

# What is the growth rate of photovoltaic plus energy storage

# What is solar-plus-storage?

For solar-plus-storage--the pairing of solar photovoltaic (PV) and energy storage technologies--NREL researchers study and quantify the unique economic and grid benefits reaped by distributed and utility-scale systems. Much of NREL's current energy storage research is informing solar-plus-storage analysis.

## How much energy does a PV system cost in 2023?

The United States installed approximately 26.0 GWh /8.8 GWac of energy storage onto the electric grid in 2023,up 34% y/y. list of acronyms and abbreviations is available at the end of the presentation. The median system price of large-scale utility-owned PV systems in 2023 was \$1.27/Wac--relatively flat since 2018.

#### How does solar-plus-storage affect energy systems?

Solar-plus-storage shifts some of the solar system's output to evening and night hours and provides other grid benefits. NREL employs a variety of analysis approaches to understand the factors that influence solar-plus-storage deployment and how solar-plus-storage will affect energy systems.

## Is energy storage a viable option for utility-scale solar energy systems?

Energy storage has become an increasingly common component of utility-scale solar energy systems in the United States. Much of NREL's analysis for this market segment focuses on the grid impacts of solar-plus-storage systems, though costs and benefits are also frequently considered.

#### How much bifacial energy gain does a PV system provide?

The bifacial module share remained at 5% or less for systems 2.5-100 kWdc. Ground-mount and flat-roof nonresidential PV installations can provide bifacial energy gain, but typical sloped residential rooftop installations do not provide bifacial gain. Installers may use bifacial modules to avoid tariff-related module costs.

#### How many battery energy storage systems were installed in 2023?

In 2023,EIA reports that the U.S. installed 67,700 battery energy storage systems,of which 66,700 were residential,650 were C&I,and 122 were utility-scale. LBNL conducted a survey of 123 utility-scale wind and solar project developers.



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