Large-scale energy storage in cascade power stations

Can pumped storage power stations be built among Cascade reservoirs?
The construction of pumped storage power stations among cascade reservoirs is a feasibleway to expand the flexible resources of the multi-energy complementary clean energy base. However,this way makes the hydraulic and electrical connections of the upper and lower reservoirs more complicated,which brings more uncertainty to the power generation.

What is a cascade hydropower plant & pump station?
The CESSis an integrated system of cascade hydropower plants and pump stations,whose main function is to consume excess energy from renewables,while satisfying water and energy demands for the public. Essentially,the CESS belongs to a kind of pumped storage power station.

Why does Cascade Power Station 3 need a start-stop operation?
In this case,due to the relatively high propor-tion of renewable energy and signicant load uctuation,fi fl the unit of Cascade power Station 3 needs to perform fre-quent start-stop operations to maintain the power balance of the systemand ensure the stable operation of the power system.

Can pumped storage power stations support a high-quality power supply?
Hence, to support the high-quality power supply, this research explores the complementary characteristics of the clean energy base building different types of pumped storage power stations, and recognizes the efficient operation intervals of the giant cascade reservoir.

How does Cascade hydropower work?
Since the cascade hydropower in this example primarily relies on the runoff type power station,it lacks annual adjustment and water storage capabilities,com-monly referred to as "relying on the weather for power generation ",meaning that electricity production is directly proportional to the available water supply.

What is the eficiency of a cascade hydropower system?
The eficiency is defined as a ratio of reduced renewable energy curtailment to increased hydropower pro-duction,and it is calculated based on two scenarios (i.e.,optimal oper-ations of the cascade hydropower system and CESS). A case study using China's Longyangxia-Laxiwa CESS was conducted.

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