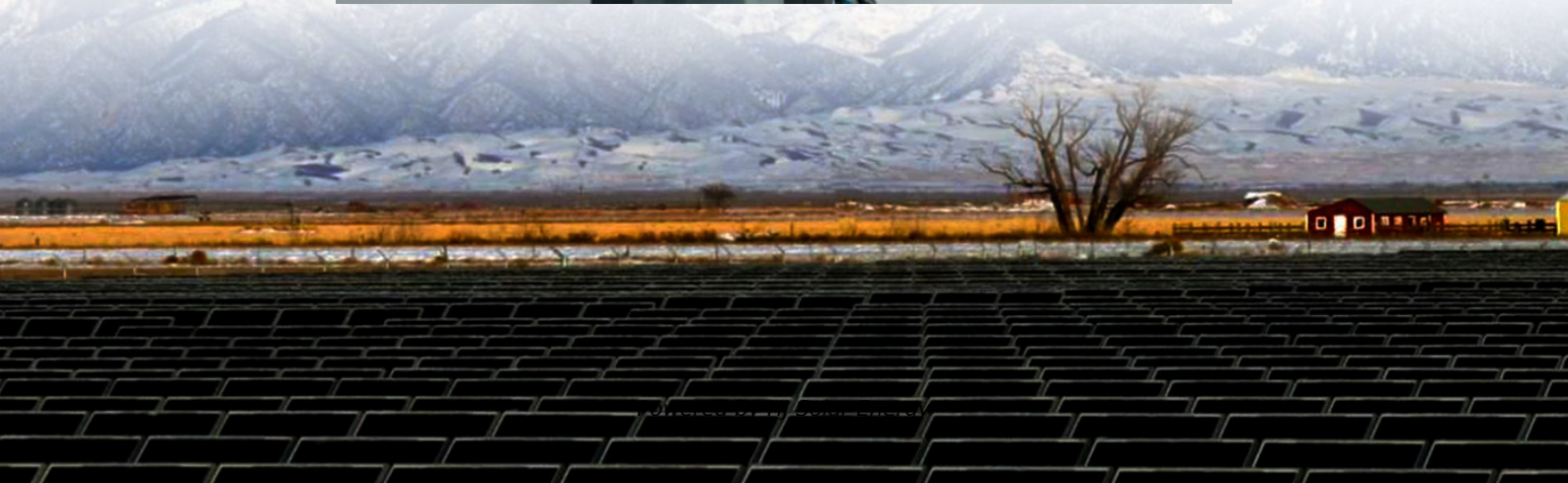


# **The scale of new energy storage will exceed that of pumped water**





## Overview

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This Comment explores the potential of using existing large-scale hydropower systems for long-duration and seasonal energy storage, highlighting technological challenges and future research.

This Comment explores the potential of using existing large-scale hydropower systems for long-duration and seasonal energy storage, highlighting technological challenges and future research.

China's cumulative installed pumped hydro capacity exceeded 58 gigawatts (GW) by the end of 2024, with 7.75 GW of new capacity added in the past year alone, according to the China Renewable Energy Development Report 2024 released recently by the China Renewable Energy Engineering Institute.

China aims to install more than 100 GW of new energy storage - primarily battery storage, excluding pumped hydro - by 2027, according to a new action plan presented by authorities on Friday. The "Special Action Plan for Large-Scale Construction of New Energy Storage (2025-2027)" released by the.

NREL experts are developing tools and partnering with industry to unlock the full potential of pumped storage hydropower (PSH)—a form of hydropower used to generate electricity, store energy, and provide grid services. Image from IKM 3D. Pumped storage hydropower facilities rely on two reservoirs.

PHS uses the gravitational potential energy of water to store electrical energy. This involves connecting two reservoirs with a head difference through a water conductor, such as a pipe, as shown in Figure 1. Water is pumped through the conductor from the lower to the upper reservoir, typically.

Researchers analyzed the life cycle greenhouse gas impacts of energy storage technologies and found that pumped storage hydropower has the lowest global warming potential on average. Grid Reliability, Resilience, & Integration (HydroWIRES) Project Name: PSH Characterization and Capacity Expansion. What is pumped hydroelectric storage (PHS)?



Pumped hydroelectric storage (PHS) is the most widely used electrical energy storage technology in the world today. It can offer a wide range of services to the modern-day power grid, especially assisting the large-scale integration of variable energy resources.

Can pumped storage stations be used as energy storage support?

With China continuously scaling up the construction of integrated clean energy bases like “hydro-wind-storage” and new energy bases such as “Shagohuang”, pumped storage stations, especially variable-speed ones, will be more widely applied as energy storage support in regional grids (China Power, 2023).

What is pumped storage hydropower?

Pumped storage hydropower is recognized as the most mature technology, economically optimal, and most suitable for large-scale development as a regulating power and energy storage method (Central People’s Government of the People’s Republic of China, 2021b).

Can pumped hydro storage solve China's energy challenges?

Zhang Zongliang, an academician with the Chinese Academy of Engineering, emphasizes the critical role of pumped hydro storage in addressing these challenges. He believes significant market growth for pumped hydro storage in China is expected, driven by the increasing integration of wind and solar power into the energy system.

Will pumped storage increase global hydropower capacity?

If one-tenth of the global conventional hydropower capacity is technically eligible for similar-scale pumped storage renovations, this could result in an increase of over 120 GW in storage capacity — 1.2 times greater than the total capacity of all other energy storage technologies worldwide.

What is pumped storage hydropower (PSH)?

NREL experts are developing tools and partnering with industry to unlock the full potential of pumped storage hydropower (PSH)—a form of hydropower used to generate electricity, store energy, and provide grid services. Image from IKM 3D.



## The scale of new energy storage will exceed that of pumped water

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### China targets 180 GW of new energy storage by 2027 in ...

5 ???· China aims to install more than 100 GW of new energy storage - primarily battery storage, excluding pumped hydro - by 2027, according to a new action plan presented by ...

### Pumped-storage hydroelectricity

Pumped-storage hydroelectricity (PSH), or pumped hydroelectric energy storage (PHES), is a type of hydroelectric energy storage used by electric power systems for load balancing. A PSH ...



### [V`zobnovyaemi energijni iztochniczi](#)

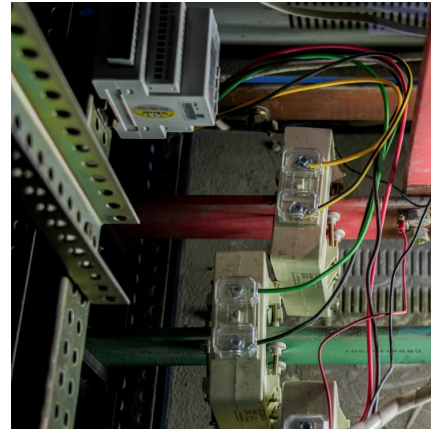
5 ???· China aims to install more than 100 GW of new energy storage - primarily battery storage, excluding pumped hydro - by 2027, according to a new action plan presented by ...

### [4 New Ways to Store Renewable Energy With Water](#)

To store energy, the system uses electricity to pump water out into the sea. When discharging, the pump works in reverse, generating electricity



as water refills the sphere.



### [DOE ESHB Chapter 9: Pumped Hydroelectric Storage](#)

Pumped hydroelectric storage (PHS) is the most widely used electrical energy storage technology in the world today. It can offer a wide range of services to the modern-day power grid, ...

### **Drivers and barriers to the deployment of pumped hydro energy storage**

Storage technology is recognized as a critical enabler of a reliable future renewable energy network. There is growing acknowledgement of the potential viability of ...



### **Pumped-Storage Hydroelectricity Fact Sheet: Harnessing Water ...**

Pumped hydro storage is a well-established and widely used method for large-scale energy storage. It utilizes gravitational potential energy to store and generate electricity.



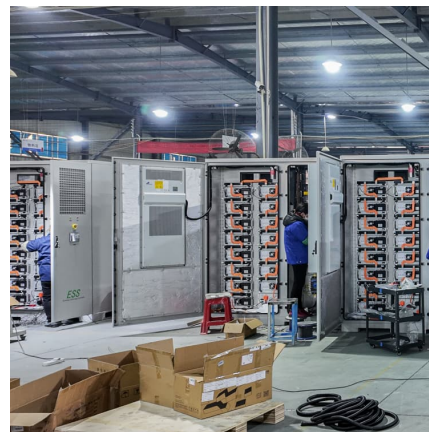
### **Pumped hydro systems could help solve the challenge of ...**

Pumped hydro systems require two reservoirs of water - one higher in elevation than the other. When solar and wind energy are plentiful, that power can be used to pump ...



### **Battery storage is about to overtake global capacity of ...**

Battery storage is often dismissed as an "immature" technology, not ready for a renewables dominated grid. But within a year it is likely to ...



### [Pumped Storage Hydropower , Water Research , NREL](#)

Capabilities Pumped Storage Hydropower's Role in a Future Power System According to the U.S. Department of Energy, PSH facilities account for about 96% of the ...

### [A Comparison of the Environmental Effects of](#)

Results in Brief Pumped storage hydropower (PSH) is characterized as either open-loop (continuously connected to a naturally flowing water feature) or closed-loop (not continuously ...



### **Pumped Hydro Storage , Umbrex**

Pumped Hydro Storage (PHS) is a type of mechanical energy storage system that utilizes gravitational potential energy to store and generate electricity. It is the most widely used form ...

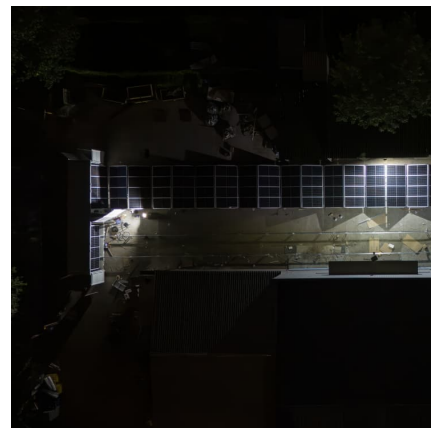


### **Pumped storage development to play a bigger role in promoting energy**

"In the next 5 to 10 years, China's pumped storage industry is expected to enter a critical phase of large-scale, intelligent, and market-oriented development," he said.

### **New energy storage to see large-scale development by 2025**

China aims to further develop its new energy storage capacity, which is expected to advance from the initial stage of commercialization to large-scale development by 2025, with ...





[\\$81 Million For Gigantic Energy Storage Showcase In ...](#)

Pumped hydropower is the basis for 96% of utility-scale energy storage capacity in the US, and it is ripe with potential for expansion.

[Farm dams can be converted into renewable energy ...](#)

However, constructing new water reservoirs for micro-pumped hydro energy storage can be expensive. "The transition to low-carbon power ...



[New Analysis Reveals Pumped Storage Hydropower](#)

Researchers analyzed the life cycle greenhouse gas impacts of energy storage technologies and found that pumped storage hydropower has the lowest global warming ...



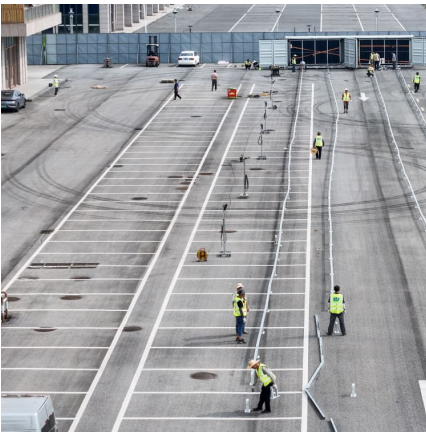
[Pumped Storage Hydropower , Water Research , NREL](#)

NREL experts are developing tools and partnering with industry to unlock the full potential of pumped storage hydropower (PSH)--a form of hydropower used to generate ...



### Australia to India: Entura scales up pumped storage for a ...

Australia to India: Entura scales up pumped storage for a renewable energy future From the small island state of Tasmania to far north Queensland and now to other ...



### CNESA: China's new energy storage fleet surpasses 100 GW, ...

As of June 2025, the China Energy Storage Alliance (CNESA) reports that China has amassed approximately 164 GW of total installed energy storage capacity. This ...



### Pumped storage hydropower operation for supporting clean energy ...

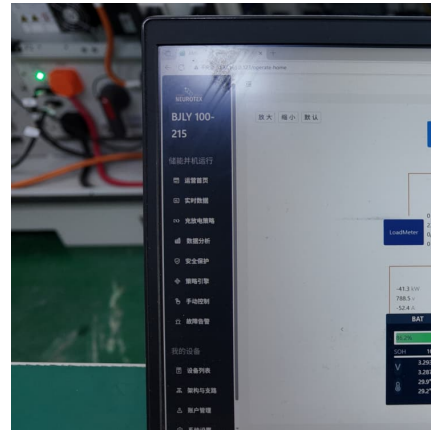
Pumped storage hydropower stores energy and provides services for the electrical grid. This Review discusses the types, applications and broader effects of this form of ...





## China expands pumped hydro storage

According to the report by CREEI, pumped hydro storage projects in China are gradually expanding from the eastern coastal regions toward the west, often in larger scale.



## Pumped Storage Hydropower

Pumped storage hydro - "the World's Water Battery" Pumped storage hydropower (PSH) currently accounts for over 90% of storage capacity and stored energy in grid scale ...

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