IET response to the Department Energy Security and Net Zero Open Consultation - Plug-in solar: Regulatory amendment and interim product specification

About the IET

The IET is a trusted adviser of independent, impartial, evidence-based engineering and technology expertise. We are a registered charity and one of the world's leading professional societies for the engineering and technology community with over 157,000 members worldwide in 148 countries. Our strength is in working collaboratively with government, industry and academia to engineer solutions for our greatest societal challenges. We believe that professional guidance, especially in highly technological areas, is critical to good policy making. For further details on the evidence submitted, please contact policy@theiet.org

Questions

1. Do you agree with the proposed approach of amending the PSSR to allow plug-in solar to connect via a BS 1363 plug as a transitional measure pending any future changes to BS 1363?

The IET recognises the rationale for enabling plug in solar to connect via a BS 1363 socket as a transitional measure. A single low power system of less than approximately one kilowatt is unlikely to introduce significant additional loading when compared with common household appliances.

However, suitability is dependent on the existing installation. The principal issue is not the inherent risk of a small plug in system, but the variability in domestic electrical installations in the United Kingdom, alongside the fact that conventional plug and socket arrangements have not been designed for connection of generation sources. This creates a degree of misalignment between existing standards and emerging usage.

The IET therefore considers that government guidance should make clear that consumers should take account of the condition of their installation prior to connection. This should be proportionate and accessible, rather than mandating a full inspection in all cases. The focus of policy should remain on the specific characteristics of plug in solar, including bidirectional power flow and installation practice, rather than risks common to all electrical appliances.

Whilst a EICR is recommended, consideration should be given to a less costly alternative to assess if the installation meets a prespecified criteria to accept a plug-in solar pv unit. These criteria might include minimum requirements for consumer unit and circuit protection (eg earth leakage), IP66 outdoor sockets and secure fixings for unit. This should help reduce the risk of units being installed in properties that are likely to be unsafe, ensuring installations are as safe as possible and that older properties with fuse boards or other unsuitable safety measures are not used to connect potentially hazardous equipment.

2. In your view, is the proposed approach sufficiently clear that this update would only apply to plug-in solar products which meet the Interim Product Specification? If not, please set out any potential amendments that could provide further clarity.

Further clarification would be beneficial. The consultation should more clearly define the scope of applicability and ensure consistent alignment with existing electrical installation requirements. Without this, there is a risk that products which do not meet the intended criteria are assumed to be compliant

Initially, keeping the product specification focussed on plug-in solar PV is sensible. It allows industry to focus on this route. Once established, learnings can be applied to plug-in battery systems as, due to the higher power outputs available, e.g. 3kW as opposed to 0.8 kW plug-in solar PV, a specification to plug-in batteries can be established.

3. In your view, does allowing connection via a standard plug raise any specific safety concerns that are not addressed by the Interim Product Specification? If yes, please outline the potential concern(s).

Connection via a standard plug raises practical considerations where systems are installed externally. In particular, sockets used outdoors must be suitable for the environment and appropriately protected. There are also specific technical considerations associated with plug in solar. Interaction between microinverters and residual current devices may affect protective performance under certain conditions, particularly where direct current leakage is present, which may reduce sensitivity to faults.

In addition, the presence of local generation within a circuit introduces the potential for uneven current distribution. Sections of wiring may carry higher currents than expected, creating a credible risk of conductor overloading that would not arise from demand only appliances. The likely use of extension leads in outdoor or improvised installations also raises concern. Longer cable runs, or the use of multiple leads, may increase earth loop impedance and reduce the effectiveness of protective devices under fault conditions.

These issues represent realistic use cases and should be explicitly addressed in accompanying guidance.

We have serious safety concerns in the following areas related to connecting generating sets into final circuits:

- Insufficient testing of existing RCDs and RCBOs (unidirectional/bidirectional, and older RCDs).
- There was one failure; with such a small sample population, a single failure indicates more testing is absolutely necessary.
- Potential electric shock risk: Single-pole RCBOs disconnection time is effectively extended beyond the limit for safety for the circuit in which the plug-in PV is connected. A device provided for the purposes or Regulation 411.3.3 of BS 7671:2018+A4:2026 is required to disconnect within 40 ms for residual current faults exceeding 250 mA this will be extended by a further 100 ms, which can lead to physical effects that include fibrillation and death.
- The fact that shock risk is increased as described is supported by the testing carried out to-date. The interim product standard does nothing to mitigate this identified risk.
- The IPS must acknowledge that overcurrent protection is rendered ineffective (overload protection specifically). Agree the risks can be minimized by limiting output, but the fact remains.

- The financial incentive for consumers becomes stronger if they install more than one 800 W plug-in system (plug-in PV or battery system), which will increase the risks highlighted in these responses.
- Connection of multiple plug-in generation and storage systems could result in fire, serious injury or death.
- There is no realistic way to monitor or control how many systems are connected in a UK home. Consumers can buy and plug in multiple units without notification, inspection or assessment.

Any safety case must therefore account for reasonably foreseeable misuse, including multiple units being connected within the same installation.

4. Are you aware of risks that this update could be misinterpreted or misused (e.g. applied to other types of equipment)? If yes, please set out the potential risk(s) and how they might be mitigated.

There is a risk that the update could be interpreted as permitting wider use cases than intended, particularly in relation to multiple systems or higher capacity devices. Clear communication of limits and intended use is necessary to avoid misapplication.

5. Do you consider the proposed approach clear and enforceable for manufacturers, retailers, and regulators?

No, the proposed approach is neither clear nor enforceable for manufacturers, retailers, and regulators. This is evidenced by the fact that many retailers are currently advertising and selling non-compliant or illegal equipment on their websites/stores. As mentioned in question 1, certain properties with fuse boxes, faulty sockets and defective wiring are at the highest risk of plug-in solar devices causing catastrophic consequences. Manufacturers, retailers and regulators need to consider individual property types and have effective a clear guidance from government to ensure these devices are only installed at appropriate properties.

Electric bikes and scooters present a comparable technology and legislative framework. Although they are illegal to use on public roads, this is not effectively enforced with both online and high street shops continuing to sell them with little mention of the regulation changes.

6. Do you agree with the proposal to require manufacturer compliance with an interim product specification before a plug-in solar product can be placed on the market?

Where plug in solar is sold it should come with guidance that explicitly communicates residual current device performance, ring circuit overcurrent risks, and safe installation guidance. Market surveillance should ensure that adverts that recommend ‘daisy chaining’ are removed and standards should define safe mounting and maintenance arrangements suitable for everyday shoppers. It would be useful to provide users with realistic performance expectations in line with government recommendations through a public awareness campaign and product advertisement requirements. This should highlight that without export metering; the householder will not receive any payment for any power exported from the site. This will also help avoid instances of ‘daisy chaining’ as this will increase the amount of export individuals

will not receive any payment for. Government recommendations should highlight that plug in solar panels are for consumption rather than export through holistic performance expectations.

7. Do you agree with the proposal to use the same broad approach as the German standard (DIN VDE 0126-95) as a baseline, with amendments for the UK context, to support future international harmonisation?

Germany has adopted more permissive approaches to plug in solar, but they operate within different technical, regulatory, and housing contexts that limit direct comparability with the United Kingdom. In Germany, domestic electrical systems typically use radial circuits rather than ring circuits, which provide a clearer relationship between current flow and protective devices and reduce the risk of undetected overload. Germany does not use voltage dependent RCDs whereas the UK does. This affects the way the device operates in particular conditions. The components used in these devices can be more vulnerable than the voltage independent devices (such as the use of semi-conductors).

Plug in solar is most commonly associated with apartment living and balcony installations, where physical constraints limit the number of systems per dwelling and reduce aggregation risk. Historically, Germany required connection via a specialist “Wieland” plug, designed to prevent electric shock by avoiding exposed live pins, although this required professional installation. More recently, updated standards (DIN VDE V 0126-95) now permit the use of standard household plugs for certified systems up to 800 watts, provided inverters automatically disconnect when unplugged or when grid supply is lost. Regulatory frameworks include defined capacity limits, simplified registration through a national database, and requirements for a bidirectional meter, alongside legal provisions that generally require landlords to permit installations subject to reasonable safety conditions.

Differences in earthing arrangements also influence the behaviour of protective devices and inverter leakage currents causing nuisance tripping. These systems are widely available at relatively low cost and can provide meaningful benefits where generation aligns with household demand, particularly for those without access to rooftop solar, although performance is highly dependent on orientation, shading, and usage patterns.

Taken together, the United Kingdom’s reliance on ring circuits, the variability in installation condition, and the lower prevalence of balconies mean that German standards cannot be directly transferred without very careful and considered adaptations in line with broader recommendations from this response.

8. Are the engineering controls in the Interim Product Specification proportionate to the risks in deploying plug-in solar in the UK? If not, please outline anything that is missing or over-specified.

The proposed engineering controls appear broadly proportionate. However, consideration should be given to the interaction between inverter characteristics and protective devices, particularly in relation to residual current device performance and compatibility with bidirectional current flow, as these represent distinct technical considerations for plug in solar products.

9. Does the Interim Product Specification address all the points in the safety study commissioned by DESNZ? Please refer to the safety study results published alongside this consultation.

The IET has published a detailed plug in solar position paper for the benefit of DESNZ. This paper can be found here:

10. Are there elements of existing technical standards quoted in the Interim Product Specification that are unsuitable for the UK context or not applicable to plug-in solar products? If yes, please set out any potential modifications.

BS 7671 establishes requirements for the safe design, installation, and operation of electrical installations. These requirements assume that work is undertaken by competent persons and that installations are subject to appropriate inspection and testing. Plug in solar photovoltaic systems challenge this model by enabling connection by consumers without professional oversight.

Under BS 7671, key requirements relevant to plug in solar include:

- Protection against electric shock through appropriate earthing arrangements and residual current protection.
- Protection against overcurrent and overload through correctly rated devices.
- Consideration of bidirectional power flow when generation is connected.
- Suitability of equipment, including inverters and connection accessories.
- Verification through inspection and testing.

A critical issue is that there is no legal requirement for owner occupiers to have periodic inspection and testing of domestic installations. As a result, installations may range from legacy fuse wire protection through to modern RCBO based systems. This creates uncertainty regarding suitability for connection of generation.

Typical domestic protection arrangements include:

- Miniature circuit breakers generally acceptable for conventional loads.
- Miniature circuit breakers with RCD protection acceptable subject to earth leakage considerations.
- RCBOs preferred in modern installations but must be suitable for bidirectional current and direct current leakage.

BS 7671 requires that circuits supplying generation are protected by devices capable of operating under reverse power flow. In practice, this means that protection should be bidirectional and, where relevant, Type B to manage direct current leakage from inverters.

Plug in solar systems circumvent the usual requirement for installations or modifications to be carried out under Building Regulations by a registered electrician. This creates a gap between regulatory intent and real world application.

There is also a question as to whether reliance on BS 7671 alone is sufficient to satisfy statutory duties under the Electricity Safety, Quality and Continuity Regulations. The robustness of this legal chain warrants further consideration.

11. The electrical safety study showed plug-in solar was safe at a circuit level. Should the Interim Product Specification limit the number of microinverters to one per household or one per household circuit?

The United Kingdom already experiences supply voltages above nominal levels in some areas. Additional distributed generation could increase voltage further. Microinverters may trip in response, leading to underperformance and reputational risk. There is currently limited published modelling of low voltage network impacts from widespread plug in solar deployment. This should be addressed alongside ongoing voltage management initiatives.

Good practice for plug in solar must be grounded in compliance with BS 7671 and a structured risk management approach. Systems should be limited to a maximum of approximately 1 kilowatt, with a strong presumption of one unit per dwelling. Systems below 4 amperes present comparatively lower risk. However, recent safety testing has shown that devices can vary in export behaviour with some exceeding declared values[1]. Multiple units should only be permitted where installed as a conventional compliant generation system. However, we have real concerns about the ability to effectively regulate such a measure.

12. What risks or unintended consequences, if any, should be considered in implementing the Interim Specification?

Consumers should be provided with clear, accessible information that enables them to understand suitability, safe installation and expected performance. This is particularly important given that connection may take place without professional involvement.

13. What information should be provided to consumers at the point of sale and prior to installation, including on safety, suitability of existing electrical circuits and protective devices, suitability of dwellings, and limitations of the product?

Connection should only be permitted where circuits are protected by miniature circuit breakers, RCD protected circuits and protective devices are suitable for bidirectional current and inverter characteristics. It would be necessary to exclude installations with fuse wire protection. This would require a basic assessment of the installation condition prior to connection. Undertaking an assessment of this kind could risk removing the cost benefits for the consumer that supermarket/online sellers can provide.

Finally, it should be explored whether a formal risk register should underpin policy development, ensuring that both household and system risks are systematically assessed and mitigated.

14. Are there risks of misuse, misunderstanding, or unsafe adaptation that should be mitigated? If yes, please set out the settings in which these risks would be most relevant e.g. types of dwellings.

[1] RAF013/2526 Plug-in PV Systems in the United Kingdom

There is strong evidence that products are marketed in ways that encourage multiple installations or 'daisy chaining'. This can result in power levels far exceeding safe assumptions. While a single system of less than 4 amps presents low risk, multiple systems introduce uncertainty that is not currently managed.

Other potential issues concern the physical fitting of the panels, with potential for these panels to come loose and fall off roofs or balconies. This raises huge concerns around liability and public safety, especially in high rise blocks of flats in densely populated areas. Government must urgently action regulation to address attachment structures for these devices to mitigate the potentially unsafe physical fittings of plug-in solar devices.

15. Is the proposed timeline for introducing the Interim Product Specification feasible? If not, why not?

n/a

16. What support or guidance would help ensure timely and effective implementation of the Interim Product Specification?

n/a

17. Are there any additional comments or evidence you would like to provide to inform the development of this framework?

With increased temperatures across the UK there is now a greater general fire risk to anything on roofs and near a loft of a property. From 2015 and 2024, the number of days exceeding 30C in the UK more than trebled compared with the 1961-1990 average[2]. If these plug-in solar devices are not suitable to withstand these increased temperatures, property fires may drastically increase.

Another key aspect of any plug-in solar framework will be definitions. Many manufacturers and retailers are labelling plug-in solar devices as 'balcony solar'. This conflates many different aspects of these devices and makes an already complicated technology harder to research and trust. Government must be very clear in its definitions and intentions, giving consumers as clear a framework as possible.

Consumers would also greatly benefit from a public awareness campaign if these devices are approved. This could take many forms including instructional videos or FAQ's answers. This should come from government to ensure the right information is passed to consumers and is kept update with evolutions in these technologies.

2 https://www.bbc.co.uk/news/articles/c30y619glveo#:~:text=Between%202015%20and%202024%2C%20the,the%20top%20of%20the%20agenda.