FRANKLINWH

Unlocking Energy Independence with AC-Coupled Solutions

As aging power grids struggle to meet the demands of modern energy use, homeowners are encountering growing challenges. Grid reliability is deteriorating due to underinvestment in infrastructure and the growing frequency of severe weather events — which are responsible for the majority of outages. This instability highlights the need for more dependable power sources.

While time-of-use (TOU) batteries have been presented as an alternative, these systems often fall short. Due to limited storage capacity, they are insufficient for supporting home energy demands.

"TOU batteries cannot provide backup power if the grid goes down," adds Ke Bi, Chief Operating Officer at FranklinWH. "They must work with the grid, so if there's an outage, the battery won't function at all."

FranklinWH's AC-coupled energy management and storage solution addresses the limitations of TOU-only systems by integrating multiple energy sources to boost energy efficiency and provide energy freedom to homeowners.

OVERVIEW OF THE FRANKLINWH SYSTEM

The FranklinWH whole-home energy management system is built around three key components: the aGate, aPower, and the FranklinWH App. The aGate serves as the intelligent control hub, managing energy flow between solar panels, the grid, battery storage and generators. During outages, it automatically switches to available power sources to ensure uninterrupted power while optimizing critical household loads.

"We provide energy independence, even if the grid goes down, by forming a microgrid powered by our batteries," says Bi.

The aPower 2 is a 15 kWh battery storage unit featuring a built-in inverter and an AC-coupled design. It can be scaled up to 15 units per aGate, to provide as much as 225 kWh of storage. A single aPower 2 unit is powerful enough to start a 5-ton air conditioner.

Users can easily monitor and control their energy system remotely through the FranklinWH App.

The FranklinWH energy management system boasts several unique features. One of these is an optional Smart Circuits Module installed in the aGate. Through the FranklinWH App, this module allows homeowners to view real-time power consumption and control specific circuits connected to essential loads.

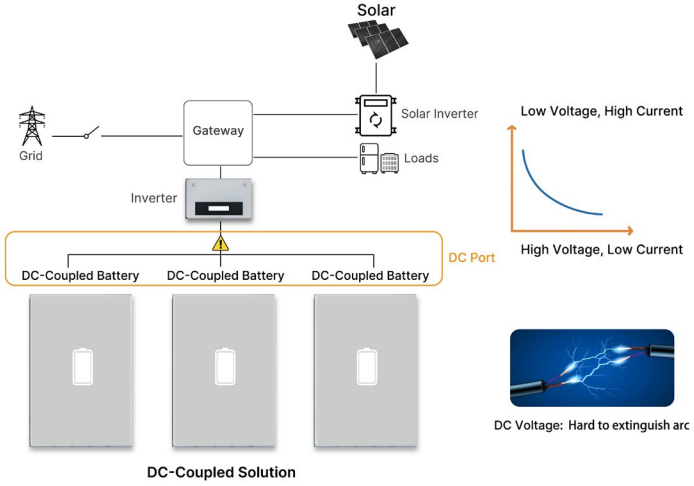
"For example, if you have a 240 V central AC system, you can connect it to the Smart Circuit instead of your home's main panel," explains Bi. "During outages, you can make informed decisions about which loads to keep running, like lights and refrigerators, and which ones to shut off, like the AC, to conserve battery power. Homeowners can even set up parameters in the app so that the system automatically shuts off certain loads during an outage to prolong battery life."

Another standout feature is Black Start, designed for prolonged outages when the battery is fully depleted. Black Start reserves 5% of battery capacity to wake the system once conditions improve, such as when photovoltaic (PV) systems are expected to begin generating energy. Once the solar panels are up and running, they recharge the battery and restore power to the home.

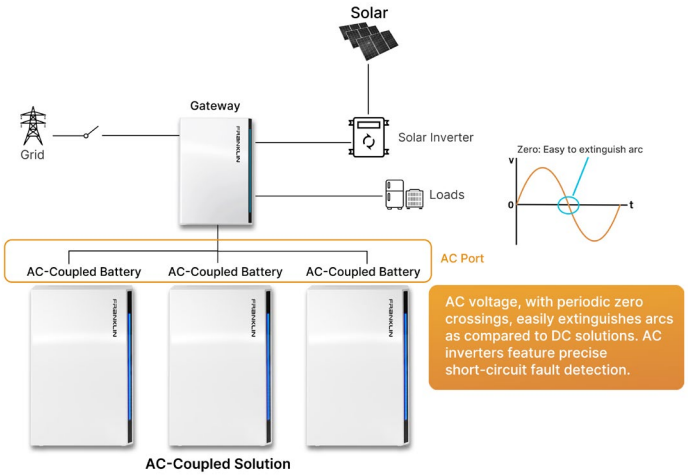
"We've also introduced a feature called Smart Black Start, which temporarily disconnects home loads from the system during the start-up process," says Bi. "It ensures that all available power goes toward starting the PV system. This feature prevents the system from going back to sleep mode if the load is too heavy during start-up."

BENEFITS OF AN AC-COUPLED BATTERY

AC-coupled technology plays a pivotal role in FranklinWH's energy management system, offering significant advantages in terms of ease of installation, safety and expandability.



DC-Coupled Solution



AC-Coupled Solution

In an AC-coupled system, each battery has an integrated inverter that directly converts its output to AC power. This contrasts with DC-coupled systems, which require an external inverter. One of the key benefits of AC-coupling is how easily it integrates with existing home electrical systems, which already run on AC power. FranklinWH's aPower battery can connect directly to the home's main panel, eliminating the need for complex rewiring or additional conversion steps and therefore simplifying installation.

The battery's AC-coupled design minimizes safety risks since AC power is governed by well-established safety codes and regulations. In contrast, DC-coupled systems — especially those operating at higher voltages — pose greater risks. "If there's a short circuit or electrical arcing, high-voltage DC can be very dangerous," says Bi. "You need a lot of protections to prevent issues. Proper insulation is difficult to achieve consistently, so there's always a chance of something going wrong."

Even low-voltage DC systems are problematic because they need higher current to operate; this generates more heat and necessitates thicker, more expensive cables.

The modular nature of AC-coupled systems also makes them easy to expand. Homeowners can simply add more batteries to increase both storage capacity and power output. Unlike DC-coupled systems, which require careful planning to balance inverter size with battery power and storage capacity, AC-coupled setups allow easy scaling without reconfiguring inverters or rewiring. Introducing new batteries — whether from the same generation or a newer one — is straightforward because the AC output is always the same at 240 V.

"It's very easy to have different versions of hardware working together because each extension is AC-coupled," says Bi. "When you mix new and old batteries in DC systems, balancing the total output and maintaining the system's efficiency over time is a challenge because of the differences between the existing battery pack and the new one."

Moreover, the parallel configuration of AC-coupled batteries ensures that if one battery fails, it won't affect the performance of others. This contrasts with DC-coupled setups, where the failure of a single battery module can cause the entire system to fail.

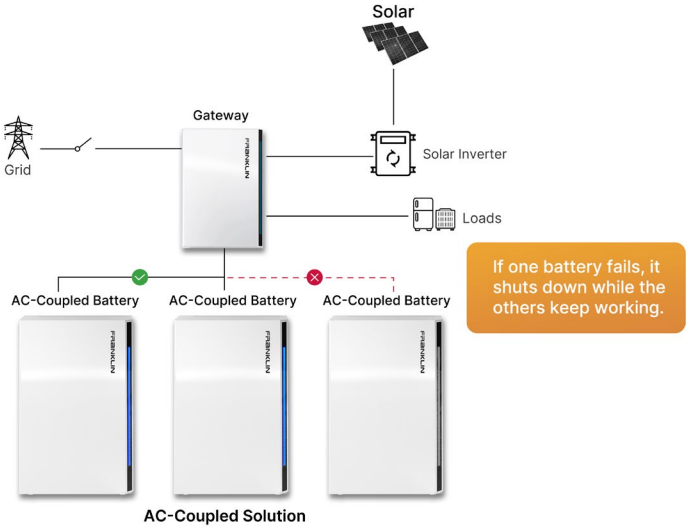
AC-coupled systems even have fewer battery installation requirements. Due to the absence of DC ports — as well as having successfully passed the UL9540A large-scale fire testing standard — the batteries can be placed as close as six inches apart, making efficient use of available wall space. Additionally, since AC batteries come with their own integrated inverter, they don't need to be positioned close to an external inverter. This allows for flexible installation options, including distances of up to 100 feet between batteries if needed.

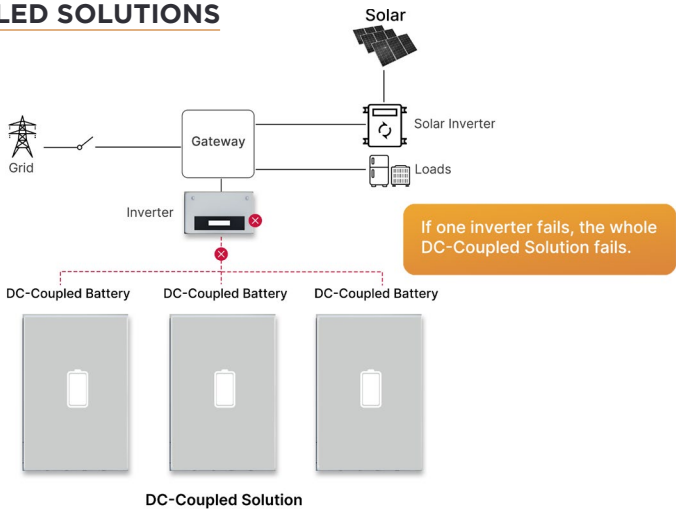
The lack of DC ports also mitigates the risk of water damage, ensuring reliable operation in harsh weather conditions.

SETTING UP AN AC-COUPLED HOME ENERGY SYSTEM

A well-designed AC-coupled storage system provides a versatile way to manage home energy needs by integrating power sources such as solar, generators, electric vehicles (EVs), and the grid. Since these typically have AC output, the system's home-focused control strategy enables seamless switching without the need to layer in complex communication and control algorithms. This flexible system structure allows homeowners to easily access any power source — ensuring continuous backup and keeping generator operation to a minimum to reduce noise and fuel consumption during prolonged outages.

For installers, setting up the system begins with understanding the home's energy loads.





It is important to take both average daily usage and peak power demands into account when performing load calculations. "You want a system that can cover everything," says Bi. "It has to be powerful enough to cover big loads or multiple loads when they are running."

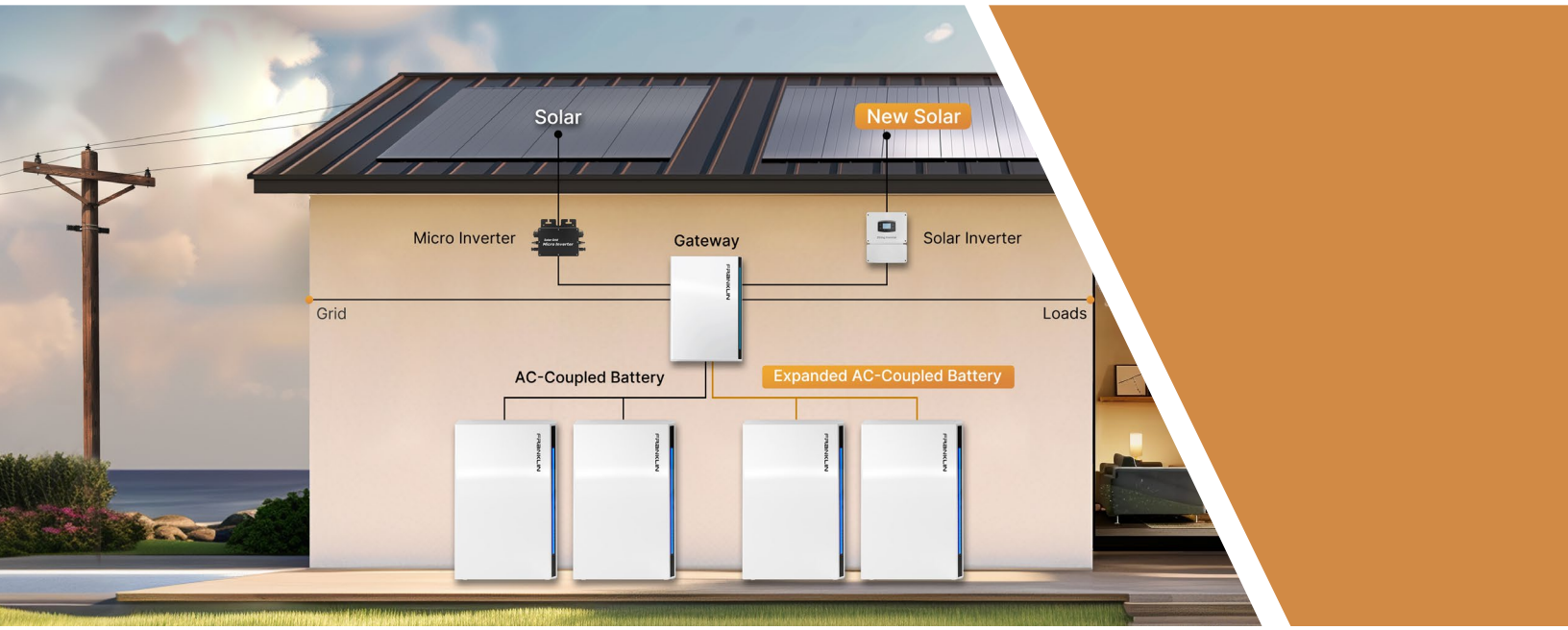
Solar integration is hassle-free in an AC-coupled setup. By connecting directly to existing PV inverters — whether string or micro-inverters — the FranklinWH system enables the storage of excess power generated during the day for use at night or during outages. This design supports compatibility with both new solar setups and retrofit projects. It also facilitates participation in various solar incentive programs across the country.

Generators, both stationary and portable, are easily incorporated into an AC-coupled system. In FranklinWH's solution, an optional Generator Module allows the generator to recharge the battery and provide power to the house during prolonged outages. While the primary backup is still the aPower battery, the generator can act as additional backup when solar or grid power is unavailable.

"The Generator Module can automatically start and stop the generator based on the battery's state of charge," says Bi. "For example, if the battery drops below 20%, the generator can kick in automatically to recharge the battery and provide power to the home. Once the battery reaches 80%, the generator stops automatically to conserve fuel."

The same Generator Module can also connect to EVs, turning them into supplementary energy sources during power outages.

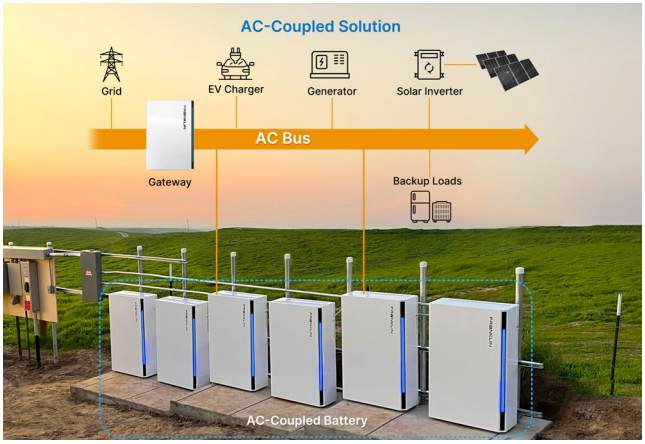
Although the utility grid may be weak, an AC-coupled system such as FranklinWH's can still work well with it. "We actually monitor the grid's voltage quality all the time," says Bi. "If the grid has issues, we switch over to our battery-powered system quickly in a seamless transition. The homeowner won't even notice because of our fast switch-over."



Time-of-use capabilities are a great example of how the FranklinWH system works with the grid. TOU functionality allows homeowners to save on electricity costs by balancing power from the grid, PV system and battery during off-peak hours, and using solar and battery during peak times. By preventing the home from drawing grid power during peak utility rate periods, the battery can pay for itself several times over.

Systems such as FranklinWH's also support participation in Virtual Power Plant (VPP) programs, allowing homeowners to sell stored energy back to the grid for credits or incentives.

"These programs lower the total ownership cost for homeowners and make our batteries more affordable," says Bi.



CONCLUSION

FranklinWH's solution showcases the strengths of AC-coupled technology, offering a robust, flexible, and scalable system that enhances home energy resilience. There are numerous case studies that underscore the value of FranklinWH's system, including one with installer feedback about ease of installation, and another that highlights how the AC architecture eliminates complex wiring.

The FranklinWH system comes with an extensive 15-year warranty and a guaranteed total throughput of 60 megawatt-hours.

To learn more about FranklinWH's whole-home energy solutions, visit www.franklinwh.com.

FRANKLINWH