

How much energy storage will the future grid need





Overview

A zero-carbon future by 2050 would require 930GW storage capacity in the U.S 33, and the grid may need 225-460 GW of long duration energy storage (LDES) capacity 34.

US researchers suggest that by 2050, approximately 930 gigawatts (GW) of power and six and a half hours of capacity will be needed to fully cover demand for electricity in the United States in order to provide 94% of electricity from renewable sources. 930GW and six and a half hours of capacity comes out to 6 terawatt hours (TWh) of energy storage capacity. How much energy does a zero-carbon grid need in 2050?

A zero-carbon future by 2050 would require 930GW storage capacity in the U.S 33, and the grid may need 225-460 GW of long duration energy storage (LDES) capacity 34. Hydrogen, CAES, and PHS are the most viable technologies for LDES. 35 Center for Sustainable Systems, University of Michigan. 2024.

Why is energy storage important for the grid?

Energy storage is important because it allows us to manage changing demand and ensure that the electricity grid can keep up with varying power needs. By storing excess power, we can prevent outages, such as those caused by a lack of sunlight or wind.

How many GW of energy storage do we need?

That's approximately 1,500 GW of energy storage, with batteries expected to provide about 1,200 GW of that total. Looking further into the future, the picture gets even more ambitious. To keep global warming below 2°C, we need to triple our storage capacity by 2050 - from 140 GW in 2014 to at least 450 GW.

How much energy is needed for a net-zero grid?

Long-duration storage (1-7 days) such as pumped hydro gets us through those cloudy weeks, while seasonal options like hydrogen can bridge entire seasons. The Department of Energy isn't mincing words about what's needed -



achieving a net-zero grid by 2050 will require 225-460 GW of long-duration energy storage in the US alone.

How much battery storage do we need to meet climate targets?

According to the International Energy Agency, we need to increase global battery storage capacity six-fold by 2030 to meet our climate targets. That's approximately 1,500 GW of energy storage, with batteries expected to provide about 1,200 GW of that total. Looking further into the future, the picture gets even more ambitious.

What is the \$119 million investment in grid scale energy storage?

The \$119 million investment in grid scale energy storage, included in the President's FY 2022 Budget Request for the Office of Electricity, aims to develop and demonstrate new technologies while addressing issues around planning, sizing, placement, valuation, and societal and environmental impacts.



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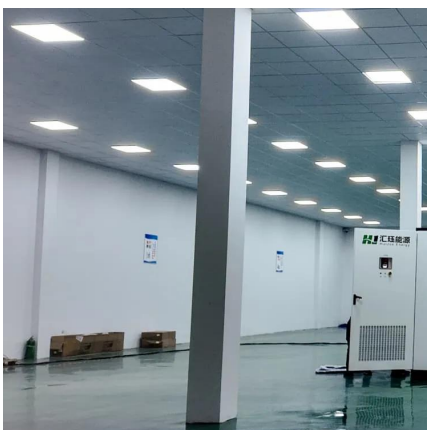


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