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FROM THE EDITOR…

Energy has been an integral part of the modern world. Each country is forced to seek new ways of power generation to ensure its energy sustainability. Pumped-storage hydroelectricity (PSH) is a new concept for the engineering community in Sri Lanka. PSH, or pumped hydroelectric energy storage (PHES), is a type of hydroelectric energy storage used by electric power systems for load balancing. A pumped storage power plant involves two reservoirs in a cascade, where water from the lower reservoir is pumped up to the higher one using excess power generated from either renewable energy such as solar during daytime, or high winds or large thermal plant at optimal capacity or surplus off-peak electric power. The upper reservoir is not required to be large in size as it only needs to store a half-day water requirement for power generation. The PSH method stores energy in the form of gravitational potential energy of water. During periods of high electrical demand, the stored water is released through turbines to produce electric power. Although the losses of the pumping process make the plant a net consumer of energy overall, the system increases revenue by selling more electricity during periods of peak demand. If the upper lake collects significant rainfall or is fed by a river, then the plant may be a net energy producer in the manner of a traditional hydroelectric plant.

The first use of pumped storage was in 1907 in Switzerland, at the Engeweiher pumped storage facility near Schaffhausen, Switzerland. In the 1930s, reversible hydroelectric turbines became available. These turbines could operate as both turbine-generators and in reverse as electric motor driven pumps. These machines operate in synchronization with the network frequency when generating, but operate asynchronously (independent of the network frequency) when pumping. The first use of pumped-storage in the United States was in 1930 by the Connecticut Electric and Power Company using a large reservoir located near New Milford, Connecticut, pumping water from the Housatonic River to the storage reservoir 70 m above. At present, nearly 30% of power generation of Switzerland comes from PSH. There is a considerable amount of research being conducted with regard to PSH such as using sea water for PSH and the use of underground caves for water storage.

In Sri Lanka, a preliminary study carried out by the Ceylon Electricity Board (CEB) in 2014 with the Japan International Co-operation fund has already identified the Arananayake area in the Ma Oya valley and Wewatenne in Kandy as two potential locations to build the pumped storage unit. CEB has proposed to find the most suitable location and carry out a full-feasibility study. With funds available from a Green Power Development and Energy Efficiency Improvement Project of the Asian Development Bank, the government of Sri Lanka had given the go ahead to conduct the study. A pumped storage plant has been proposed in the 2020-2037 long-term generation expansion plan of the CEB. It is expected that the first PSH is to be in operation in 2028. With the kind of technology, energy sustainability of Sri Lanka would be obtained, and such techniques will certainly enhance absorption of renewable energy potential in the national grid.

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