Energy storage technologies sao tome

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One of the problems often encountered with off-grid systems is the premature ageing and failure of the electrochemical storage unit (batteries). Because of the high and often unfunded cost of replacement, these systems often stop working properly within a few years and end up being abandoned, depriving users of electrical service.

Willing to provide a more reliable and sustainable energy storage solution, ARE Member Rutten NES has created the NES-Store, an innovative, environmentally friendly and sustainable storage system inspired by pumped hydro, but which does away with any topographical constraints.

The energy is stored in the form of air compressed by water and is released through a specifically and in-house designed hydroelectric turbine. The whole system is containerised and modular. According to the chosen community"s needs, a given number of containers can be grouped together to achieve the required power and storage capacity.

With commissioning scheduled for the second half of 2024, this emblematic project will enable the development of educational and economic activities through the productive use of energy within the community. The project will help to support the country’s renewable energy and sustainable development goals (SDG7), which are of vital importance for small island developing states such as S?o Tom? and Pr?ncipe.

A project to deploy a 1.5-MW commercial-scale ocean thermal energy conversion (OTEC) platform in the African island nation of São Tomé and Príncipe by 2025 has gained a key design certification. The crucial milestone directly addresses technical risks that have hampered OTEC, a long-pursued baseload offshore renewable technology.

“History is an important teacher, and we are committed to learning from it,” said Global OTEC Founder and CEO Dan Grech. “Failure of previous OTEC projects highlights where we should exercise caution, so third-party technical due diligence from the earliest stage is important for our success,” he said.

Global OTEC’s flagship project is the “Dominque,” a floating 1.5-MW OTEC platform set to be installed in São Tomé and Príncipe in 2025 (Figure 1). The company says the platform “will be the first commercial-scale OTEC system.”

That’s significant because OTEC is a technology that was proposed as far back as 1881 by French physicist Jacques Arsened’Arsonval for converting solar radiation absorbed into the ocean to electrical power. OTEC has been proven to provide continuous power as well as fresh drinking water and cold water for

refrigeration. But while more than a dozen prototypes have been tested intermittently since the first experimental 22-kW low-pressure turbine was deployed in 1930, no commercial-scale plants exist.

Existing prototypes have typically conformed to three basic configurations depending on their location: on land, relatively a short distance from the coast; mounted on the edge of a continental shelf; or on a floating platform or ship, where deep cold water can be accessed directly underneath the hull.

More recent notable projects include Makai Ocean Engineering’s land-based 105-kW OTEC plant at a research center in Hawaii, and a 20-kW OTEC floating pilot plant spearheaded by the Korean Research Institute of Ships and Ocean Engineering (KRISO) that began operating in 2012. KRISO is now developing a 1-MW OTEC demonstration in the small Pacific Island of Kiribati based on a trial operation of a system tested in South Korea’s East Sea (near Pohang, Figure 2).

The Korean Research Institute of Ships and Ocean Engineering (KRISO) plans to relocate its 1-MW K-OTEC 1000 barge OTEC power cycle equipment, tested near Pohang, South Korea, to Kiribati Island. Courtesy: KRISO

“The 1-MW OTEC demonstration was designed for 24-degree-C seawater temperature difference and has successfully carried out in a trial operation (output of 338 kW under operating condition of 18.7-degree-C temperature difference) in Korea,” Dr. Hyeon-Ju Kim, a KRISO principal researcher, told OES in a July 2022–published interview. “If the demonstration of the 1-MW OTEC plant near the equator is successfully carried out in the future, competent professionals can draw a positive outlook on the scale of 10-, 100-, and 400-MW OTEC plants gradually.”

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