Pumped hydro storage dushanbe

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Enabling the energy transitionCentralized synchronous plants will be less dominant in the future energy mix and with the massive penetration of intermittent renewables such as wind and solar and their impact on the grid reliability is huge. Supply of energy is variable and services to maintain voltage or frequency of the grid cannot be met by inverter-based resources.

Hydropower can play a defining role in the energy transition thanks to the balancing and system services to the grid that facilitate the integration of variable renewables.With higher needs for storage and grid support services, Pumped Hydro Storage is the natural large-scale energy storage solution. It provides all services from reactive power support to frequency control, synchronous or virtual inertia and black-start capabilities. It brings support that was previously managed by fossil-fueled power plants but with even more reactivity and in a sustainable manner without CO2 emissions.

Pumped hydro storage plants store energy using a system of two interconnected reservoirs with one at a higher elevation than the other. Water is pumped to the upper reservoir in times of surplus energy and, in times of excess demand, water from the upper reservoir is released, generating electricity as the water passes through reversible Francis turbines on its way to the lower reservoir. The process is then repeated with an overall cycle efficiency of about 80%.

With fixed speed pumped storage plants, power regulation is possible while the plant is generating electricity but with the state-of-the-art variable speed technology, power regulation in specific ranges is possible while generating and while pumping, providing additional flexibility to support the grid stability.

Large-scale: This is the attribute that best positions pumped hydro storage which is especially suited for long discharge durations for daily or even weekly energy storage applications.

Cost-effectiveness: thanks to its lifetime and scale, pumped hydro storage brings among the lowest cost of storage that currently exist.

Reactivity: the growing share of intermittent sources reduces the inertia of the grid, which increases its instability. Reactivity, then, is key to avoid incidents, and hydropower production and storage can provide inertia and load balancing services to the grid. The current technologies provide response times that are counted in seconds or even milliseconds in the case of variable speed technology.

Mature technology: for decades, pumped hydro storage has offered a cost-effective way to provide large-scale balancing and grid services, with predictable cost and performance. New hydro storage technologies, such as variable speed, now give plant owners even more flexibility, output, efficiency, reliability and availability.

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Renewable and Sustainable: Hydropower uses the force of water that can be pumped uphill and turbined downhill as much as needed. pumped hydro storage plants have a lifetime of more than 40 years for the electromechanical equipment and 100 years for the dam. Closed-loop pumped hydro storage present minimal environmental impact as they are not connected to existing river systems. In addition, they do not need to be located near an existing river and can therefore be located where needed to support the grid.

Multi-functional: water management, irrigation control for agriculture, water distribution and water waste control.

GE"S TECHNOLOGY AND EXPERIENCE TO HELP YOU OPTIMIZE YOUR PROJECTGE is a world leader in pumped storage plant equipment and supplies in-house capabilities not only for turbines and generators but also the full electrical balance of plant.

80%

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