adjusted accordingly, by deducting the commissioning date from the end-date of the month. To obtain typical monthly generation, maximum operational generation (as estimated in the first step) is adjusted to account for the typical availability and performance (or load factor) of each technology.

¹ Available at: www.ofgem.gov.uk/environmental-programmes/feed-tariff-fit-scheme/feed-tariff-reports/annual-reports

² Available at: www.gov.uk/government/statistical-data-sets/feed-in-tariff-generation-statistics

³ Further information on this can be found in DECC's analysis of the 2010/11 FiT generation data, available at: www.gov.uk/government/publications/feed-in-tariff-generation-data-2010-to-2011

⁴ Available at: www.gov.uk/government/statistical-data-sets/monthly-central-feed-in-tariff-register-statistics

Load factors

Load factors for individual installations are not available. Therefore, technology and, where appropriate, region/month specific load factors are estimated (since several of the technologies' performance will depend on weather conditions, which will vary from location to location and month to month). DECC is continuing to review the load factor methodologies used; the current methods are outlined below, with the latest values given in Annex 1.

For solar photovoltaics, a typical annual load factor, for the UK, of 9.7 per cent is assumed⁵. To allow for monthly variation in performance (higher in summer months, lower in the winter), monthly load factors derived from similar scale (<= 5 MW) solar PV installations accredited under the Renewables Obligation (RO)⁶ are benchmarked to the annual load factor. Whilst solar incidence (and therefore solar PV performance) will vary across Great Britain, the number of RO installations is not enough to provide robust load factors at a regional level.

For wind and hydro, monthly load factors are again derived from similar scale installations accredited under the RO. In these cases, there are enough installations accredited under the RO in each of the three GB countries to provide robust load factors for each.

For anaerobic digestion and microCHP, generation is not weather or location dependent, with little variation in load factors across the year or country. Fixed load factors (initially those used in DECC's FiTs model), reviewed on an annual basis, are applied to generation from these installations.

Consumption and exports

DECC's energy balances also require data on the consuming sector of all electricity supplied, and any electricity transferred from 'auto-generators' (organisations primarily generating for use on site) to the public distribution system (PDS, the 'grid'). This applies to FiT schemes, where the generation is either consumed by the site (e.g. household) or exported to the grid.

With an estimate of generation for each of the four consuming sectors already produced (as above), to assess how much of this is consumed by the sector, and how much is exported, an estimate of the share of generation exported is required. From Ofgem's annual actual data on generation and exports, the share of exports can be calculated (by dividing exports by generation) for each tariff code,

The export shares, by tariff code, are then applied to estimated generation, by tariff code and sector. Upon aggregation, this gives, for each consuming sector, a split of generation between consumption and exports.

Other assumptions

In the CFR, of the 2.1 GW total capacity (424,000 installations) approximately 7.5 per cent (158 MW / 5,624 installations) do not have location information⁷. Assumptions therefore need to be made in terms of the choice of regional load factor for these installations, and ultimate allocation of generation to country.

For solar PV, anaerobic digestion and microCHP, only one load factor is currently used across all countries, so there is no choice of load factor to be made for schemes without a region. For wind and hydro, however, it is assumed that the majority of such installations will be located in Scotland, so the Scottish load factors are used. Generation for solar PV, wind, anaerobic digestion and microCHP schemes without location information is apportioned across the regions, according to the region's share of quarterly generation for that technology, with all hydro allocated to Scotland.

⁵ Used in DECC's Feed in Tariff model

⁶ Derived by comparing generation (via RO certificates issued) with capacity. Certificates issued data can be found at: www.renewablesandchp.ofgem.gov.uk/Public/ReportManager.aspx?ReportVisibility=1&ReportCategory=0

⁷ See DECC's sub-regional Feed in Tariff statistics, at: www.gov.uk/government/statistical-data-sets/sub-regional-feed-in-tariffs-confirmed-on-the-cfr-statistics

Special feature – FiT generation methodology

Publications

Generation data from FiTs schemes feed into a number of DECC's electricity and renewables tables and publications, including:

Energy Trends table ET 6.1 - quarterly renewable electricity generation, by technology and UK country (internet only)⁸

Energy Trends article, "Renewable electricity in Scotland, Wales, Northern Ireland and the regions of England" - annual renewable electricity generation, by technology and UK region⁹.

Digest of UK Energy Statistics (DUKES), table DUKES 5.3 – electricity supply and demand balance, disaggregated by PDS/auto-generation and consuming sector. FiTs schemes represent the majority of the auto-generators' domestic sector consumption figure (543 GWh in 2012), while FiTs exports are included within the 16,669 GWh (in 2012) of transfers to the PDS.¹⁰

Revisions

The CFR is constantly being retrospectively updated with new schemes, which can result in revisions to previous months' data. For the quarters beyond the latest calendar year published in DUKES, these revisions can be incorporated. However, DECC's revisions policy decrees that any revisions prior to this (and no further than four years) can only be made once a year, when the next edition of DUKES is published.

DECC is currently developing a data collection of actual quarterly generation/exports data for individual installations, for the preceding financial year, around six months in arrears. It is intended that this data, when available, will replace the estimated generation data in DECC's publications, subject to the revisions policy outlined above, with commencement of this announced in a future edition of Energy Trends and on the FiTs page of the DECC statistics website.

Latest statistics

During quarter 3 2013, FiTs installations accounted for 633 GWh of generation, with 458 GWh from solar PV, 77 GWh from wind, 69 GWh from anaerobic digestion, 30 GWh from hydro and 0.2 GWh from microCHP (see chart 1). This represented 6.1 per cent of all renewable electricity generation (10.3 TWh), and 0.8 per cent of total generation (78,203 GWh). Of this 633 GWh of generation, 207 GWh was consumed in the domestic sector, 200 GWh in the commercial sector, 41 GWh in the industrial sector, 7.5 GWh in the community sector, while 177 GWh was exported to the grid (see chart 2).

Chart 1: FiT Generation, by technology, 2013 Q3

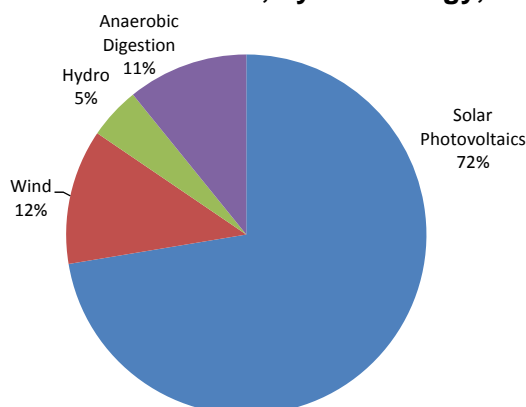
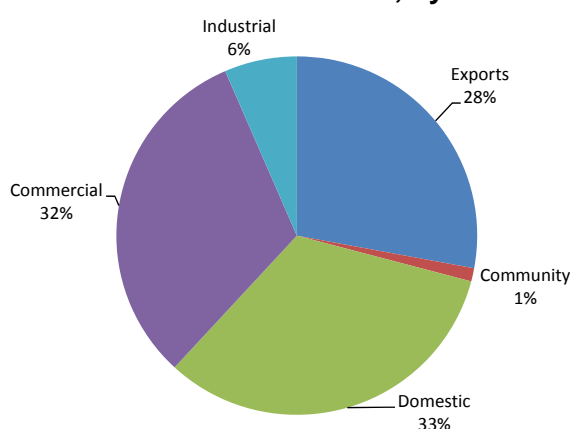


Chart 2: FiT Generation, by user 2013 Q3



⁸ Available at: www.gov.uk/government/publications/renewables-section-6-energy-trends

⁹ Latest edition (September 2013) available at: www.gov.uk/government/publications/energy-trends-september-2013-special-feature-articles-renewable-electricity-in-scotland-wales-northern-ireland-and-the-regions-of-england-in-201

¹⁰ Available at: www.gov.uk/government/publications/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes

Annex 1 – Range of Monthly Load Factors (2012) used in estimating Feed in Tariff generation

	England	Scotland	Wales	No location
Solar photovoltaics	1.4% - 17%	1.4% - 17%	1.4% - 17%	1.4% - 17%
Wind	15.5% - 35.2%	18.4% - 45.3%	15.2% - 33.0%	18.4% - 45.3%
Hydro	25.4% - 44.9%	19.0% - 58.9%	16.5% - 59.1%	19.0% - 58.9%
Anaerobic digestion	63%	63%	63%	63%
MicroCHP	15%	15%	15%	15%

User feedback

We welcome all feedback from users; therefore, if you have any comments or queries regarding the methodology used in producing these estimates, please contact James Hemingway using the contact details below.

James Hemingway

Energy Statistics

Tel: 0300 068 5042

E-mail: James.Hemingway@decc.gsi.gov.uk