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House Committee on Energy & Digital Infrastructure
Vermont House of Representatives
RE: Follow-up Testimony on SB 202

April 14, 2026

Good afternoon, Chair James and members of the Vermont House Committee on Energy & Digital Infrastructure. Thank you for this opportunity to provide follow-up testimony on SB 202. We also commend this committee for its dedication to addressing the safety challenges for Vermont residents.

I have prepared answers to your follow-up questions on UL 3700. I will walk through these answers but if it is helpful to interrupt with questions, please do so. I am happy to discuss these topics in whatever depth suits the Committee.

UL 3700

Terms Used. Plug-in photovoltaic, or PIPV, is the term used throughout UL 3700. In the glossary of terms, "PIPV" is "a generic term that could refer to PV components, equipment, or system that, when assembled and installed as a complete PIPV system in accordance with manufacturer instructions, generates AC power from exposure to light and is electrically connected through a PIPV plug." The scope of the standard covers PIPV systems.

The standard does not use other industry terms, like "portable solar generation" or "balcony solar." However, products sold or marketed under those names would be encompassed within the scope.

Dedicated Circuit. UL 3700 does not universally require plug-in photovoltaic (PIPV) systems to be connected to a dedicated branch circuit. Instead, the standard allows multiple design configurations to address the electrical and safety hazards associated with connecting a PIPV system to an existing premises wiring system. Installation Instructions differ for PIPV products intended for use on dedicated circuits (Secs. 9.2.2-9.2.6) and those intended for use on non-dedicated circuits (Sec. 9.2.7-9.2.14).

Specialized Plug. UL 3700 requires a proprietary, non-standard plug and receptacle system. The use of special plug configurations has several safety implications. First, a

specialized plug can promote the safe installation of PIPV products on only those residential circuits where compatibility is not a safety issue. A specialized plug and a mating specialized receptacle will provide a unique method of electrical connection. This prevents accidental connection to standard 120 V, 15 A household circuits with NEMA 5-15 receptacles that have not been deliberately configured with appropriate overcurrent protection and bidirectional GFCI, and helps maintain predictable grounding, bonding, and fault-clearing behavior. A specialized plug can also help address touch safety, although other methods of protection can also be used.

Bidirectional GFCI. Bidirectional GFCI protection is mandatory under UL 3700. The standard requires the use of Class A GFCI devices that comply with UL 943 and are suitable for bidirectional current flow. Because plug-in photovoltaic systems can export power to the branch circuit, the GFCI must provide personnel protection not only during normal utility-to-load operation but also during PIPV current export. While UL 943 establishes the baseline requirements for Class A GFCI performance, UL 3700 explicitly requires that GFCI protection remain effective under reverse or bidirectional current conditions, ensuring that ground-fault protection is not compromised when the inverter is exporting power. This is critical for safety as traditional unidirectional GFCIs can be damaged by bidirectional current flow and lose the ability to provide ground fault protection in this unintended mode of operation; however, they can continue to provide electrical power through the receptacle despite having lost the ability to protect.

UL 1741. UL 1741 is a normative reference in UL 3700, meaning that the inverter component of a plug-in photovoltaic system must comply with UL 1741 as a foundational requirement. UL 1741 establishes the baseline for inverter construction, electrical safety, grid-interactive behavior, anti-islanding, and functional safety. UL 3700 builds on this foundation by applying UL 1741-certified inverters within a plug-in system architecture and adding supplemental requirements to address user accessibility, branch-circuit interconnection, bidirectional power flow, and protection against electric shock. Together, the two standards ensure that plug-in PV inverters are both grid-compatible and safe for consumer-installed operation. UL 3700 also references requirements in UL 1741 for safe interconnection.

IEEE 1547. IEEE 1547 and IEEE 1547.1 are referenced in UL 3700. UL 3700 requires that plug-in PV inverters behave in a manner consistent with the technical requirements in IEEE 1547 and IEEE 1547.1 for interconnection, including voltage and frequency response, abnormal condition behavior, and similar PIPV output protection issues as noted in Annex A.

NEC Reference. UL 3700 references the National Electrical Code (NEC), NFPA 70, as the governing model Code for “practical safeguarding of persons and property from hazards arising from the use of electricity.” This generally includes the field installation of plug-in photovoltaic (PIPV) systems. UL 3700 specifically relies on applicable NEC provisions. UL 3700 does not replace or supersede the NEC; rather, it complements existing NEC

installation requirements with product-level safety requirements for plug-in PV equipment, designed to operate within NEC-compliant electrical systems.

Mounting. UL 3700 establishes detailed, enforceable mounting and hardware requirements for plug-in photovoltaic systems. While the mounting system may be movable or temporary, it must be mechanically secure and supplied as part of the product. UL 3700 requires mounting systems to comply with UL 2703 and to be designed and tested to withstand applicable wind, snow, seismic, and gravity loads. UL 3700 explicitly states that plug-in PV systems are not expected to be removed prior to weather events, reinforcing that mounting systems must be robust enough to remain safely installed under foreseeable environmental conditions.

Overcurrent Protection. To comprehensively address electrical safety, UL 3700 provides a structured approach to overcurrent protection for both plug-in photovoltaic (PIPV) systems themselves, and the electrical circuits to which they may be connected. This is an essential safety principle, as the upstream overcurrent protection devices in the premises wiring system cannot detect the additional current injected into the circuit by a PIPV product and therefore cannot protect all of the downstream wiring, connections and devices from overcurrents that might occur. For PIPV products specified for use on dedicated circuits, UL 3700 requires coordinated overcurrent protection at the branch-circuit level, ensuring the PIPV device is the only source connected to the circuit and that conductor ampacity is not exceeded. For non-dedicated circuits, where other loads share the branch circuit, UL 3700 allows two alternative protection approaches: either (1) integral overcurrent protection within the PIPV system that limits the combined utility and inverter current to safe levels, or (2) the use of a power control system or other protective scheme designed to prevent branch-circuit overload. Together, these options ensure that overcurrent protection remains effective under different installation modes.

UL Solutions appreciates the opportunity to answer these questions and can provide further follow-up as needed. We are strongly supportive of your efforts to expand access to renewable energy though PIPV systems while also protecting safety for the resident's of the state.