FRANKLINWH

Unlocking Unrestrictive Vehicle to Load (V2L) Capabilities with the FranklinWH System

Introduction

With the growing demand for electric vehicles (EVs), including the introduction of electrified trucks such as the F150 Lightning, Tesla Cybertruck, and Chevy Silverado — each equipped with high-capacity batteries — homeowners are increasingly eager to leverage EV's batteries to power their homes during extended power outages. While only a limited number of EV trucks offer these capabilities today, it's an exciting development. Multiple vehicle manufacturers, such Ford, GM, Hyundai, Tesla, Rivian and Kia, are adding vehicle-to-load (V2L) and vehicle-to-home (V2H) capabilities to their newest EVs.

With an average daily household consumption of 30 kWh, a 100-kWh battery pack could theoretically power a home for up to three days. While this is an interesting and evolving field within renewables, there are still some barriers to address and before we achieve mass adoption. Homeowners are particularly concerned about the cost of adopting this technology and how EV warranties may be affected when additional capabilities, such as V2H or V2L are integrated. This creates exciting opportunities for integrating stationary home energy storage systems, such as the FranklinWH system, with existing EVs.

At FranklinWH, we are dedicated to innovation, energy freedom and futureproofing as fundamental pillars of our mission. The FranklinWH system supports V2L, allowing homeowners to use a compatible EV to power home loads and charge the aPower batteries during an outage. The best part is that this setup requires neither costly proprietary equipment from the vehicle manufacturer nor a significant investment to enable this feature. At FranklinWH, our goal is to seamlessly integrate all power sources into the home by focusing on innovation and simplicity. We do not currently support V2H bi-directional charging, however it is on the product roadmap. The aGate's open and robust 280 A busbar and Energy Management System has the capability to manage many power sources including EV chargers.

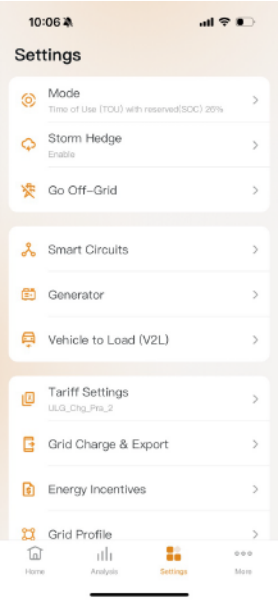
FranklinWH's Innovative Approach to V2L

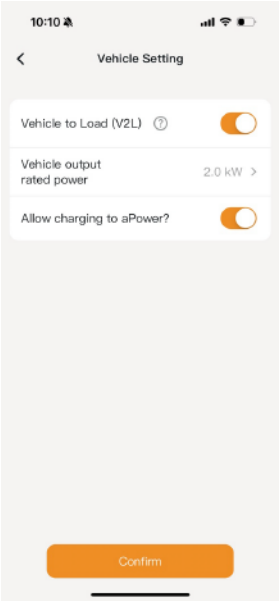
V2L refers to the process of transferring stored electricity from EV batteries to support loads (electric) in the home. Several pathways are available to bring EV power to the home. One of the more complex pathways may bring substantial costs due to the necessity of installing the required inverter equipment and infrastructure upgrades to effectively utilize this capability. Those costs may include a main panel upgrade, which adds to the overall project cost and leaves homeowners frustrated.

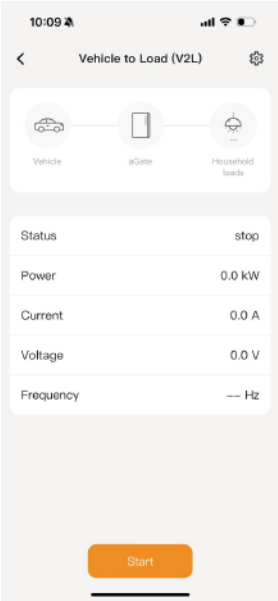
The FranklinWH system takes a simpler approach, without infrastructure upgrades. The system allows the eligible V2L compatible EV to feed home loads and charge the aPowers as well during an outage. Several EV trucks have an onboard 240 V NEMA 14-30 or NEMA 14-50 outlet which can be leveraged to integrate with the FranklinWH solution using the Generator Module (aGate accessory). At the time of publishing this document, it's important to note that some EV manufacturers such as Hyundai and Kia may have EVs with V2L capabilities, however they cannot be integrated with the FranklinWH V2L solution as they are not a true 240 V outlet.

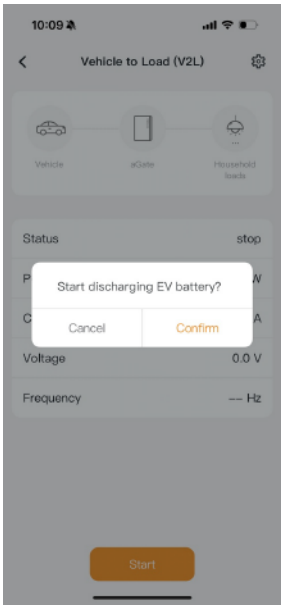
When the utility grid and solar are not available, and during a prolonged outage or at night, the aPower battery state of charge (SoC) can be depleted to a low-level. In such events, just like generator operation for the FranklinWH system, the eligible EV model can serve as a backup power source for the household loads and to recharge the aPower battery.

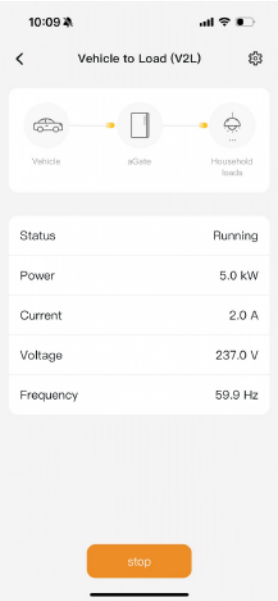
This feature enables uninterrupted power experience to homeowners during prolonged outages without requiring any additional hardware or major electrical upgrades. The Ford F150 Lightning (Pro and Lariat), an example of the EV's tested for this feature, consists of a 240 V generator output in the truck bed which was landed on the aGate's Generator Module. The Generator Module L1 and L2 lugs are typically wired to a NEMA14-50 receptacle. A NEMA14-50P cable is run between the house outlet and the Ford Lightning. It is commissioned in the FranklinWH App. Refer to the commissioning instructions and screenshots below. Navigate to the **Settings** page, select **Vehicle to Load (V2L) - Disable** for V2L configuration as shown in the following images.

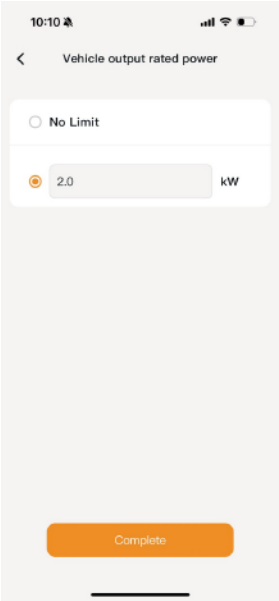


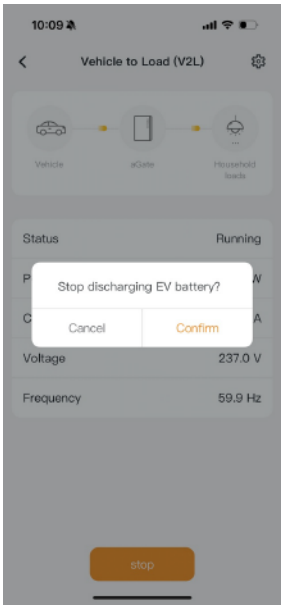


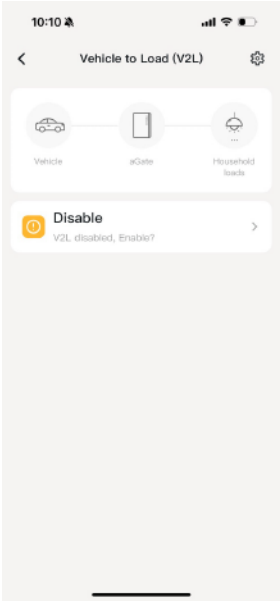












FranklinWH tested this integration with several EV pickup trucks and confirms that the EV trucks tested were serving home loads as well as charging the aPower battery. The trucks were able to charge the aPower in a few hours while supporting basic home loads. For the Ford F150, the NEMA 14 plug connecting to the F150 will need to have its ground wire disconnected. If it remains connected, the truck's electrical system will show a ground fault error.

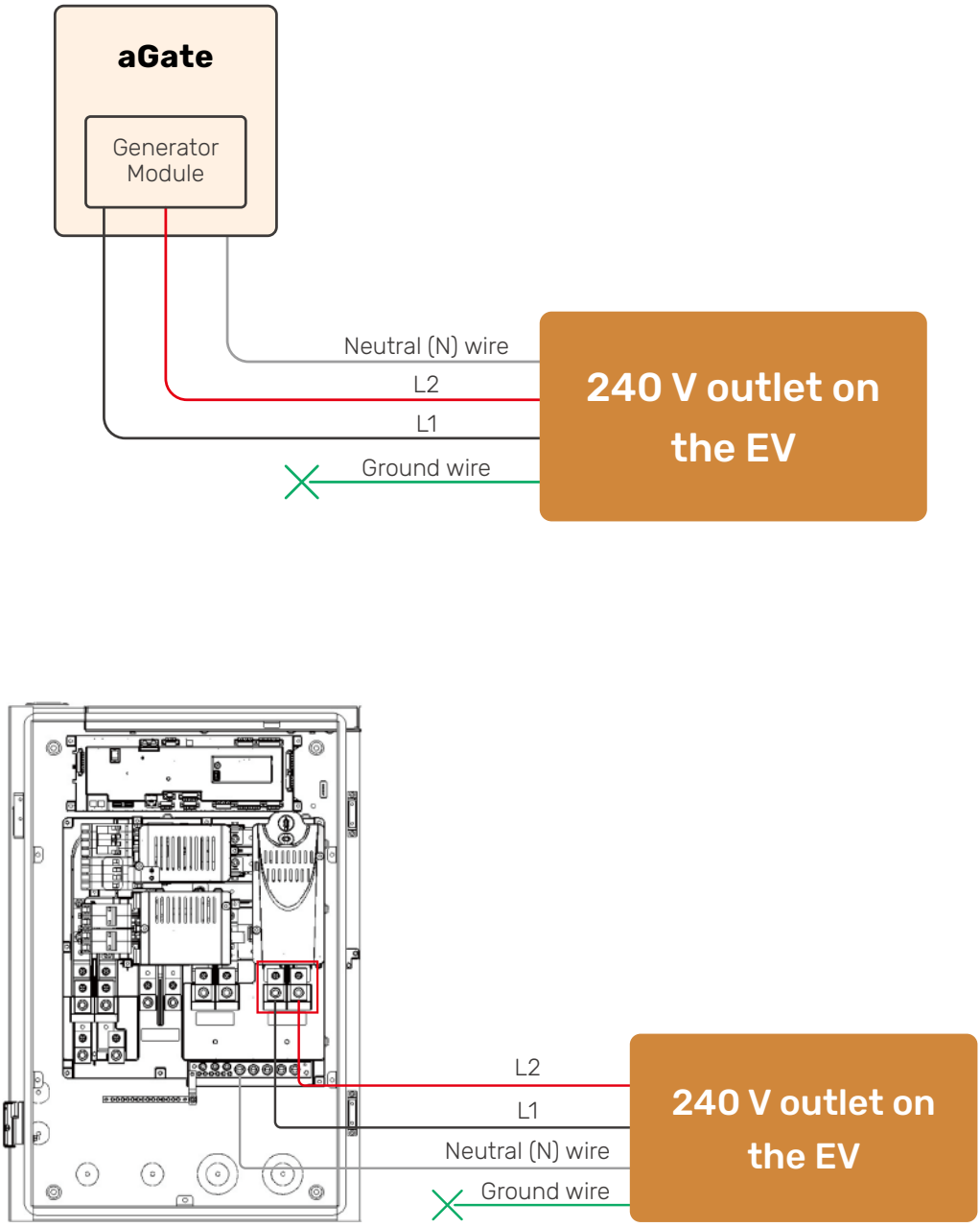


Figure 1. Configuration for EV truck and aGate

Figure 2. 240 V outlet on the bed of an EV pickup truck

To conclude, here are the requirements for integrating V2L with the FranklinWH system:

- FranklinWH certified installer
- aPower X, aPower 2 and future models
- aGate 1.3 and future versions
- Compatible Generator Module (aGate accessory purchased from distributor)
- Eligible EV with V2L capabilities and at least one 240 V AC outlet in the EV

Please note that the above-mentioned set-up does not require any additional hardware from the EV manufacturer and should only be used during an extended outage when other system generation sources (PV, Stationary/Mobile Generator) are not available or adequate to serve consumer demand. Also note that grounding at the truck needs to be removed to prevent any ground fault errors.Please read the EV's V2L capabilities and the FranklinWH Generator Module integration documentation before performing the integration. For any questions regarding this integration, please contact the FranklinWH Product Management team at **engineering@franklinwh.com**.

Frequently Asked Questions

Q: Do all aGates support the V2L functionality?

A: No, currently only aGate 1.3 supports the V2L functionality. You could have aPower X or aPower 2 with aGate 1.3 for this functionality.

Q: Which EVs support the V2L functionality with the FranklinWH solution?

A: As of 1Q2025, we have completed full testing with a Ford F-150 Lightning, Tesla Cybertruck, and Chevy Silverado with 240 V outlets. We plan to test additional vehicles for this feature and will continue to update our approved list. Please let us know which vehicle you would like us to test next by emailing us at **engineering@franklinwh.com**. Note that the EV must have a 240 V outlet for the V2L feature to be enabled and check with the EV manufacturer for more on V2L capabilities.

Q: Will the EV charge my aPower to full state of charge?

A: Yes (configurable). The EV with V2L functionality behaves as a portable generator on wheels with the primary goal of feeding the home loads and using any excess capacity to charge the aPowers. For faster aPower charging, keep home loads under 1 kW.

Q: Can I use my portable generator if I have an eligible EV that can do V2L with FranklinWH?

A: Yes, however, you can use only one at a time.

Q: What's the output from the compatible EVs that can do V2L with FranklinWH solution?

A: Please check with the vehicle manufacturer regarding this. From our testing, some of the EVs have rated output of 9.6 kW and our system default setting will not take more than 80% of the rated power for use. The usable 7.68 kW will be used to power home loads and charge the aPower batteries (depending on home load profile).

Q: Does FranklinWH support V2H as well?

A: No, it's important to note that the FranklinWH system supports V2L only and does not currently support V2H bi-directional charging. However, it is on the product roadmap of FranklinWH to support V2H. The aGate's robust 280 A busbar and Energy Management System has the capability to manage many power sources including bidirectional charger.

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