

Unite the Union response to Department for Energy Security and Net Zero Consultation into Plug in Solar Panels



1. Introduction

- 1.1. This submission is made by Unite, the UK's largest trade union with over one million members across all sectors of the economy, including manufacturing, financial services, transport, food, agriculture, construction, energy, utilities, information technology, service industries, health, local government and the not-for-profit sector. Unite also organises in the community, enabling those who are not in employment to be part of our union.
- 1.2. Of particular interest to this inquiry Unite represents almost 35,000 Energy and Utilities workers who amongst other things, are instrumental in the generation, distribution and managing the supply of electricity. Unite is also the sole signatory trade union representing the UK electrical contracting industry workforce, including representing electricians in the public and private sectors UK wide, including under the JIB and SJIB national collective agreements, and the aligned Electrotechnical Certification Scheme (ECS).

2. Comments

- 2.1. The consultation is examining barriers to plug in solar panels for quick and simple small home installations, suitable for balconies of flats etc. Unite members have raised a number of concerns about the roll out of these panels which can be broken down to home safety, fire risk, non-standard equipment being used, electrical distribution worker safety. Not least of which is the length of this consultation which it would appear many organisations were unaware that this was happening¹. Unite would caution against undue haste to enable the rollout of plug-in solar within months as this could result in the loss of life being placed over political ambitions.

2.2. Home Safety

- 2.2.1. Homes electronics were designed to draw power from the grid and not pour power back to suppliers. While a single small panel might be accommodated on a 13 Amp ring final circuit within a property multiple units plugged in via extension leads or multiple wall sockets could easily overload the wiring and cause a fire. Around a third of all homes are over 100 years old and there is no guarantee that the wiring in all homes could cope and not melt or short circuit.
- 2.2.2. While about 70% have a smart meter there are still multiple old-fashioned meters and wiring that could be many decades old. Therefore, even if the just one panel was plugged in, it is doubtful that all customers will realise an accurate return for the electricity generated. It is also the case that the grid itself may not benefit due to the losses in transmission on the powers journey back to the network.

¹ **The Gunning principles**, arising from *R v Brent London Borough Council, ex p Gunning*, (1985) 84 LGR 168 and approved by the Supreme Court in *R (Moseley) v Haringey LBC* [2014] 1 WLR 394, require that:

- (1) Consultation must take place at a formative stage;
- (2) It must be accompanied by sufficient information to allow intelligent consideration;
- (3) Adequate time must be allowed for response; and
- (4) The responses must be conscientiously considered before a decision is made.

Therefore, it is by these principles that this consultation opens itself up to accusations of being unreasonable and unlawful given the respondents were not alerted to the consultation or permitted enough time or the ability to respond after due consideration of proposals.

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- 2.2.3. Given devices can be purchased and enter the country from all over the world, it is possible that instead of delivering the generated power to the grid at the UK standard of 50 Hz the supply might be delivering power from the panel at anything from 47 to 60 Hz even though the tolerances are meant to typically be as small as ± 0.1 Hz to ± 0.5 Hz. This can cause damage not just to the grid but also to electrical equipment within the home of the individual where the panel is plugged in and to homes of their neighbours who are on the same circuit from the local transformer.
- 2.2.4. Given the wiring could melt there is no guarantee that the device would not trip the properties fuse box, as highlighted, it is not designed to accept a flow in the opposite direction. The safety of the home will need to rely on the fuse in the plug to ensure the homes safety. It should be realised that if multiple plug-in panels are connected there will be no overall fuse to cut all the connections should there be an overload.
- 2.2.5. Modern homes are being connected to the grid via a three-phase system given increased need for supplies to charge vehicles, charge a range of electrical equipment and operate heat pumps as well as the normal day to day activities. As such the panels need to have the capacity to be fed back to the grid down a three-phase cable.
- 2.2.6. It is likely to be the case that an increase in fires in the home linked to plug in solar could derail the roll out of full-scale solar home deployment in homes given the rumours and half-truths that can circulate on social media. There is only one opportunity to make a good impression and Unite would like to see as many consumers as possible taking up the opportunity to charge batteries or self-generate power.
- 2.2.7. As was starkly demonstrated by the Smart meter roll out, however, there many today who do not want to have a Smart meter because they still believe it will lock them into a single provider or that the meter will need to be changed each time they switch, because that was the situation when smart metres were first rolled out.
- 2.2.8. Unite would strongly suggest that the plugs used to connect panels to the grid are not of the typical three pin variety that allows the panel to be connected anywhere. Clause 5 of **BS 1363-1** (the British Standard for 13A fused plugs) establishes the fundamental mechanical parameters for “non-solid pins”, ensuring they prevent excessive wear on socket-outlet contacts and shutters. It dictates “that pins must not be constructed in a way that causes premature degradation or electrical hazards during mating”. The design of the standard plug is meant to ensure that there is no way the user could be exposed to live exposed metal connections and that such connections are made inside the wall or extension lead. However, as the electricity is flowing in the opposite direction, the design of these three pin plugs is one that could easily lead to electrocutions and therefore is in breach of Clause 5 of BS 1363-1. Consequently, the plug to the solar panel must be supplied with a female connection rather than one that has exposed metal parts and if the inverter does not switch off the supply immediately when it detects it is no longer plugged in, there is a discernible risk to the public.
- 2.2.9. Unite is very concerned that the general public will replace connectors with conventional connections, plugs and sockets so they can ‘make it work’ even if it is supplied without a 13 Amp plug, resulting in all sorts of Heath-Robinson solutions, assuming cheap solar panels are allowed to enter the market. Even if these panels are supplied with something other than a typical 13 Amp household plug, I would not take a qualified electrician to cut off the connector that the device is supplied with and add a 13 Amp plug. Unite therefore strongly recommends that there needs to be some way to determine if the plug supplied is removed, to prevent a potential disaster, be that a chip in the socket or a kelvin tested wiring loop² to check the resistivity of the earth wire, a drop to which would need to render the device useless.

² A kelvin testing of a ground loop is a four-wire resistance measuring method used in aerospace and in the automotive industry that sends a signal down one pair of wires and this is measured off by using a second pair of wires to measure

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- 2.2.10. It is recognised that this will slow down the roll out of such plug-in panels, but it is better to be safe than cause deaths through undue haste. While the consumer has to stop and think for a moment as to why the panels are not fitted with a standard household plug or socket as standard the better as this could prevent the loss of people's lives.
- 2.2.11. The Construction Index reported that German supermarket group Lidl is among organisations working to make plug and play solar panels available in their centre isle which they called "*a recipe for disaster*"³. If products are made readily available in supermarkets for an unqualified person to install, disaster could follow.
- 2.2.12. Unite would therefore recommend a plug design that is needs to be very different to the household 13 Amp plug, and similar in design to those used in caravans and in electric vehicles, where the partners of the plug design are only available to reputable, qualified solar panel electricians. This may then help prevent DIY connections that should be ideally left to a professional, to ensure consumer safety. Just as written warnings on included paperwork may reduce the actions likely to create a domestic fire or electrocution, it will not prevent it.
- 2.2.13. In an ideal world the grid should also be made aware of the connection so it can monitor the connection for issues and more easily predict and balance the grid, but it is very unlikely that the general public will let the grid know if they unplugged the panels or connected them somewhere else in the house.

2.3. Worker Safety

- 2.3.1. When energy distribution companies are working on the local transformers or infrastructure, they may call on the grid to disrupt supplies but then discover that the local circuit is live and providing power to homes on the same network from the plugged-in panels.
- 2.3.2. As a result, similar home generation setups can and have caused worker electrifications from professionally home installed solar panels and consumer battery set-ups that have not automatically disconnected when they detected a drop in the supply to the home. This has resulted in a door knocking exercise to find out who on that circuit has the bank of batteries in their garage.

2.4. Grid Predictability

- 2.4.1. The grid attempts to predict the unpredictable by examining where the power generation is likely to come from and ensuring that the supply matches the demand on a moment-by-moment basis. If the grid does not know that Mr and Mrs J Bloggs now have a plug in panel it might not be an issue in the grand scheme of things but if as is hoped several residents of blocks of flats suddenly start generating power rather than drawing it may mean that there is significantly more power being received than expected and that power will either have to be stored (if there is capacity) or sold to another country. If not, the ripples could turn into a tidal wave of issues for energy providers.
- 2.4.2. If the grid receives too much electrical energy, because it has to maintain this critical balance, this unmanaged surplus can physically stress equipment, potentially leading to widespread blackouts. To keep the grid stable and maintain the standard frequency, grid operators may not react in time to deploy safety systems. If these fail, unlike water pressure which can simply burst a seal or stored, AC electricity cannot be rapidly stored. If generation spikes above consumption, the rotational speed of generators speeds up which can burn out bearings. This physically increases

the voltage drop. Such a method could then measure if the resistance of the ground wire has dropped because the distance to the plug has changed.

³ The [article can be found here](#)

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the AC frequency and line voltage, which can damage sensitive electronics as it exceeds operational tolerances.

- 2.4.3. If these plug-in solar panels are exporting excess AC power, the inverters should constantly monitor grid voltage. If the grid voltage spikes too high (e.g., above 253V in the UK), these smart inverters should be programmed to automatically disconnect from the grid to protect local infrastructure. Equally if standard domestic or industrial solar panels or home battery systems detect that the grid is not providing power, they should also disconnect the flow to the grid. But plug in solar would be incapable of detecting the flow of electricity to the home without a secondary monitoring device connected to the incoming supply. If these two devices are connected over a home wifi network, then plug-in solar might have the same capability to disconnect the home from the grid and switch off the panel. This is not something that could be installed as a DIY project, but it is something that an energy providers fully trained electrician would need to put in place.
- 2.4.4. If plug in panels are the only source of power due to a blackout in the area, it must be noted that they should not be relied on to provide the home or business with power. A solar panel absorbs and supplies power, but most domestic and industrial products are designed to just consume power and hence they could be damaged as the supply from the panel rapidly attempts to change direction.
- 2.4.5. It cannot be assumed that all devices plugged into the walls in the UK will meet UK standards due to the rise of the internet and items slipping past customs checks, as has happened on multiple occasions with substandard lithium-ion batteries for electric vehicles.
- 2.4.6. According to an article in Construction News⁴ there has already been a death in one Australian state caused by plug in Solar panels. Obviously Unite does not wish to see this repeated anywhere.

3. Conclusion

- 3.1. To be clear Unite supports the roll out of domestic solar, wind and even hydro projects as the country needs far more electricity in the near future than has already been catered for. One only needs to look at the number of additional electric vehicles, more powerful and power-hungry computers, servers for faster internet and AI, hydrogen generation techniques to provide mobile energy supplies and long-term storage (via metal hydrides⁵)... the list could go on. Unite just cautions against allowing the general public to plug-in solar panels without an expert on hand to ensure that connections are carried out safely and that the wiring can handle the load.
- 3.2. There are some far more suitable solutions to solar generation in flats including solar glazing where the windows generate power. These work by printing transparent photovoltaic cells or special inks onto the glass, these windows harvest renewable energy without completely blocking visible light. They are primarily used in modern commercial facades and residential skylights and importantly they are not plug and play but require professional installation. These also help regulate the heat into a property as the coatings naturally reflect infrared radiation to stop buildings overheating in the summer and reducing heat loss in the winter. Solar glass panels can also be integrated into the majority of structures, provided that it has a window⁶. Therefore, the government could require that all future properties are fitted with this glass as standard, which should significantly increase the demand and in turn lower the cost due to economies of scale. Tall building designers appear to love wrapping new buildings in glass, so why not require that every panel is generating power, rather than adding additional fire hazards into tall buildings.

⁴ <https://www.constructionnews.co.uk/buildings/building-safety/safety-bodies-urge-pause-on-plug-in-solar-rollout-over-fire-risk-fears-08-06-2026/>

⁵ This has been covered in previous consultations responses where the benefits of metal hydride storage are measured against other leaky options, like battery or heat storage which release energy over time.

⁶ See [The Renewable Energy Hub for details](#)

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- 3.3. Unite believes that the connection of such devices to the grid should be part of a programme of home and grid improvements so that the electrical supply can flow more freely and there are far fewer losses during transmission. Homes need to be retrofitted to remove all forms of fossil fuel consumption as soon as is humanly possible but if the time to train the workforce needed is considered, more workers would be needed than were/are employed on the Channel Tunnel, HS2 and Hinkley Point C construction projects combined. And every day as more natural gas boilers are installed the problem gets worse. If this rollout is delayed the number of workers needed to complete the task of becoming net zero grows exponentially.
- 3.4. The Electrotechnical Skills Partnership (TESP) is a not-for-profit industry partnership formed by the Electrical Contractors' Association (ECA). Their Labour Market Information (LMI)⁷ on the roll out of solar panels suggests that the number of additional electricians required to achieve professionally installed solar rollout is far from insurmountable in the time we have available.
- 3.5. Unite believes that given the scale of the challenge that DESNZ should be acting now to maintain and increase the number of skilled engineers in the UK capable of completing this work by what ever reasonable means possible or their goals of achieving energy security and net zero emissions will both be impossible. Given the average age of these workers, this may mean encouraging workers due to retire to stay in work even if it is on a part-time basis as a mentor so that valuable knowledge is not lost.
- 3.6. Therefore, it may appear logical to find a way to provide access to a plug-in solar panel solution for those without access to a roof or outside space but as seen from the above, Unite cautions against placing a life and safety ahead of expediency and making solar easily available to the masses. Unite recommends that DESNZ should be concentrating on community / cooperative renewables and clean heat initiatives for solar and heat pumps rather than what Construction Index deems a "*recipe for disaster*" as highlighted previously.
- 3.7. Finally Unite would highlight that questionable equipment is already on sale via well-known online marketplaces in the UK, and this needs to be clamped down on to protect UK consumers from fire (especially in high-risk tower blocks), electrical shocks and electrocutions.

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⁷ You will find the [TESP LMI here](#)