

Pumped Hydro: Money Matters

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There is an urgent need to ramp up utility-scale energy storage solutions in the power grids of most countries. This surge in demand for energy storage is being experienced due to renewable capacity increment and its intermittencies. Pumped-hydro energy storage (PHES) is one of the most promising solutions. However, PHES systems are significantly more expensive than conventional hydro power plants. Therefore, some countries are providing funding support of various kinds to attract investors and developers towards this sector. This blog discusses the common funding mechanisms adopted by the USA, Australia, and China to analyse how such mechanisms can be adapted in the Indian context.

The USA, with its [22.6 GW](#) installed capacity (14% of the global share), is further promoting PHES development to increase its flexible energy storage capacity. The US Department of Energy ([DoE](#)) provides loans to PHES developers through debt capital at low interest rates, partnerships, and viability gap funding ([VGF](#)). VGF support makes the project financially feasible, while keeping the generation tariff of PHES commercially competitive.

In Australia, the expense distribution model is the prevailing funding mechanism. This concept, based on collaborative ownership and funding, has the required investment, resources, and assets owned by multiple partners, including private and government stakeholders. Based on the value of the contribution, PHES benefits are shared among the stakeholders.

China, with a PHES capacity of [32 GW](#) (21% of global share), generally follows the conventional method of 70:30 debt-equity ratio for financing. Having significant

storage capacity already, China is promoting competition between its existing PHEs projects through generation-based incentives (GBIs). This tariff mechanism provides additional subsidy on a per-unit generation basis with respect to the national average utilisation hours of PHEs plants. The per-unit price of subsidy increases with increase in energy generation. This attracts more developers, reduces generation tariff, increases competition, and utilises higher PHEs.

Compatibility of Funding Mechanisms in India

Most installed PHEs projects in India (accounting for 4.78 GW capacity) have adopted the conventional funding method of 70:30 debt-equity ratio. Generally, this works well for conventional and renewable power plants. However, the capital costs required, along with operational cost of PHEs, are substantially high in India. Having explored the VGF mechanism for large-scale RE projects successfully, India can extend it to PHEs as well.

Considering the geographical distribution of potential PHEs sites around the country, the expense distribution model (resources, assets, and investment distribution) can also be feasible through collaboration between local governments and developers. For instance, a scenario wherein an existing hydro station (government-owned) linked with a new lower reservoir (owned by private developer, along with multiple investors) with the major share of pumping-power being purchased through open access from RE developers lends itself well to a public-private-partnership (PPP) model. In the Indian context, utilisation of unused assets and infrastructure will help in reducing the risks associated with energy pricing and energy volume, and ensure stable cash flow to stakeholders.

For more detailed discussions on this topic, please join our upcoming virtual event on the “The Role of Pumped-Hydro Storage in the Indian Grid” on 30 July 2021, 4:00–5:30 PM. Register [here](#).