

Land utilised by solar PV – September 2024

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Key headlines

At the end of September 2024, ground-mount solar PV panels covered an estimated **21,200 hectares** (52,000 acres), which is around **0.1 per cent** of the total land area of the UK.

Background

This article publishes the Department's first estimate of the amount of land covered by solar PV panels in the UK. This estimate does not include rooftop solar panels which are placed on buildings. These figures are estimated, more details of how they have been calculated are given below.

Methodology

The estimates are based on:

1. An estimate for the total capacity of ground-mount solar PV
2. The median area covered by solar installations per MW of capacity
3. The total land area of the UK

1. Total capacity of ground-mount solar PV

The total capacity of ground-mount solar is based on the data published in Table 2 of the Department's Solar Deployment report. This is published at:

<https://www.gov.uk/government/statistics/solar-photovoltaics-deployment>

Table 2 shows that at the end of September 2024, there was a minimum of 7,700 MW of confirmed ground-mount capacity, accounting for 45 per cent of total UK solar PV capacity. This is comprised of the 'FiTs standalone', 'RO ground mounted' and 'CfD ground mounted' lines. FiTs standalone refers to ground-mounted installations smaller than 5 MW capacity which are supported by the Feed-in-Tariff (FiTs) scheme. RO ground-mounted refers to larger projects supported by the Renewables Obligation (RO). Both RO and FiTs are now closed to new entrants. CfD ground-mounted refers to Charity and Triangle installations which are supported by Contracts for Difference (CfD).

In addition, there is around 4,700 MW of capacity from installations that are not supported by FiTs, RO or CfD. These schemes include both ground-mount and rooftop installations and are summarised under 'unaccredited' within Table 2. These installations are registered under the MCS (microgeneration certification scheme), Renewable Energy Planning Database (REPD) and the Department's own survey of major power producers (MPP).

To estimate the ground-mount portion of the installations, we assume that nearly all the MCS installations are rooftop as they are all 50 kW or less. In total they contribute nearly 3,000 MW to the unaccredited figure. For the REPD and MPP installations, a conservative approach has been used here which assumes all of the remaining unaccredited capacity (from the REPD and MPP) is ground-mounted. This means that the estimated total ground-mount capacity is:

7,700 MW (ground – mount in Table 2) + 4,700 MW (unaccredited) – 3,000 MW (of which MCS) = 9,400 MW

This equates to 55 per cent of total UK solar PV capacity.

2. The average area covered by projects per MW of capacity

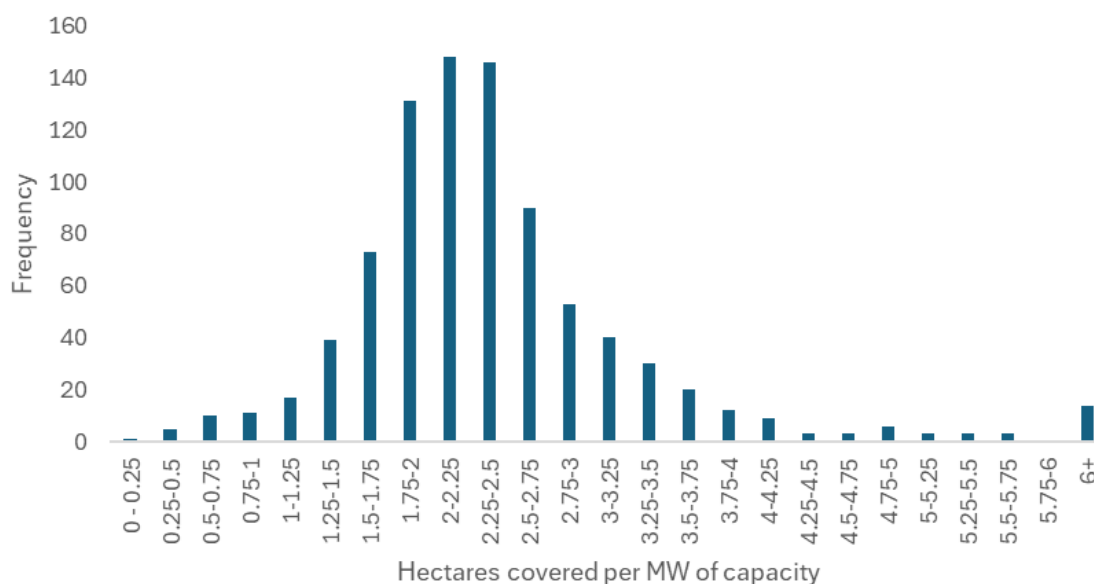
The exact area of many solar plants is not centrally recorded. Therefore, an average land area per MW of capacity has been estimated. The average is based on data from the Renewable Energy Planning Database. This is published at: <https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract>

The REPD tracks the progress of UK renewable electricity projects over 150kW through the planning system and is sourced mostly from planning authority databases and through direct contact with developers. The minimum threshold for installed capacity was 1MW until 2021, at which point it was lowered to 150kW. This means that projects below 1MW that were going through planning system before 2021 may not be represented in the REPD.

The REPD included 1,187 operational ground-mount solar PV installations at the end of September 2024. Of these, 315 did not have a recorded land use. For each of the remaining 872 sites, the land used per megawatt of capacity was calculated. For example, if a 10 MW installation covered 25 hectares, it would have a value of 2.5 hectares per MW.

The median footprint of these projects was then taken. This was calculated to be 2.25 hectare (5.6 acres) per MW of capacity. The median was close to the weighted mean of 2.2 hectares per MW, using the mean instead of the median would not have had a material effect on the total land use estimate. The median was chosen as there are some outliers in the data as shown in Chart 1. Just under 60 per cent of the installations fell within 0.5 hectares of the median estimate and 83 per cent fell within 1 hectare:

Chart 1 – Distribution of solar installations – hectares covered per MW of capacity



It should be noted that this estimate captures existing ground-mount installations. Older installations typically have lower efficiency panels generating less power per area. Therefore, this estimate will be higher than our estimate of future installations - 1.6 - 2 hectares (4-5 acres) per MW based on current technology.

3. Total land area of the UK

The total land area of the UK is 24,438,000 hectares. This is published by the ONS¹ in 'Standard Area Measurements for Administrative Areas (December 2023)'. This is published at:

<https://geoportal.statistics.gov.uk/datasets/c1aca9d405094d90b63e64b29e6c00b7/about>

4. Final calculation

Total land area utilised = Median area per MW × Total ground mount capacity

Total land area covered = 2.25 × 9400 MW = 21,200 hectares

$$\text{Percentage land utilised} = \frac{\text{Total land utilised}}{\text{Total area of UK}} \times 100 = \frac{21,200}{24,438,000} = 0.1\% \text{ (1 dp)}$$

5. Limitations and sensitivity analysis

There is a degree of uncertainty in this analysis, particularly around the amount of land covered per solar installation and, to a lesser extent, the total number of installations which we have derived from the available administrative data.

These limitations are set out in more detail in the attached Annex.

As ever, we welcome comments and methodological suggestions as to how these estimates might be improved.

¹ Area to mean high water

Annex: Limitations and sensitivity analysis

The figures published here are estimates which come with a degree of uncertainty. The precise size is not known for every solar installation. Furthermore, there is some uncertainty around the total amount of ground-mount capacity. Several checks were carried out to test the robustness of this estimate.

The lower quartile in the data analysed was 1.88 hectares per MW. The upper quartile was 2.7 hectare per MW.

As mentioned in section 1, the ground-mount capacity was calculated as all known ground-mount FITs, RO and CfD capacity + any unaccredited capacity which is not registered with the MCS.

An upper bound for the total amount of known ground-mount capacity would assume that only the MCS installations recorded as “domestic” are rooftop and all other unaccredited capacity is ground-mount. Upper bound:

$$7,700 \text{ MW (ground – mount in Table 2)} + 4,700 \text{ MW (unaccredited)} - 1,900 \text{ MW (of which MCS domestic)} \\ = 10,500 \text{ MW} = 61 \text{ per cent of total capacity}$$

A lower bound would assume that only the unaccredited installations that are greater than 5 MW are ground-mount and that all other installations are rooftop. Lower bound:

$$7,700 \text{ MW (ground – mount in Table 2)} + 1,600 \text{ MW (unaccredited over 5 MW)} = 9,300 \text{ MW} \\ = 54 \text{ per cent of total capacity}$$

Using the lower quartile for hectares per MW and the lower bound for ground-mount capacity results in a lower bound of:

$$\textit{Total land area covered} = 1.88 \times 9,300 \text{ MW} = 17,500 \text{ hectares (43,000 acres)}$$

The corresponding upper bound is:

$$\textit{Total land area covered} = 2.70 \times 10,500 \text{ MW} = 28,400 \text{ hectares (70,000 acres)}$$

Both of these calculations still round to 0.1% of total UK land use.

The total capacity used here includes all known capacity as published in our Solar Deployment report. This includes solar installations reported in our own survey of Major Power Producers (MPP), the Renewable Energy Planning Database (REPD), the Microgeneration Certification Scheme database (MCS) and those subsidised by the Renewables Obligation, Feed-in Tariff, and Contracts for Difference. In addition, several plants from Distribution Network Operators (DNO) embedded capacity registers are included. However, the statistics do not currently include all unsubsidised solar installations below 150 kW capacity that are not recorded in these data sources. We are reviewing data sources to improve coverage and intend to make use of data from other sources when available.



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