



U.S. to Install Battery Energy Storage Despite Supply Chain Constraints

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- Like other advanced economies United States is also rapidly deploying variable renewable energy in the country in order to reduce carbon emissions and meet climate goals.
- In the U.S., the battery energy storage market is observing a significant shift towards solar plus storage mainly due to the Investment Tax Credit (ITC).
- U.S. is expected to install 16 GW of battery energy storage capacity from 2022-2025 despite the delay in the installation of battery energy storage projects.

Like other advanced economies United States is also rapidly deploying variable renewable energy in the country in order to reduce carbon emissions and meet climate goals. In 2021 alone U.S. has installed around 28 GW of renewable energy capacity while around 3,200 MW of battery energy storage capacity was installed in the same year. This was the single largest annual addition in the battery energy storage market of U.S. and was almost thrice the amount of storage capacity that was installed in 2020. Renewables are an intermittent source of energy which leads to grid stability issues especially when their penetration in the energy mix goes beyond a certain point. So, in order to support the grid whilst growing penetration of renewable energy storage, battery energy storage is installed (which is one of the solutions). In the U.S. energy storage market 106 utility scale storage went live in 2021 whereas the cumulative battery energy storage capacity almost tripled from 2020-2021.

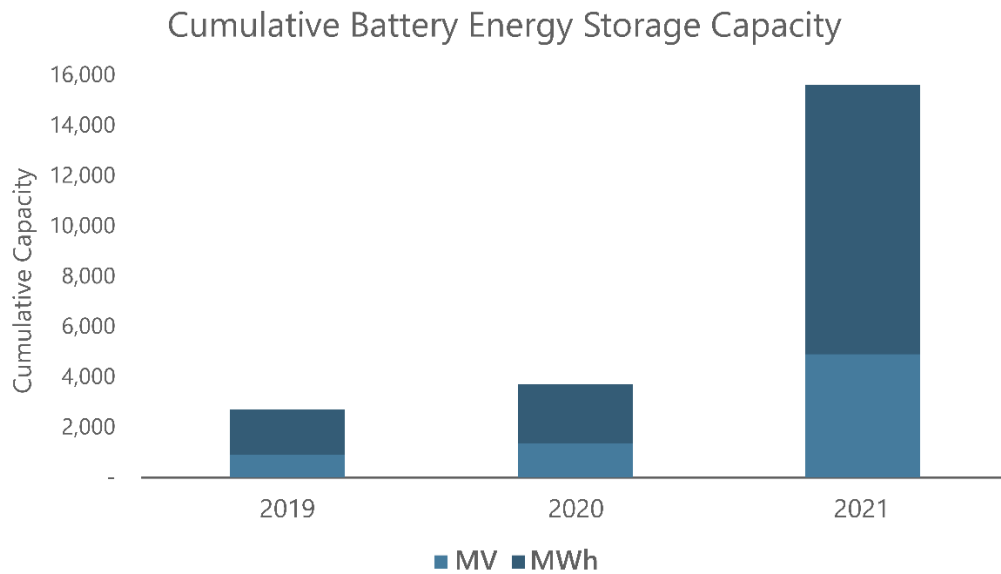


Figure 1: Cumulative Battery Energy Storage Capacity of the U.S.
Source: Power Technology Research and Energy Information Administration of the U.S.

Present Scenario of Battery Energy Storage in the U.S.

In the U.S., 9 out of 50 U.S. states have introduced mandates/targets which are aimed at accelerating the growth of energy storage in the country but regardless of the absence of established targets in other states, Power Technology Research has observed continuous growth in the deployment of battery energy storage. This growth is mainly due to consistent penetration of intermittent renewables in the energy mix followed by reduction in the dispatch of fossil fuel fired generation. However, it is significant to note that the states in the north of U.S. maintain a much less battery energy storage capacity accounting for only 70 MW.

Illinois:

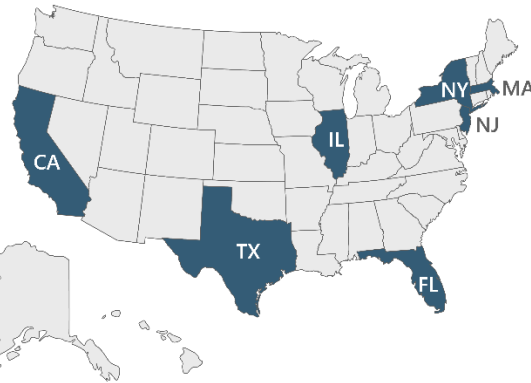
- Has installed battery energy storage capacity of around 135 MW.
- Illinois introduced a program "Coal-to-Solar Energy Storage" through which it has selected 255 MW of energy storage projects for funding.

New Jersey:

- 600 MW energy storage target by 2021 and 2,000 MW energy storage target by 2030
- To reduce the cost for peak hours and help with renewable firming
- 43.2 MW of cumulative battery storage capacity installed by the end of 2021

California:

- 15 GW of energy storage by 2032.
- Increasing renewable capacity portfolio to 25 GW by 2032.
- 2,500 MW of battery storage capacity installed by the end of 2021

**Florida:**

- Florida has installed capacity of battery energy storage around 509 MW.
- No specific energy storage mandate, however, recently set target for 100% renewables by 2050

New Jersey:

- 1000 MWh energy storage capacity by 2025
- Increase the state's renewable portfolio standard 40% by 2030
- 141.8 MW battery storage capacity was installed by the end of 2021.

New York:

- 6 GW of energy storage by 2030.
- 70% renewable energy by 2030, 100% carbon-free electricity by 2040
- 1,330 MW battery storage capacity is planned by the end of 2025 and 87.6 MW battery storage capacity has been deployed by 2021.

Texas:

- No clear mandate/target exists
- Reducing the dependence on coal and avoiding the blackout events
- 800 MW of battery storage installed by the end of 2021.

Figure 2: Overview of the Energy Storage Market of States of the U.S.

Source: Power Technology Research

Recent Trends in the Battery Energy Storage Market

In the U.S., the battery energy storage market is observing a significant shift towards solar plus storage model mainly due to the Investment Tax Credit (ITC) which is offered on batteries that are attached with solar panels and helps the developer in reducing the capital cost of the project. As per the estimates of Energy Information Administration of the U.S., in the next two years (March 2022 onwards) beyond 60% of the total 10 GW of battery energy storage capacity that is expected to come online in the service areas of U.S. utilities will be paired with solar.

But on the other hand, standalone battery energy storage projects are centrally planned and have the advantage of being deployed at optimum locations (as per Lawrence Berkley National Laboratory) as compared to solar plus storage arrangement. So, it is expected that a similar ITC will be passed in the Inflation Reduction Act for the stand-alone battery energy storage projects which will increase the deployment of stand-alone energy storage projects.

As far as the applications of battery energy storage in the U.S. is concerned till 2020 the battery energy storage market was solely providing ancillary services to the grid operator. However, as the battery energy storage capacity has almost tripled from 2020-2021 which saturated the ancillary services market and a tilt towards energy arbitrage has been observed. Additionally, load management application of battery energy storage also gained traction in 2021.

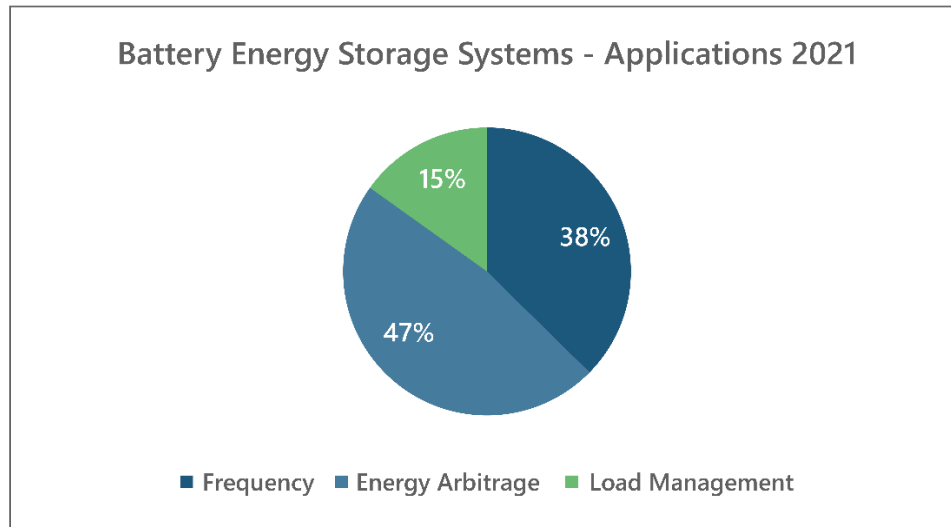


Figure 3: Applications of Battery Energy Storage Systems for Projects Installed in 2021.

Source: Energy Information Administration of U.S.

Supply Chain Constraints

A consistent decline in the price of batteries has been observed over the years. But at the end of 2021 the trend began to reverse as the raw materials that are essential for building batteries specifically lithium-ion batteries including lithium, cobalt, and nickel observed an increase in their price. The increase in price was observed because the supply chain was affected by Covid-19 followed by an increase in demand for EVs (Electric Vehicles) and closure of mining in AU in 2019. Battery energy storage projects are observing a delay of 6-12 months and the OEMs (original equipment manufacturers) in the country have increased the price of battery energy storage systems by 15-20%.

Looking Ahead

U.S. is expected to install 16 GW of battery energy storage capacity from 2022-2025 despite the delay in the installation of battery energy storage projects due to disruption in the supply chain of raw materials. Disruption in the supply chain of raw materials may serve as a double-edged sword as it is expected to pave way for alternative battery energy storage technologies for instance flow batteries and low cobalt chemistries. Furthermore, the Biden led U.S. government has invoked the Defense Production Act in March 2022 which allowed Department of Defense to develop domestic supply chain for critical raw materials used in the manufacturing of batteries. This move will provide a push to the stationary energy storage market of the country and also assist in the widespread deployment of EVs.

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