Feed-in Tariff load factor analysis

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Key headlines

Median load factors for solar, wind and hydro installations decreased in 2024/25. Unfavourable weather conditions were the main driver, with less wind, sunshine and rainfall this financial year.

The median load factor for solar photovoltaic (PV) decreased to 9.2 per cent in 2024/25. This is the lowest recorded median in the time series. Average sun hours in 2024/25 were down on the previous year and were at their lowest since 2012/13.

The median load factor for wind was 18.7 per cent in 2024/25, a 1.4 percentage points decrease with respect to 2023/24 due in part to a fall in average wind speed.

Like last year, **South West and East of England had the highest median load factor for solar PV,** while **Scotland had the highest wind load factor** for the ninth year in a row. Wind load factors exhibit greater regional variability than solar load factors.

Background

This article analyses load factors of small-scale renewable installations accredited under the Feed-in Tariff (FiT) scheme[1]. The Feed in Tariff scheme supports small-scale renewable generation, up to 5 MW. See Appendix 1 for more details. Around 25 per cent of solar, 2 per cent of wind, 12 per cent of hydro and 46 per cent of anaerobic digestion capacity is supported by FiTs.

Load factors are a measure of the efficiency of electricity generation. A load factor is the amount of electricity generated by a system over a certain period expressed as a proportion of its maximum possible output.

For each financial year since 2011/12 (the second year of the FiT scheme), we provide an update on national load factors for all technologies, as well as regional load factors for solar PV and Wind installations, and quarterly national load factors for solar PV, Wind and Hydro schemes. Detailed tables are available as an Excel workbook, at: https://www.gov.uk/government/publications/quarterly-and-annual-load-factors

In the financial year 2024/2025, 285,443 installations had a valid annual load factor and were included in the analysis. This is a third of all FiT installations, which is broadly in line with the sample size previous years. See the Technical Notes in Appendix 1 for more details.

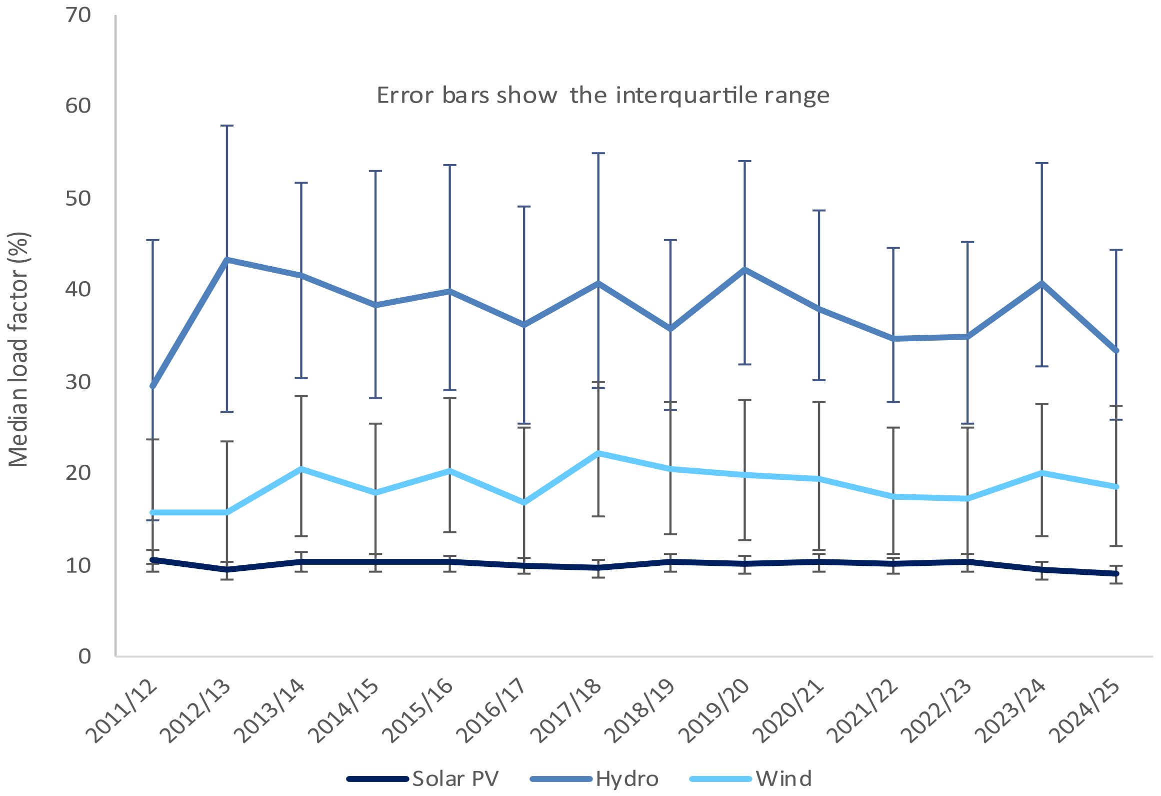
Results

Chart 1 below shows the annual load factors for the leading technologies (hydro, wind, and solar PV) over the FiT years. We present load factors on a line plot for each technology and year, displaying their median value and the interquartile ranges as a measure of dispersion around it.

The plot highlights the differences between the technologies: although primary renewables are all dependent on weather conditions, the distribution of load factors around their median repeats across the years and has a different spread for each technology. While load factors for solar PV are more concentrated, hydro and wind load factors exhibit a wider spread and a wider range of values can be observed. Fluctuating sample sizes may also influence the distribution year on year; solar PV has the largest sample size each year.

[1] More details here: www.ofgem.gov.uk/environmental-and-social-schemes/feed-tariffs-fit

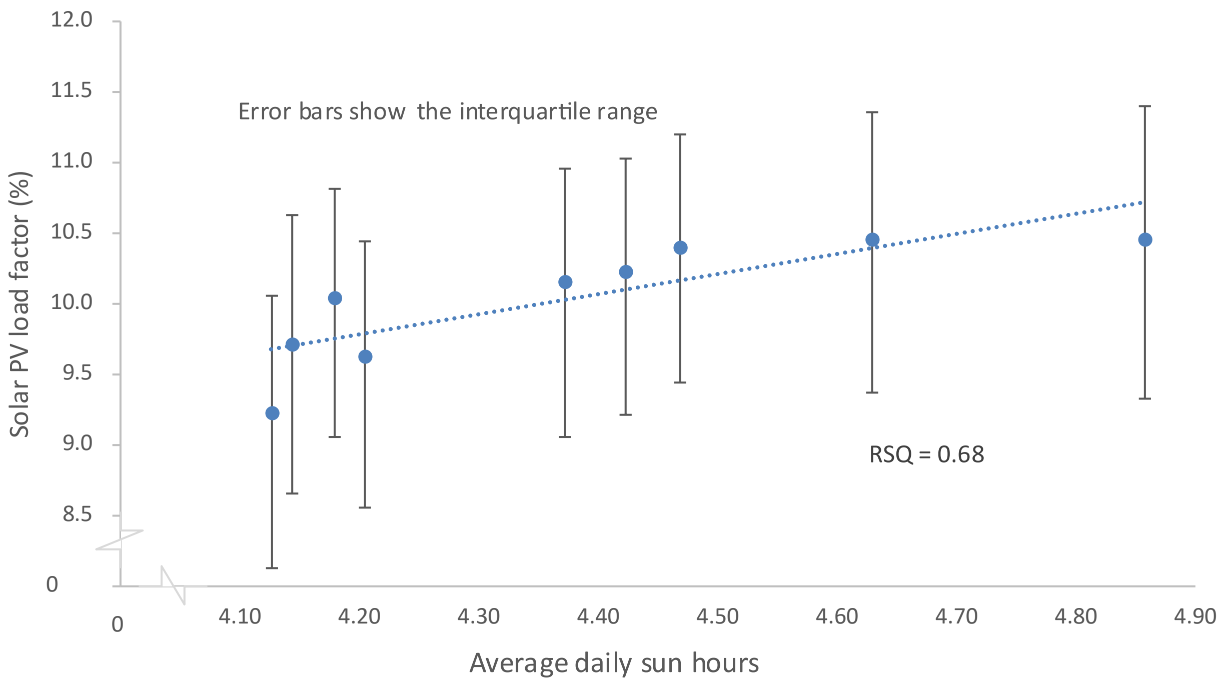
Chart 1: Hydro, Wind and Solar PV load factors, 2011/12-2024/25



The median load factor for solar PV in 2024/25 was 9.2 per cent, 0.4 percentage points lower than in 2023/24; this was due to shorter average sun hours which were down by around 2 per cent over the course of the year and at their lowest level since 2012/13. The weighted mean was 8.3 per cent, also down on last year. The weighted mean is typically lower than the median, but the difference is small in relative terms; this suggests that the efficiency of solar PV installations is less dependent on their size than other technologies, although small scale installations (less than 50 kW) account for around two thirds of accredited capacity and may skew mean load factors towards the lower end.

The load factors for solar PV show a close relationship with average sunlight hours, with patterns repeating in the two series (see Chart 2 below).

Chart 2: Solar PV load factors and average sun hours, 2016/17-2024/25



In 2024/25, the median load factor for Wind was 18.7 per cent, a 1.4 percentage points decrease on 2023/24, due in part to a 2.5 per cent decrease in average wind speeds over the year. As in previous years, the weighted mean of the load factor for wind is notably higher than the median and tends to be more closely related to the average wind speeds. In 2024/25 the weighted mean was 24.6, a small decrease on 25.2 in 2023/24. The difference between the median and weighted mean generally reflects that larger wind farms are more efficient, and therefore skew the mean load factor towards higher values.

There is a relationship between annual wind speed and wind load factors, but it is weaker than the relationship between solar PV and sun hours. Load factors for wind vary more than those for solar PV throughout the year, with percentiles spreading further away from the median. It is also worth noting that wind speeds can vary considerably by location and by height above the ground, making an accurate nationwide analysis more difficult to achieve.

The median load factor for hydro in 2024/25 was 33.6 per cent, a decrease of 7.2 percentage points on the previous year, mostly as a result of a 12 per cent decrease in average rainfall. Load factors for hydro tend to vary a lot within the sample.

The median load factor for anaerobic digestion was 74.8 per cent in 2024/25. This is the lowest in the time series, and possibly down to the lower level of coverage for this year- only 41 per cent of installations have been included this year compared to over half in the previous three years.

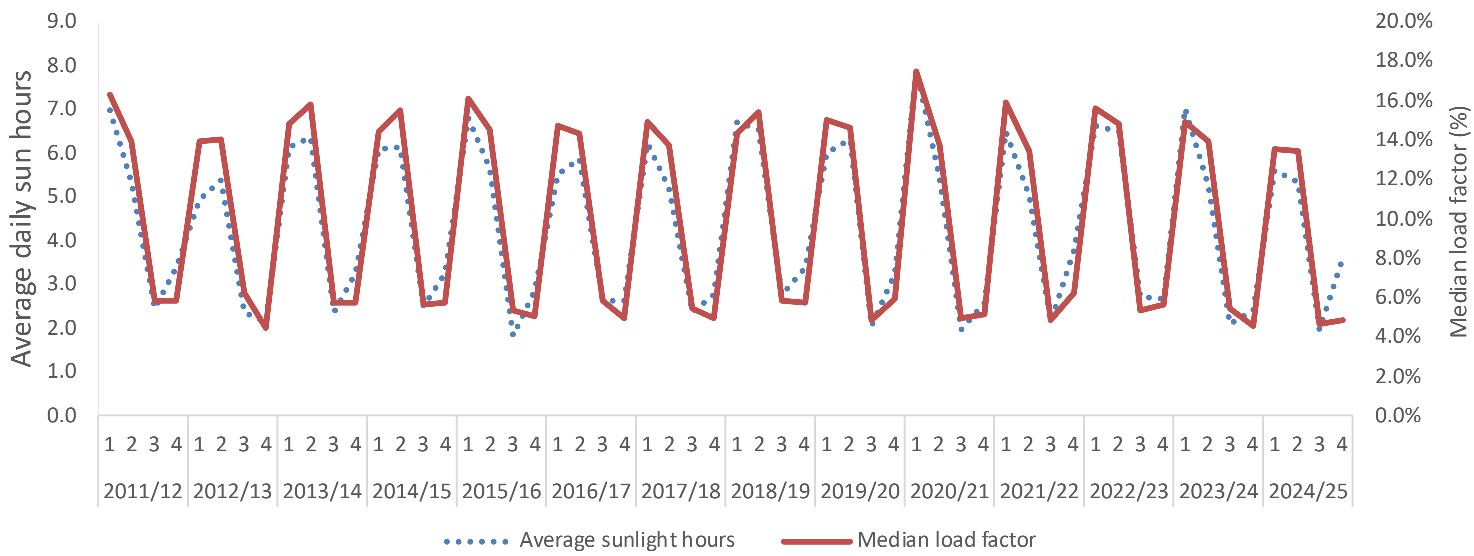
Quarterly load factors

The load factors for solar PV, wind and hydro follow a seasonal pattern due to weather conditions, with high load factors for hydro and wind being associated with wetter, windier autumn and winter months, and solar PV load factors being higher in spring and summer months.

Chart 3 below shows quarterly load factors for Solar PV compared to average sunlight hours. As expected, there is a strong association between sunnier seasons and higher load factors. Solar PV generation is boosted when the sun shines for longer and is weaker in winter months.

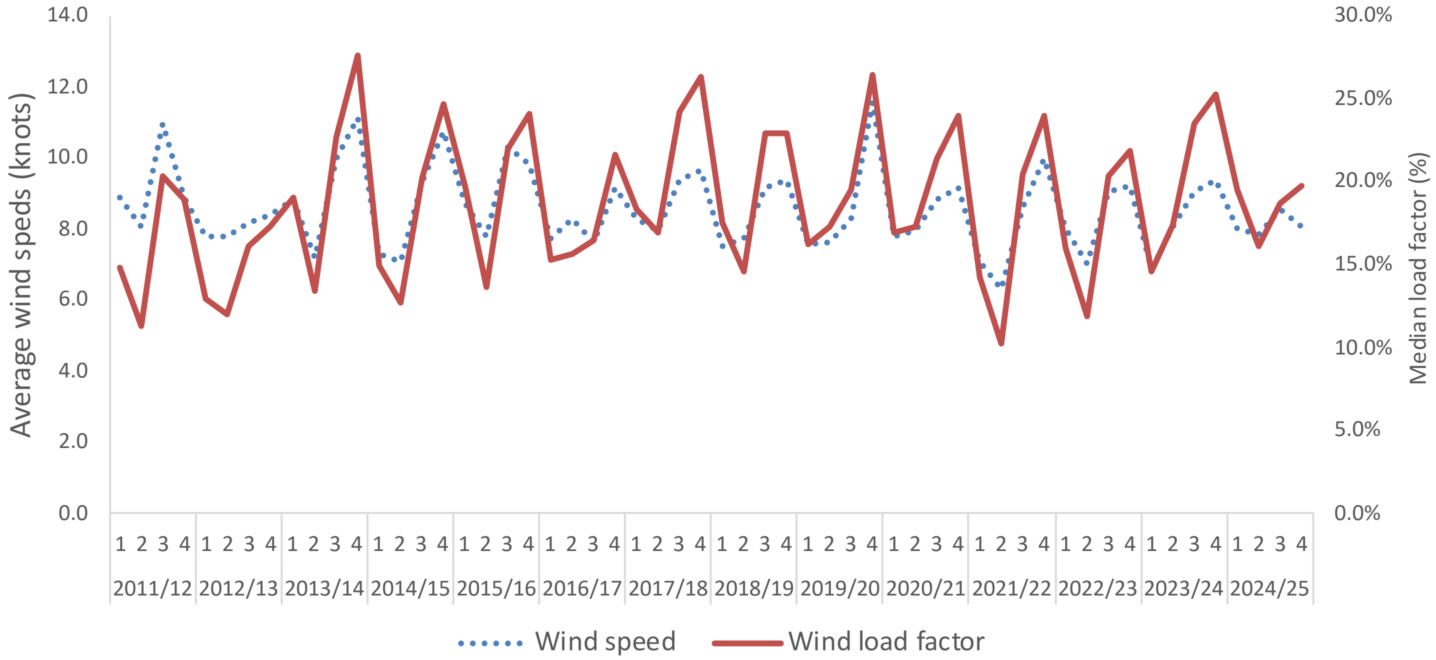
In 2024/25, the spring quarter (April - June 2024) had the highest load factor of the year (13.6 per cent), which has often been the case over the previous ten years; the sun's irradiance is at its highest in June. However, this was the lowest load factor for the spring quarter in any year in the time series. The lowest load factor of 4.7 per cent was observed between October and December, the lowest for this quarter in any year and reflects fewer sun hours during this period.

Chart 3: Quarterly Solar PV load factors by FIT year



Wind load factors also follow a regular quarterly pattern. Chart 4 displays a line plot of wind load factors across the quarters since 2011 against average wind speed. Except for some discrepancies in the early years, load factors have mirrored wind speed quite closely, reaching their maximum during the winter months in most years.

Chart 4: Average wind load factors and wind speeds by quarter

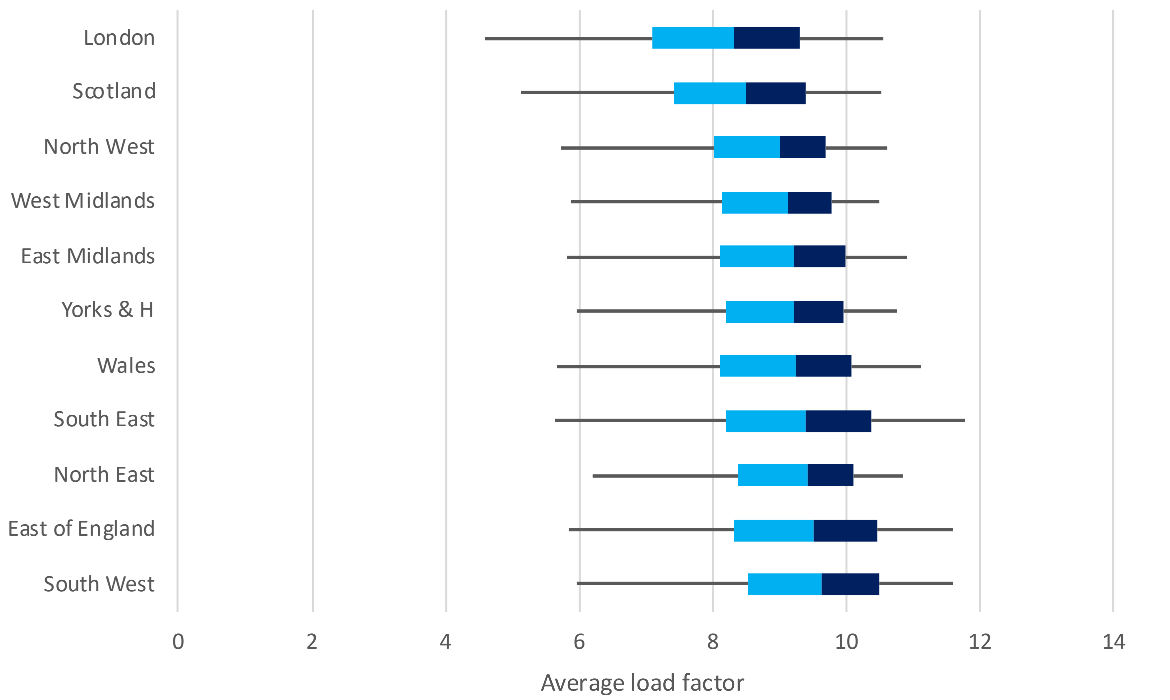


For hydro, wetter seasons are associated with higher load factors, though the relationship between weather and load factors is less strong than it is for wind or solar PV.

Regional Solar PV load factors

Chart 5 is a box-and-whiskers plot showing PV load factor for Scotland, Wales, and each region of England in 2024/25. The median load factor varies across regions, but the distributions are similar from region to region.

Chart 5: Solar PV regional load factors for 2024/25.



In 2024/25, South West England had the highest load factor, closely followed by the East of England and North East, all at around 9.5 per cent. The same regions typically have the highest average load factors. London had the lowest median load factor in 2024/25, followed by Scotland and North West England. London typically has one of the lowest regional load factors; this may be due to pollution particles settling on the panels, or because panels are shaded by tall buildings nearby. Every region showed a decrease in median load factors when compared to the previous year, except for the North East, which increased slightly.

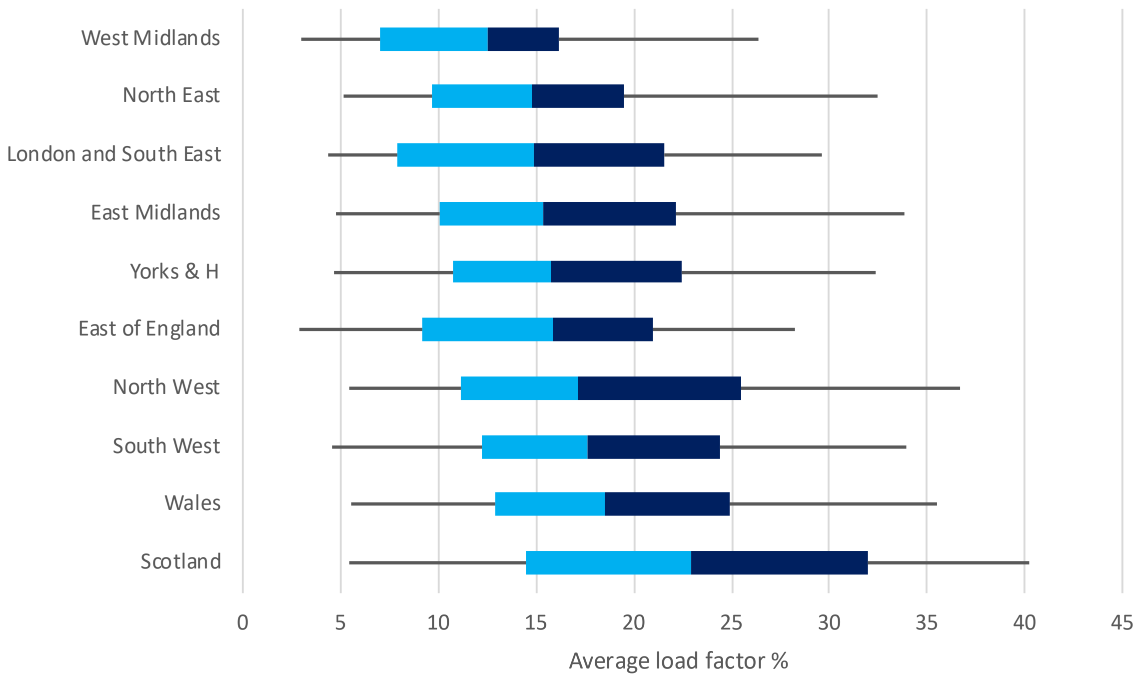
Regional Wind load factors

Chart 6 below shows wind load factors in a box-and-whiskers plot for each region. Data from London and the South East are aggregated due to the low number of installations with a valid load factor in these regions.

In the latest year, **Scotland had the highest median load factor for wind at 22.9 per cent**, followed by Wales and South West. Scotland has had the highest median load factor for wind in every year of the time series except 2015/16. Every region except North East England showed a decrease in median load factor in 2024/25.

Unlike solar PV, load factors for wind appear to follow different distributions across different regions, although the overall spreads are comparable. West-facing coastal regions tend to report higher load factors more frequently than central and easterly regions. Moreover, regions with a lower median load factor are less likely to report extreme load factors. This suggests that wind load factors have a stronger geographic dependence than solar PV load factors.

Chart 6: Wind regional load factors for FITs 2024/25



Appendix 1: Technical notes

The Feed-in Tariff scheme was launched in April 2010. It is managed by Ofgem. It is a financial support scheme for eligible low-carbon electricity technologies, aimed at small-scale installations. The following technologies are supported:

- Solar photovoltaic (up to 5 MW capacity)
- Anaerobic digestion (up to 5 MW capacity)
- Hydro (up to 5 MW capacity)
- Wind (up to 5 MW capacity)
- Micro Combined Heat & Power (Micro CHP, up to 2 kW capacity)

Some generators receive financial support for generating electricity and some for exporting electricity, depending on the tariff which they are on. The generation tariff is based on the number of Kilowatt hours (kWh) generated whereas the export tariff is based on electricity that is generated on site, not used, and exported back to the grid. The FIT scheme closed to new entrants at the end of March 2019, though a grace period has been allowed to a small number of installations since then. Accredited generators continue to receive support for 20 years from the date they were commissioned (10 years for micro-CHP, 25 years for solar PV commissioned prior to August 2012).

Data cleansing

Table 1 shows how many installations were registered on the Central Feed-in Tariff Register at the start of FIT 2024/25 and how many installations had valid meter readings; to be included in the analysis, each installation was required to have meter reading taken sufficiently close to April 1st, 2024, and a corresponding reading approximately one year later.

Of the 869,446 schemes registered for FiTs at the start of the financial year[2], 33 per cent were found to have sufficient meter readings for the annual analysis. Extreme load factor values were then excluded (as in previous years' analysis), accounting for around 3,400 (0.4 per cent) of installations. The column 'Valid load factor' in Table 1 indicates how many installations were included in the final annual analysis for each technology. Micro CHP statistics are no longer included in this release as there are few installations remaining which are still in support of FIT support.

The headline coverage is always lower in the most recent survey year, due to the absence of a final meter reading for many installations. In the 2022 publication, we introduced a new method whereby closing readings for the previous year's analysis are added to the data set which increases the sample size for that year, making the results more robust. See the methodology annex in the December 2022 edition of this article[3]. Therefore, we have revised the results for 2023/24 by supplementing the data with this year's data. This has added 140,000 more installations with valid readings to the analysis. We have also received additional data for the 2023/24 financial year which has allowed us to revise the results for 2022/23, adding over 5,000 valid readings to the analysis.

[2] Excluding Micro CHP and subject to further revision.
[3] The article published in December 2022 can be found at the following link (opens in a new window)

Table 1: Installations included in analysis by technology – 2024/25

Technology	Commissioned by 31st March 2021	Generation Data Reported*	Valid load factor	% remaining in analysis
Anaerobic digestion	427	216	175	41%
Hydro	1,206	551	500	41%
Photovoltaic	860,252	284,954	282,047	33%
Wind	7,561	3,119	2,721	36%
All Technologies	**869,446**	**288,840**	**285,443**	**33%**

For this year's edition, we have revised the data for 2022/23 and 2023/24. This is because more data is available by using meter readings from the latest survey which were taken on or around March 31st 2024. Likewise, it is likely that the sample size for 2024/25 will increase in next year's publication, in which case the load factors will be revised.

This publication is available from: www.gov.uk/government/collections/energy-trends

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