Solar with Storage Trend on the Rise in the U.S.

by Rida Arshad, *Research Analyst at Power Technology Research*

- The installed base of solar with storage is quite low in the majority of countries across the globe.
- Majority of the energy storage systems installed in residential areas or commercial buildings in the U.S. are connected with solar PV systems.
- Power Technology Research believes that the trend for solar-plus-storage is expected to grow in U.S., especially if the federal and state incentives continue.

The installed base of solar with storage is quite low in the majority of countries across the globe. However, in recent years, this business model has observed growth as more and more solar projects are having batteries installed along with them. The U.S. states enact the Renewable Portfolio Standards across their areas which are essentially policies that require electricity suppliers in the country to provide consumers with a certain share of electricity from eligible renewable energy resources. Majority of the U.S. states either have enforceable RPS or voluntary objectives requiring a certain share of renewables within a set time frame.

Currently, 38 U.S. states along with the district of Colombia have enacted the Renewable Portfolio Standards, whereas 12 of these U.S. states along with the district of Colombia have set a target of 100% generation from renewable energy sources by 2050 or earlier.

The pursuit of these renewable targets, be it enforceable or voluntary in nature has, led to the rise of renewables in the generation mix to the extent that renewables provided 21% of the country's electricity in 2020. It should be noted that due to the intermittency of renewables, renewable integration leads to stability issues in the grid which is dealt

with by installing storage either with or without solar arrays.

Market Trends Attributing to Rise in Solar with Storage

Majority of the energy storage systems installed in residential areas or commercial buildings in the U.S. are connected with solar PV systems. According to research conducted by the Lawrence Berkeley National Laboratory (LBNL), up until 2019, nearly 70% of all behind the meters battery storage systems had been connected with PV solar. The reason behind this is that residential consumers do not really have a source to charge the batteries once the grid stops providing power which may be to a power failure or maintenance activities.

However, there are situations where installation of a standalone battery is more feasible such as where consumers experience only short duration outages. Although, solar with storage and standalone storage both are cost effective, the cost effectiveness of solar with storage increases with Time of Use tariffs.

States with High Solar with Storage

According to a news report published by the Lawrence Berkeley National Laboratory (LBNL), the highest storage with solar attachment rate was observed in Hawaii where 80% of the residential and 40% of the non-residential had solar systems with storage in 2020. California, on the other hand, had merely 8% residential and 2% of the non-residential solar systems with storage in 2020.

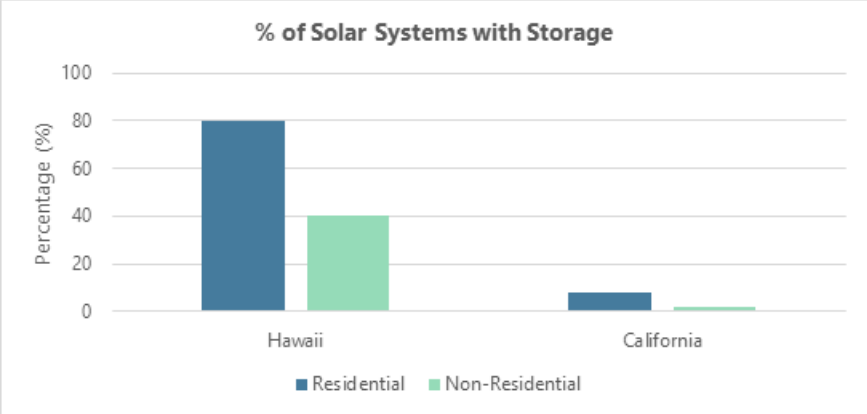

Figure 1: Percentage out of all solar systems with storage in Hawaii and California.
Source: Lawrence Berkeley National Laboratory

Utilities in the U.S. such as the Salt River Project in Arizona and Puget Sound Energy in Washington have solar attachment rates ranging from 10-20%. Contrastingly, the world's largest battery energy storage system is being constructed by Florida Power and Light Company right next to a solar plant with a capacity of 409 MW.

As far as incentives are concerned federal tax credit (ITC) is the most popular incentive which provides 26% tax credit against residential, commercial, and large-scale solar installations, applying to storage only when connected with

solar.

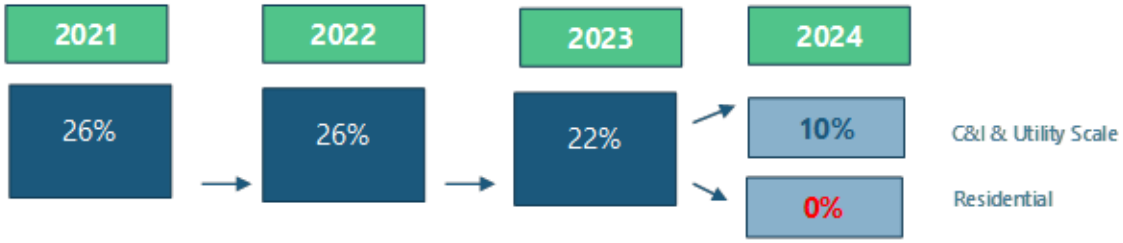

Figure 2: Federal tax credits in US for residential, commercial, and large-scale utility solar installations.
Source: Power Technology Research

Looking Ahead

As per the US Energy Information Administration, it is expected that the country will have around 59 GW of battery storage capacity by 2050, consisting mostly of hybrid projects that combine solar or wind with on-site batteries. It is significant to note that solar with storage reduces the location flexibility as to where battery storage can be located anywhere.

Further, a study was conducted by the Lawrence Berkeley National Laboratory (LBNL) which compared the market value of co-located battery and renewable projects with those that are independently sited. The researchers, while making use of wholesale prices from 2012-2019 across the seven Independent System Operators in the U.S., concluded that independently siting a battery could lead to a higher value in nearly all markets and years.

Power Technology Research believes that while coupling or standalone storage depends on the location and varies in benefits accordingly, overall, the trend for solar-plus-storage is expected to grow in U.S., especially if the federal and state incentives continue. The growth might be impeded a bit as the ITC tax phases out in 2024. Other state-level incentives, however, may help continue the momentum.

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