PUMPED STORAGE PROJECTS - ECONOMY

Budget 2024-25 promised a policy for promoting pumped storage projects which will be brought out for electricity storage and facilitating smooth integration of the growing share of renewable energy with its variable and intermittent nature.

What's in the news?

What is a Pumped Storage Project (PSP)?

- A **Pumped Storage Project (PSP)** is a type of **hydroelectric power system** that serves as a large-scale energy storage facility.

How it works?

- Pumped storage plants use the **principle of gravity to generate electricity.**
- It works by pumping water from a **lower reservoir to an upper reservoir** during periods of low energy demand and releasing it back through turbines to generate electricity during peak demand.
- It requires power as it pumps water **back into the upper reservoir.**

It is a configuration of two water reservoirs at **different elevations** that can generate power as water moves down from one to the other, passing **through a turbine.**

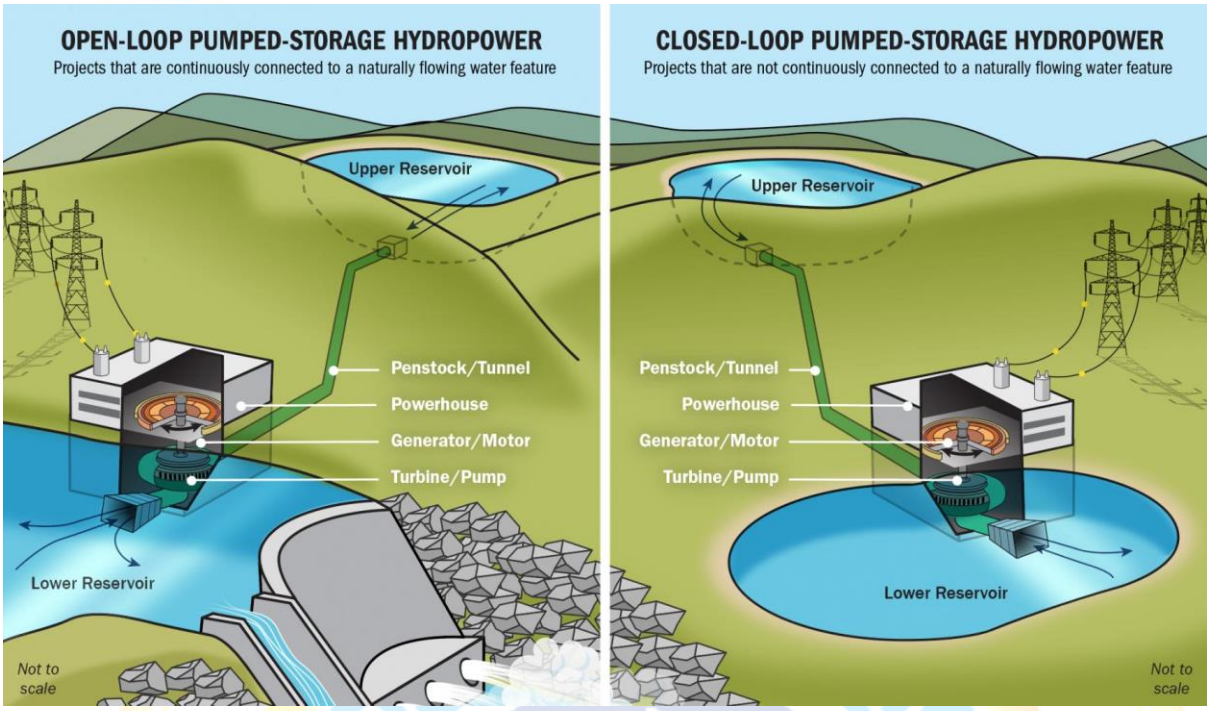
Types of PSP

Pumped storage is of two types: on river and off river.

- **On-river** is like any hydroelectric project supplied by a river. Existing hydro projects could become pumped storage**.**
- **Off-river** projects are those that have two reservoirs at two different levels to which the water is pumped up or falls down to under gravity in a closed loop.
- **Abandoned mines can**, for instance, be converted to such reservoirs.

Status of Pumped Storage Development in India

- In 1970 **India's** first PHS project commenced at **Nagarjuna Sagar** in **Telangana** with an installed capacity of **705 megawatts (MW).**
- The current potential of '**on-river pumped storage' in India is 103 GW.**
- **Nagarjuna Sagar** - Telangana.
- **Srisailam** - Telangana, plays a crucial role in both power generation and irrigation.
- **Kadamparai** - Tamil Nadu and is known for its role in grid balancing during peak demand times.
- **Bhira and Ghatgar** - Maharashtra.
- **Purulia** - West Bengal, located in Ajodhya Hills.
- About 44.5 GW including 34 GW off river pumped storage hydro plants are under various stages of development.



Potential In Tamil Nadu

- In Tamil Nadu, at noon on a typical day in July, wind and solar can generate half of all power. This is among the highest in the country.
- On a summer day, solar plants in Tamil Nadu produce some **5,000 MW at noon**.
- Tamil Nadu has peaks of around **17,000 MW to 20,000 MW on a daily basis.**
- This year in July, maximum wind power generated reached 5,499 MW and maximum solar reached 5,512 MW.

Kadamparai plant as a role model

- The plant has a **higher reservoir** that is at a height of **around 380 m above a lower reservoir**.
- Each unit is a **turbine generator set producing electric power** when the water flows from the **upper reservoir to the lower.**
- The same unit can function as a pump **consuming electric power** when it pumps water from lower to higher reservoir.
- There is a power surplus **coming from solar**. That power is used to pump up the water at Kadamparai.
- Each unit needs **20% more power to operate** as pump than what it can produce as generator.

Source: https://economictimes.indiatimes.com/industry/energy/power/detailed-project-reports-of-two-hydro-pumped-storage-plants-approved-in-record-time-power-ministry/articleshow/112222793.cms?from=mdr