Safety of Plug-in Solar

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What is plug-in solar?

Plug-in solar typically consists of 1-4 solar panels and is designed for simple, self-installation by a homeowner or renter. Plug-in solar is connected to the home's electrical system via a plug into a standard wall outlet.

How does plug-in solar work?

After the electricity generated from a plug-in solar system feeds into the outlet, it first flows to any other devices plugged into the circuit, which is the wiring that runs from the main service panel to a series of outlets. If there is any leftover electricity, it flows through the main service panel to other devices, such as lights and large appliances (e.g. air conditioners, dryers, ovens). If the solar panels ever generate more electricity than can be consumed onsite, the excess electricity flows to the grid to power neighboring homes.

What are the benefits of plug-in solar to homeowners and renters?

Plug-in solar is a low-cost way for residents such as homeowners and renters to introduce renewable energy into their lives and reduce their everyday energy costs. By directly supplying power to household appliances, plug-in solar reduces the electrical energy residents must purchase from the utility and reduces electric bills. Importantly, plug-in solar is accessible to renters and families living in apartments, as smaller systems do not require structural or electrical modifications to the building and can be easily moved when relocating.

What are the benefits of plug-in solar to the wider community?

The electricity generated by plug-in solar is consumed on site and in the neighborhood, directly offsetting local energy demand, reducing stress on utility infrastructure, and helping to delay or avoid costly grid investments. Local generation also reduces line loss, which is the energy wasted as heat during long-distance transmission, improving the overall efficiency and stability of the entire power system.

Is plug-in solar safe?

A safety standard developed by UL Standards and Engagement (ULSE) is now available for plug-in solar devices. ULSE is one of the country's preeminent standards development organizations. On December 11, 2025 ULSE released *UL3700, Outline of Investigation for*

Interactive Plug-in PV (PIPV) Equipment and Systems. The standard constitutes a suite of rigorous requirements and tests to demonstrate the product will not pose risks associated with electrical shock, fire, structural, and other hazards. UL3700 includes requirements for component parts to meet other product safety standards, such as that inverters meet UL1741, which would prevent electricity from backfeeding to the grid during a power outage.

With appropriate legislation, plug-in solar products on the market will be required to meet national product safety standards. To effectuate this, every plug-in solar manufacturer will need a Nationally Recognized Testing Laboratory (NRTL) to test their products. Plug-in solar products that meet the standards will consequently bear the NRTL's mark.

After 10 years of adoption in Germany, four million of plug-in solar systems are in use with no significant safety incidents reported.

Does plug-in solar remain safe when space heaters, hair dryers, and other power hungry appliances are simultaneously plugged into other outlets?

Plug-in solar systems that meet ULSE's product safety standard will be safe. As typical for product safety standards, the plug-in solar standard has multiple pathways to meet the safety requirements. One of the more common pathways, established in the UL3700 standard, is the use of special equipment that operates as a power control system (PCS). Power control systems use current sensors that measure the flow of electricity and can send a signal to the solar system's inverter to reduce the solar generation. In the unlikely event that power hungry appliances are plugged into outlets in an atypical configuration that begins to heat the home wiring to unsafe levels, the PCS will automatically shut off or throttle down the solar power production.

Does plug-in solar remain safe if someone were to use multiple units in their home.

Owners of plug-in solar systems should follow the manufacturer's installation instructions, which lay out potential restrictions on using multiple plug-in solar systems together and additional hardware to install to protect safety.

Does plug-in solar remain safe in homes with old wiring?

Yes. The National Electrical Code (NEC) sets the requirements for wiring in homes. These NEC electrical requirements, together with the product safety standards, provide the necessary safety since they specify the minimum requirements in building wiring.

Does plug-in solar need to be plugged into a "dedicated circuit"?

While a "dedicated circuit" (wiring that runs between a circuit breaker and the plug-in solar system does not have any other receptacles) is one method to protect the home wiring from overheating, as most homes do not have many such dedicated circuits, other methods – such as PCS discussed above – will be more commonly employed to protect the wiring.

Is plug-in solar safe for utility linemen if the grid goes down?

Yes. As soon as the grid goes down, the plug-in solar system's inverters automatically stop producing power so it cannot send electricity to the power lines. This functionality, which is crucial to the safety of traditional rooftop solar systems as well, has been a required feature of this equipment for over 25 years.

Will the plug's prongs shock users?

No. If the solar system is unplugged, it will cease sending electricity to the prongs in a similar way that it protects utility linemen..

Can outdoor outlets be used for plug-in solar?

The UL3700 standard addresses this issue. Ground fault circuit interruptor (GFCI) outlets are used outside to protect against shock in the event of water coming into contact with the wiring. GFCI outlets are crucial safety devices because they immediately deenergize the outlet upon detecting a safety issue, limiting the shock and preventing electrocution. The current GFCI product safety standard only pertains to the flow of electricity from the outlet to the appliance. While GFCI outlets are on the market that are safe for electricity to flow from the appliance to the outlet, the UL3700 standard for plug-in solar – potentially in concert with UL 943, the existing standard for GFCI outlets – will allow such products to be certified for the flow of electricity in both directions. The need for new GFCI product testing is being spurred also by electric vehicle to grid technology.

Is plug-in solar safe to put on a balcony?

Plug-in solar systems that meet ULSE's product safety standard will be structurally safe for wherever the device is intended to be used. The standard constitutes a suite of rigorous requirements and tests to demonstrate the plug-in solar system will stay in place as intended by the manufacturer. Products that are permitted to be installed on a balcony will stipulate any limitations on that method of installation. The standard also requires all necessary hardware to be included with the unit.

Does the National Electrical Code apply to plug-in solar systems?

The National Electrical Code (NEC) applies to the home's wiring to which the plug-in solar system is connected. The product installation instructions are required to stipulate how to safely connect a device certified to applicable product safety standards to the house electrical system. Legislation can optimize a state's electrical code to allow broader use of plug-in solar and make clear that the products need to be listed to safety standards.

Do plug-in solar systems require approval from the utility?

Currently, utilities require traditional solar installations to enter into an interconnection agreement – a sometimes-lengthy process involving applications, reviews, and inspections. Since many plug-in solar systems will not send electricity to the grid, and those that do only send a very small amount, such utility approval would constitute an unnecessary burden that would deter families from buying a plug-in system in the first place. However, as plug-in solar is a new technology, existing regulations do not draw a distinction between traditional solar and plug-in solar. The lack of a specific distinction may unduly apply the interconnection requirements to plug-in solar. Legislation could create a new class of solar products that exempt plug-in solar systems from the utility interconnection process.

Are plug-in batteries safe?

Yes. UL 2743 is the safety standard for portable power packs and covers plug-in batteries. Traditional non-portable batteries are certified to UL 9540 which would apply to systems paired with the plug-in solar systems. These robust and proven standards check for electrical, thermal, and mechanical safety among other factors. These standards also stipulate where these products can be properly used or installed.