

## European Solar Energy Storage

# Energy bureau pumped storage

PUSUNG-R (Fit for 19 inch cabinet)



## Overview

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What is a pumped storage facility?

Pumped storage facilities are built to push water from a lower reservoir uphill to an elevated reservoir during times of surplus electricity. In pumping mode, electric energy is converted to potential energy and stored in the form of water at an upper elevation, which is why it is sometimes called a “water battery”.

How does a pumped storage project work?

Pumped storage projects move water between two reservoirs located at different elevations (i.e., an upper and lower reservoir) to store energy and generate electricity. Generally, when electricity demand is low (e.g., at night), excess electric generation capacity is used to pump water from the lower reservoir to the upper reservoir.

How does a pumped storage hydropower plant work?

Image from IKM 3D. Pumped storage hydropower facilities rely on two reservoirs at different elevations to store and generate energy. When other power plants generate more electricity than the grid needs, a PSH plant can use that power to pump water into the upper reservoir.

What is the 2024 pumped storage report?

The National Hydropower Association (NHA) released the 2024 Pumped Storage Report, which details both the promise and the challenges facing the U.S. pumped storage hydropower industry. As the global community accelerates its transition toward renewable energy, the importance of reliable energy storage becomes increasingly evident.

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What is a pumped-storage system?

One such system is being developed by Quidnet Energy, funded by the U.S. Department of Energy's Water Power Technology Office, as an innovative geo-mechanical pumped-storage system and it uses the pressure in underground wells to generate electricity.

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### **Pumped storage provides grid reliability even with net generation ...**

Pumped hydro storage operates by using electrically powered turbines to force water uphill at night to fill a reservoir. During times of the day when electricity demand is high, the water is released to flow downhill through turbines to generate electricity.

### Pumped Storage

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### **Pumped Storage Hydropower , Water Research , NREL**

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### Pumped Storage Hydropower

The Department of Energy's "Pumped Storage

Hydropower" video explains how pumped storage works. The first known use cases of PSH were found in Italy and Switzerland in the 1890s, and PSH was first used in the United States in 1930.



## Pumped-storage renovation for grid-scale, long-duration energy storage

Grid-scale, long-duration energy storage has been widely recognized as an important means to address the intermittency of wind and solar power.



## A PUMPED HYDRO ENERGY STORAGE ANALYSIS:

This section explores the current long-duration storage costs as well as price forecasts for the three main types of energy storage, chemical (e.g., batteries), mechanical (e.g., pumped storage), and thermal (e.g., heat storage).



## DOE ESHB Chapter 9: Pumped Hydroelectric Storage

Pumped hydroelectric storage (PHS) is the oldest, most commercially mature, and most widely used utility-scale electrical energy storage technology in the world.



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## Pumped-storage renovation for grid-scale, long ...

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## Pumped Storage Hydropower Wind and Solar

The Pumped Storage Hydropower Wind and Solar Integration and System Reliability Initiative is designed to provide financial assistance to eligible entities to carry out project design, transmission studies, power market assessments, and permitting for a pumped storage hydropower project to facilitate the long-duration storage of intermittent



## Pumped Storage Hydropower in the United States: Emerging

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Bold decarbonization goals have propelled a rapid resurgence of interest in pumped storage hydropower in the US, given its ability to provide

## ESS



bulk energy storage, manage grid reliability, and support increasing integration of variable renewable energy sources.

## Pumped Storage Projects

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