UK Government

Analytical Annex

Accompanies Plug-in Solar Consultation

Closing date: 30 June 2026

Department for Energy Security and Net Zero (2026)

Contents

Introduction

This annex provides analysis and evidence to inform this consultation. In particular, it points to evidence relevant to the strategic case for plug-in solar, an assessment of likely installation requirements and benefits for installers, evidence on potential uptake, and potential power system impacts. We welcome feedback on this as part of this consultation to inform the Department's ongoing analysis of the impacts of plug-in solar policy proposals and implementation decisions.

The strategic case for intervention

The Government's aim to deliver Clean Power by 2030 reflects the need for a secure and affordable energy supply and to limit our contribution to the damaging effects of climate change. Renewable energy sources can provide cheap power and protect consumers from the impact of volatile international fossil fuel prices. The impact of the recent conflict in the Middle East highlights the urgency of taking advantage of this.

Solar energy is now one of the cheapest forms of electricity generation, following rapid falls in the cost of photovoltaics globally: between January 2010 and January 2024 the price of solar PV modules sold in Europe fell by an average of 97%.[1] Solar can also be deployed relatively quickly, particularly for rooftop installations.[2]

As such, the Clean Power Action Plan (2024) called for the rapid acceleration of solar deployment to 45-47GW by 2030, from a current estimated capacity of 22GW, with scope to exceed the 47GW pathway subject to system need.[3] It noted the potential of additional rooftop solar to further boost deployment, contributing to these system goals whilst offering individual consumers energy bill savings and better control of their energy use.

Recent technological and market developments have created plug-in solar PV products that can extend the benefits of solar power to more households, with simpler installation requirements and with less reliance on professional installation and its associated cost. Plug-in solar kits are currently available from around £400 - £600 for an 800W (0.8 kW) system in Europe, excluding any installation or other ancillary costs. This is equivalent to a price of around £500 - £750 per kW. As discussed below, there may be some additional costs, which will vary depending on circumstance. In comparison, the median installation cost per total installed kW for small-scale (≤4kW) solar installations in Great Britain was £1,595 in 2025/26.[4]

[1] International Renewable Energy Agency (2025) 'Renewable Power Generation Costs in 2024' (viewed on 12 June 2026).
[2] Department for Energy Security and Net Zero (2025) 'Solar roadmap: United Kingdom powered by solar' (viewed on 12 June 2026).
[3] Department for Energy Security and Net Zero (2024) 'Clean Power 2030 Action Plan: A new era of clean electricity'; Department for Energy Security and Net Zero official statistics (2026) 'Solar photovoltaics deployment' (viewed on 12 June 2026).
[4] Department for Energy Security and Net Zero official statistics (2026) 'Solar photovoltaic (PV) cost data', Solar PV cost data: TIC basis (viewed on 12 June 2026).

Plug-in solar may offer a lower-entry-cost pathway into solar generation, especially for those without access to suitable roofs or without the resources to fund a full rooftop installation.

These products are increasingly benefitting consumers in other European countries and beyond, with policies updating to respond to this new market.[5] In Great Britain and Northern Ireland, existing legislative requirements for electrical installations and plugs reference British Standards that are designed around fixed installations and do not accommodate plug-in generation via standard plugs and sockets. In practice, this blocks a lawful route to supply and use for plug-in solar in parallel with the distribution network. Without the introduction of product specifications, consumers, regulators and government bodies would also lack assurance that only safe and compliant products are being made available in response to the removal of these barriers.

Regulatory reform and the introduction of product specifications are therefore needed to:

- Enable uptake of consumer products that can contribute to decarbonisation, reduce household and business exposure to fossil fuel prices, and energy bill savings.
- Ensure that products already coming into the market in Great Britain and Northern Ireland, and likely to be in greater demand in future, can be installed safely, avoiding unsafe, non-compliant products being accessed and reducing consumer risk.

Costs and energy bill savings for installers of plug-in solar

The main aim of this policy is to provide opportunities for consumers to take more control of their energy use, reduce their exposure to international fossil fuel prices, and reduce their electricity costs. Net consumer savings depend upon the costs of installing plug-in solar and ongoing energy bill savings. This section describes the potential requirements of and costs for installers and the determinants of energy bill savings.

Installation requirements

Before consumers buy and install plug-in solar panel systems, we expect that they will research options for PV panels and set up accessories to suit their needs. The intention of the interim product specification is to ensure that products on market are safe.

Consumers will also need to decide on the most appropriate siting, mounting arrangement and package of panels, inverters and accessories for their property. Reflecting the evidence on consumer savings presented below, this will need to consider the location of the property, likely shading, orientation, and how electricity is typically used in the home or business. The overall costs of installation will vary depending on these choices and on whether the installer requires

[5] SolarPower Europe (2025) 'Plug-In Solar PV' (viewed on 12 June 2026).

any professional assistance, for example in affixing panels safely or carrying out minor electrical works.

The table below gives the Department's current assumptions for the central values for assumptions regarding the above cost components that will be required to estimate the economic impacts of these reforms. We welcome feedback on them to inform our developing analysis.

Table 1: Illustrative installation cost components for a typical 800W plug-in solar installation

Cost Consideration	Cost Assumption
Plug-in solar kit (average)	£400 - £600 (Central Range)
Self-install time	1 hour
Expected professional support for mounting / siting (non-electrical)	15 – 25% of cases[6]
Expected minor electrical works / socket adaptation proportion	up to 15% of cases[7]
Expected larger electrical works proportion	up to 5% of cases[8]

Energy bill savings

For the illustrative estimates below, bill savings are estimated on the basis of electricity generated and consumed on site, reducing the need to purchase electricity from the grid at the point of use. No domestic storage or export is assumed in these examples. Plug-in solar is therefore assumed to enable savings primarily by reducing the need to purchase electricity that would otherwise be needed to meet installer's household or business demand at a point in time. Solar generation potential is highly variable across time – with summer and middle-of day

[6] Illustrative assumption for future analysis. This is intended to capture a minority of households that may choose to seek practical support for mounting or siting, for example where installation conditions are less straightforward or consumers are less comfortable affixing panels themselves. The range is intentionally cautious given current evidence gaps and should not be read as implying a requirement for conventional installer-led commissioning.
[7] Intended to capture limited electrical assistance, chiefly where a suitable socket arrangement is not already available, for example fitting an outdoor wall socket or similar socket-related adaptation. This 15% is an illustrative assumption for future analysis, reflecting that some installations may need this type of support depending on property layout and siting; it is not a fixed technical requirement.
[8] Intended to capture a smaller subset of cases requiring more material work to the fixed electrical installation than the minor works category, for example more involved changes beyond a simple socket addition such as upgrading a consumer unit. This 5% is an illustrative assumption for future analysis, used to distinguish these cases from simpler socket-related works.

generation relatively strong – and weather conditions. The savings available to installers of plug-in solar will therefore depend on a range of individual and wider factors, including:

- **Tariffs and export arrangements**: the value of a reduction on power demanded from the grid depends on the unit rate applicable at that point in time. This will depend on wider energy market conditions and government/Ofgem energy bill policies but also the specific tariff arrangements of the consumer, including whether they have a smart tariff with unit rates that vary across or within days. Under the Smart Export Guarantee (SEG), rooftop solar consumers can be paid for surplus electricity fed back to the network, but this requires a meter capable of providing half-hourly export readings and installation certified through the microgeneration certification scheme (MCS) or an equivalent. This is likely not to apply in the first instance for many plug-in solar installers.
- **Consumption patterns:** the ability to take full advantage of a given volume of solar generation depends on whether the consumer is using an equivalent amount of electricity at that time (enabling 'self-consumption' of power generated), and those with higher levels of consumption better aligned with generation patterns will stand to save more. Consumer-led flexibility – shifting demand patterns to coincide with availability of low-cost power – and using domestic storage will therefore enhance the benefits of plug-in solar.
- **Installation arrangements:** the size and specification of panels installed will affect the power generated for a given level of solar irradiance, but property location, orientation (e.g. South- or North-facing), angle of panels and the presence of any shading or obstruction are also important determinants of power generated.

To illustrate this variation, the table below presents indicative annual plug-in solar generation and bill savings under two installation arrangements. The estimates are derived in three steps. First, annual electricity generation is estimated using the Government's Standard Assessment Procedure for Energy Rating of Dwellings and assumptions on system size, irradiance, orientation and shading.[9] Second, a self-consumption rate is applied to estimate the proportion of generated electricity that is consumed on site rather than surplus to household demand at the time of generation using MCS guidance.[10] Third, the resulting volume of on-site consumption is valued using the applicable retail electricity unit rate.

In these illustrative examples, both cases reflect a household of Great Britain average annual electricity[11] with a 'home all day' occupancy pattern,[12] with 800W panels, a property of average UK global solar irradiance and solar declination and no/very little shading. Demand is assumed constant across scenarios, and no domestic storage is assumed. Savings are calculated only from electricity consumed on site, so the estimates exclude any value from exported electricity.

[9] BRE (2026) 'Standard Assessment Procedure SAP10' (viewed on 11 June 2026)
[10] MCS (2022) 'Solar PV Self-Consumption: A method to determine the electrical self-consumption of domestic solar PV installations with and without storage' (viewed on 11 June 2026).
[11] 3323kWh, based on 2024 Great Britain mean consumption per domestic meter from Department for Energy Security and Net Zero official statistics (2025) 'Regional and local authority electricity consumption statistics' (viewed on 12 June 2026).
[12] Defined in MCS guidance as where "The domestic property is generally occupied by at least one occupant between 9:00am to 5:00pm on weekdays".

These avoided electricity purchases are valued using Ofgem's energy price cap per unit for 1 July to 30 September 2026 for Great Britain; savings in Northern Ireland may differ.[13] For the purposes of this table, the self-consumption rate means the proportion of total plug-in solar electricity generation that is consumed on site.

Table 2: Electricity bill savings by plug-in solar installation arrangement

Panel setup scenario	Self-consumption rate	Annual kWh consumed from plug-in solar	Value of saving
A. 30° tilt & South orientation	62%	428	~£110
B. 90° tilt & East/West orientation	72%	272	~£70

Source: DESNZ analysis.

This shows that the angle and orientation of panel mounting make a significant difference to potential savings, with a 30° tilt of panels tending to be significantly better for generation at UK latitudes compared with vertical installation, and south-facing panels offering greater benefits. It also highlights that the extent to which plug-in solar can save money is limited by the amount of demand present at the time of generation: scenario A has a higher level of potential generation than scenario B but the proportion actually consumable and generating savings is lower as a result.

The overall impacts of plug-in solar for consumer savings will therefore depend on the extent to which take-up is concentrated among those with more or less optimal installation arrangements, and how far it coincides with households/businesses for whom consumption patterns align well with generation in the absence of domestic storage. It can be expected that those who stand to benefit most may be more likely to install plug-in solar, but this depends on awareness and understanding of these factors. These estimates will not provide an accurate picture of longer-term savings if tariff arrangements and energy prices change in future. They will also not represent the net energy cost impacts across all electricity consumers, due to fixed system costs and potential indirect effects of this generation on electricity markets.

Evidence on potential take-up of plug-in solar

The Government is keen to ensure that many consumers have access to the benefits that solar generation has to offer and the proposals in this consultation are intended to enable this.

[13] Ofgem (2026) 'Energy price cap unit rates and standing charges' (viewed on 11 June 2026).

However, the take-up of plug in solar is inherently uncertain. Alongside this consultation we are engaging with key stakeholders to smooth the path to enable safe consumer uptake.

International experience suggests that, once legal, technical and administrative barriers are reduced, plug-in solar can scale quickly from a niche product into a visible consumer market segment. The most developed evidence base comes from Germany, widely regarded as the leading European plug-in solar market. It has been estimated that as many as 3 million plug-in devices could have been installed by the end of 2024 across the country.[14]

Germany's rapid growth in plug-in solar did not follow a single legal change, but a sequence of federal measures that reduced cost, administrative burden and tenancy-related barriers:

- Building on an earlier technical and regulatory framework for small plug-in PV devices, the first major recent change was the introduction of a zero VAT rate from 1st January 2023 for eligible photovoltaic systems installed on or near residential buildings, including balcony systems.
- The next major step was a May 2024 reform package commonly referred to as 'Solarpaket I,'[15] which increased power limits from 600W – 800W by amending the legal framework for plug-in solar and was accompanied by simplification of the registration process. In this context, systems are registered in the Marktstammdatenregister (MaStR) – Germany's official register of electricity and gas market data, operated by Bundesnetzagentur (Federal Network Agency).[16]
- A further federal reform in October 2024 reduced legal barriers for tenants and apartment owners by amending tenancy and condominium law so that the installation of plug-in solar devices was treated as a privileged structural modification, thereby narrowing the grounds on which landlords or owners' associations could refuse consent.[17]
- After tenancy/property-rights reform, Germany's focus shifted to technical standardisation which took effect in December 2025,[18] defining plug-in solar as a standardised consumer product, followed by an additional reform (effective from 1 March 2026)[19] which clarified the simplified grid-connection route for the 800 VA category.

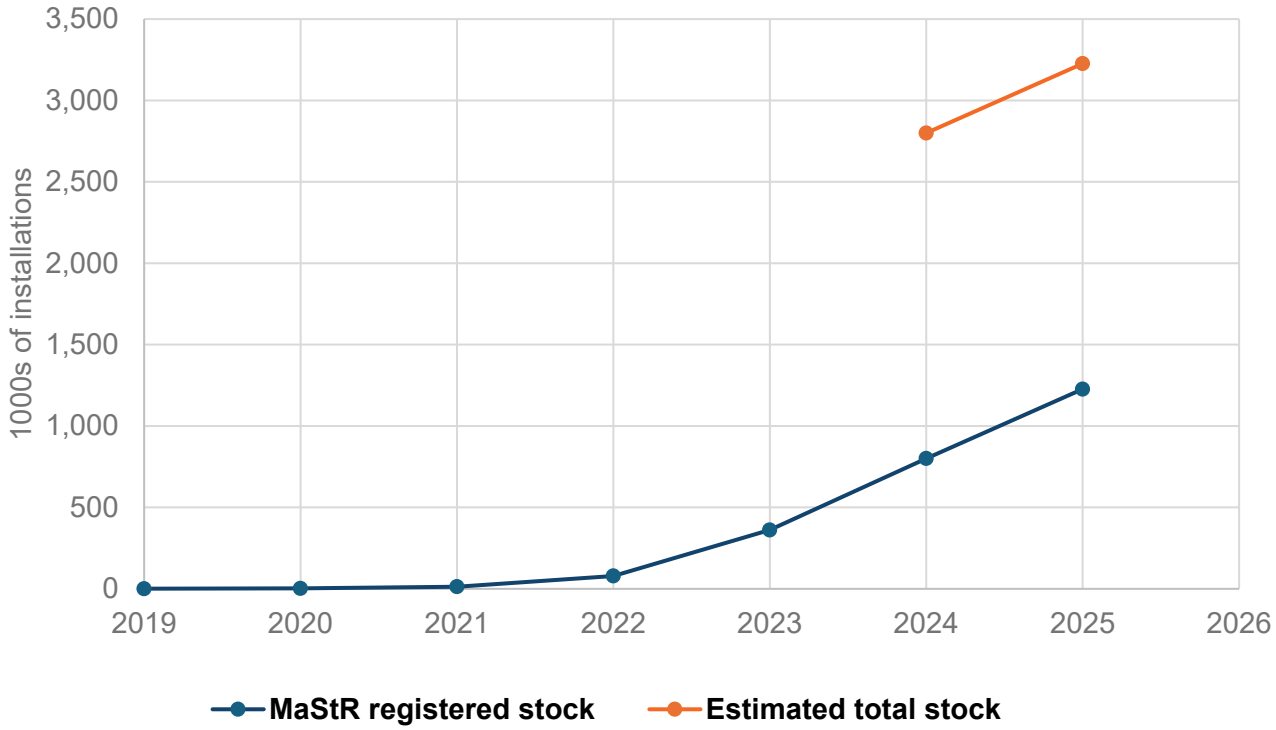
The Department has drawn in particular on two German sources for evidence on plug-in solar uptake. The first is MaStR 2025, published in January 2026 by Bundesverband Steckersolar e.V. (BVSS), the trade association for plug-in solar in Germany; that report analyses entries in

[14] Umweltbundesamt (2025) 'Steckersolargeräte: Statistische Untersuchungen zu Anzahl, installierter Leistung und Selbstverbrauch', Texte 91/2025 (viewed on 12 June 2026).
[15] Taylor Wessing (2024) 'Solar package I – Changes at a glance' (viewed on 12 June 2026).
[16] The Federal Network Agency (Bundesnetzagentur or BNetzA) is the German regulatory office responsible for overseeing electricity, gas, telecommunications, post and railway markets.
[17] Bundesgesetzblatt (2024) 'Act on the Approval of Virtual Homeowners' Meetings, to Facilitate the Use of Plug-in Solar Devices and on the Transferability of Limited Personal Easements for Renewable Energy Plants' (viewed on 12 June 2026).
[18] Bundesverband Solarwirtschaft (2025) 'DIN/VDE: world's first standard for plug-in solar devices' (viewed on 12 June 2026).
[19] PV Magazine (2026) 'New German rule allows larger plug-in PV without electrician' (viewed on 12 June 2026).

Germany's Core Energy Market Data Register (MaStR).[20] The second is Steckersolargeräte ('Plug-in solar devices'), a research report published in August 2025 by Umweltbundesamt (UBA), the German Environment Agency.[21]

Analysis of MaStR registrations suggests that German registered plug-in solar stock rose from around 0.9% of households at the end of 2023 to around 3% by the end of 2025, implying that the registered market roughly tripled over that period. UBA estimates that the actual market may already have been materially larger, with just under 3 million plug-in solar devices in operation by the end of 2024 compared with around 0.8 million registered, implying household penetration may already have been around 7–8% by 2024–2025.

Figure 1: German data on plug-in installs, registered vs unregistered stock estimates[22]



Sources: Steckersolargeräte, MaStR 2025.

UBA also estimates that these devices generated around 1.7 TWh of net electricity in Germany in 2024, including around 1.1 TWh self-consumed and around 0.6 TWh exported. This was equal to ~0.4% of Germany's total electricity generation in 2024.[23] Taken together, these findings suggest that, where barriers are reduced and products are easy to acquire and use, plug-in solar can move quickly from a niche product into a visible consumer market segment.

[20] Bundesverband Steckersolar e.V. (2026) 'MaStR 2025: Auswertung des Marktstammdatenregisters' (viewed on 12 June 2026).
[21] Umweltbundesamt (2025) 'Steckersolargeräte: Statistische Untersuchungen zu Anzahl, installierter Leistung und Selbstverbrauch', Texte 91/2025. Study by Tobias Kelm and Daniel Stauch (Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg, ZSW) (viewed on 12 June 2026).
[22] Note: 2025 figures presented here for the estimated German total stock may be an under-representation of the true stock in 2025, as the UBA does not have a statistic for the potential rate of non-registrations post-2024.
[23] SMARD (2025) 'Evaluation of last year' (viewed on 12 June 2026). The figure of around ~0.4% is calculated as 1.7 TWh divided by 431.7 TWh.

While this evidence may provide a better indication of potential uptake, good registration rates will remain important for network planning and reducing non-compliant installation.

The German evidence also indicates that uptake has been concentrated overwhelmingly in residential contexts. The German Environment Agency (UBA) reports that the large majority of devices are associated with one- and two-family houses, accounting for around 80% of the stock up to the end of 2023 and 85% of new devices commissioned in 2024. This is relevant to Great Britain because it suggests that practical ease of installation, tenure arrangements and building type are likely to remain important determinants of deployment even once product and electrical barriers are reduced.

Table 3: Registered plug-in solar deployment in Germany

Year	Registered additions (thousands)	Registered stock at year end (thousands)	Registered stock as % of households[24]
2022	~70	~80	**~0.2%**
2023	~280	~360	**~0.9%**
2024	~440	~800	**~2%**
2025	~430	~1,230	**~3%**

Sources: Steckersolargeräte, MaStR 2025. Figures are rounded.

The UK differs from Germany in a number of ways that are relevant to likely take-up, including different planning and consent requirements in some property types, different housing stock composition, lower average solar resource in some locations, and a distinct regulatory context. The UK differs from Germany in a number of ways that are relevant to likely take-up, including different planning and consent requirements in some property types, different housing stock composition, lower average solar resource in some locations, and a distinct regulatory context. The Department therefore considers German evidence highly informative about the pace and direction of market development, while recognising that take-up in the UK may differ from Germany for structural and policy reasons. The German data suggest that once barriers are reduced and products became easier to acquire and use, especially during a period of relatively high energy prices, plug-in solar deployment may accelerate strongly.

[24] DESTATIS (2026) 'German dwelling stock by years' (viewed on 12 June 2026).

Analytical annex questions

1. **Do you agree with the categories of costs we have set out and the supporting assumptions to determine their scale? If not, please set out any additional considerations or proposed amendments.**

2. **How easy will it be for consumers to understand their potential savings given their variability? Please set out any potential interventions that could improve understanding.**

3. **How might uncertainty around potential savings affect take-up of plug-in solar?**

4. **How frequently will consumers need professional support to install plug-in solar? Please consider what types of support will be most in demand.**

5. **Do you agree with our interpretation of the available evidence? Beyond international comparisons, please set out any other evidence that would help to assess likely take-up.**

Publication is available from: https://www.gov.uk/government/consultations/plug-in-solar

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