

Why Residential Solar Must Be Storage Ready

A GREENTECH MEDIA WHITE PAPER



HUAWEI

The rapid growth of solar installations across North America is one of the top economic and environmental success stories of the past decade.

According to GTM Research (now Wood Mackenzie Power & Renewables), the U.S. had a total installed solar capacity of just **over 58 gigawatts** at the end of the second quarter of 2018, a quarter that saw the installation of 2.3 gigawatts. To put that number in context, consider that **2011 was considered a “historic” year for solar** because total installations topped 1.8 gigawatts.

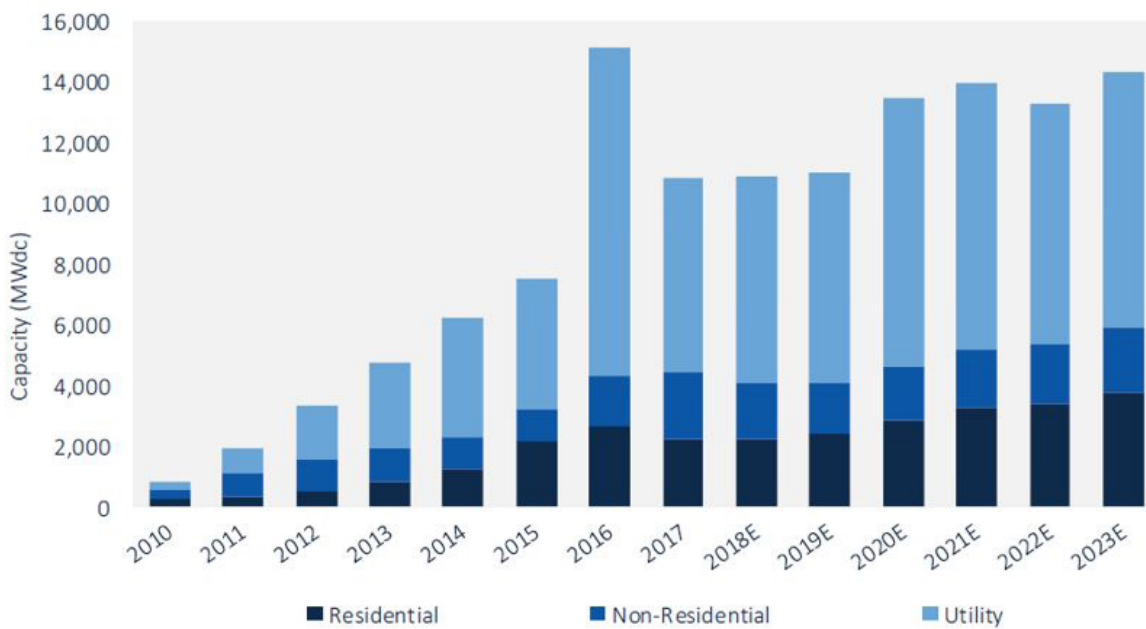
The pace of solar installations is only expected to increase. Wood Mackenzie Power & Renewables expects total PV capacity to more than double over the next five years and for annual installations to reach 14 gigawatts by 2023. A large share of that growth will come from residential installations, which WoodMac expects to be driven by system price declines of more than 30 percent by 2023.

While this is clearly a major achievement, it also comes with a number of complications that underscore the need for increased innovation.

“The reason innovation is so important is because solar can be its own worst enemy, and the high penetration of solar can make it hard for grid operators to maintain their core function of providing highly reliable electricity to their customers,” said Bates Marshall, vice president and general manager of Huawei North America’s Smart PV Business, a division of the world’s leading manufacturer of string inverters.

When grid operators believe that solar is threatening their ability to deliver on their most fundamental promise to customers, they take actions to address their concerns. These can include imposing time-of-use rates and restrictions on the export of solar energy to the grid. In response, the solar industry has promised to evolve and innovate.

Figure 1: U.S. Quarterly Energy Storage Deployments by Segment (MW)



Source: Wood Mackenzie Power & Renewables

“In the face of these new rules, the solar industry has said, ‘It’s not a problem; we can deploy batteries and shift the power to better match the load,’” said Marshall. “But the problem with that approach has been that the existing technology for storage has a cost impact that is twice what it was without storage. And that brings us to the key imperative for Huawei’s innovation: There must be a cost-effective solar-plus-storage solution that meets the requirements of grid operators.”

Innovation for cost-effective solar-plus-storage is here

The need for low-cost solar-plus-storage helps explain the momentum in the solar industry toward residential PV systems that include – or can someday accommodate – energy storage.

By 2023, Wood Mackenzie Power & Renewables estimates that solar-plus-storage will account for 90 percent of all residential deployments in the U.S. In total, the solar-plus-storage market is expected to grow twelvefold in the next five years.

But this will only happen if there is enough innovation to make solar-plus-storage affordable for customers. It’s a familiar story: Solar’s fortunes have always been tied to the industry’s ability to drive down costs in order to make it competitive with other alternatives.

If innovation is what is required, the industry’s prospects for success are aided by the active participation of Huawei. At 72 on the Fortune Global 500, Huawei operates in 170-plus countries and is on track to bring in over \$100 billion in revenue in 2018.

With more than three decades of power electronics industry experience, Huawei was ranked No. 1 globally in solar inverter shipments for three consecutive years, 2015, 2016 and 2017, based on reports released by Wood Mackenzie Power & Renewables. Between 2007 and 2017, Huawei invested \$61.87 billion into R&D, nearly 15 percent of its revenue, and it has 80,000 R&D employees focused on innovation.

In the summer of 2018, Huawei launched its FusionHome Smart Energy solution in the U.S., which

Figure 2: U.S. Quarterly Energy Storage Deployments by Segment (MW)



Source: Wood Mackenzie Power & Renewables

“Huawei has a partnership with LG Chem, a leading provider of residential batteries, so that residential solar customers can opt to add storage to their PV systems right away or easily integrate it in the future”

is designed to provide an easy-to-expand hybrid solution that allows battery-direct plug and play.

In many ways, the development and release of the FusionHome Smart Energy solution was driven by the fact that the current selection of products to enable PV-plus-storage were too complex, costly or both.

“What we’ve done is built our PV-plus-storage product to be competitive from a size, cost and feature perspective with competitors that are making PV-only inverters that don’t support storage,” said Marshall. “They have storage products, but they are nearly twice as expensive as our inverter.”

Simplicity is key

Simplicity and ease of use were the primary objectives in the development of the FusionHome Smart Energy solution. While the product doesn’t come with a battery, it requires no add-ons to integrate energy storage. Huawei has a partnership with LG Chem, a leading provider of residential batteries, so that residential solar customers can opt to add storage to their PV systems right away or easily integrate it in the future, as battery prices continue to decline.

Other features of the **FusionHome Smart Energy solution** include:

- Quick app commissioning
- Easy installation by one technician
- Backup power for critical loads in the case of a grid outage, even when a battery hasn’t been installed
- An integrated revenue-grade meter with both cellular 4G and Wi-Fi communication options, perfect for third-party owners or large fleet operators
- A smart PV optimizer to maximize energy yields of each module in case of partial shading or complex roof configurations
- Faster physical layout and optimizer auto-mapping
- Improved safety with built-in rapid shutdown compliant with NEC 2014 and 2017 standards
- Data analytics and intelligence to maximize PV self-consumption when a battery is installed

The ability to maximize self-consumption is especially important as rules around net metering change to accommodate grid operator concerns. And when a battery is available to a residential PV customer, it

also provides a level of confidence that any changes in regulations won't impact their investment.

"Solar companies must sell customers on a 25-year lifetime. But it's also true that things change and utilities change their rules," said Marshall. "Over these long time horizons, it's always possible that utilities will change the rules and put these investments in jeopardy if you can't adapt. A battery is an effective way to adapt."

A deeper relationship for installers

FusionHome Smart Energy solution is also the sort of product that changes the relationship between solar installers and their customers. Until recently, solar installers and their customers have had what is largely a transactional, one-time relationship. That is changing with the rise of battery storage and other services.

"We already see some major solar installers rebranding themselves as energy solutions providers," said Marshall. "They can expand from solar into HVAC and home energy automation."

Even if that is not an installer's goal, simply having a plug-and-play option for storage and data analytics capabilities can provide new insights and revenue streams for installers to offer.

"If a customer doesn't have the money for a battery today, they can come back in six months or six years and revisit it," said Marshall. "The installer will have analyzed their energy consumption over that time and will use that data to understand the home's energy flows. Then they can confidently say, 'If you add batteries, it will save money over the life of the system.'"

All of this is part of what can be considered solar 2.0, a necessary evolution as residential PV makes the leap into the mainstream. In the first wave of residential solar, PV systems lived in the background and delivered power with little or no interactivity with the homeowner. That has to change.

"The grid of the future is the solar inverter enabled with storage that is part of the home ecosystem," said Marshall. "It's an interactive asset that can be controlled in part by the homeowner but also in part by the grid operator or an energy aggregator. That requires a very different product from residential solar 1.0. And that requires the kind of innovation that Huawei delivers."

"The grid of the future is the solar inverter enabled with storage that is part of the home ecosystem"

Huawei is focused on developing the products and infrastructure required to create a cleaner and more interconnected and responsive energy system.

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