Proposal of a Small Pump-Turbine System for Ocean Renewable Mechanical Energy Storage System

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This study proposes an application of small sized pumped storage system that can be beneficial on islands or other remote locations that have access to other renewable energies to develop into a hybrid system. Korea has a myriad of islands in the south-western coast that extensively rely on diesel generators for power production, which increases cost and environmental pollution. The small hydro pump-turbine system for ocean renewable mechanical energy storage system is a kind of hybrid system that can reduce the usage of diesel generators and contribute to the environment in a positive manner by helping to reduce carbon emissions. The study focuses on the facility capacity calculation and beneficial cost for economic feasibility; and then concentrates on the initial hydraulic design and numerical analysis of a 30 kW-class pump-turbine system for energy independent islands in Korea. The purpose of the study is to propose an ocean renewable mechanical energy storage system using a small pump-turbine system working with seawater. A 30kW-class pump-turbine does not require a large head; approximately 30m is sufficient for the design and test facility. Several other renewable energy systems like wind turbines, tidal turbines, wave energy converters and solar energy could be used to make a hybrid system with the pump-turbine.