Off-grid systems sao tome

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With energy demands escalating and environmental concerns looming, the need for innovative solutions is apparent. Enter the Global OTEC Dominique project, off the coast of S?o Tom? and Pr?ncipe - a tiny island nation off the West coast of Africa.

The isolation and limited land area on many islands obstruct the widespread implementation of traditional renewable energy sources like solar or wind. In addition, dependence on diesel harms the environment and is an economic burden for many island nations.

The Dominique project, powered by Ocean Thermal Energy Conversion (OTEC),is a response to these challenges. It will use a 140-year-old technology to deliver sustainable energy to island nations.

In this article, we explore the historical roots of OTEC, and why this century-old concept is finding renewed relevance in the context of island nations. We also gain insights from Dan Grech, the Founder and CEO at Global OTEC.

Moreover, we examine the environmental and socio-economic impact of this innovative solution, with a specific focus on S?o Tom? and Pr?ncipe--a nation on the cusp of embracing the promises of OTEC.

OTEC finds its roots in the pioneering ideas of French physicist Jacques Arsene d’Arsonval. In 1881, D’Arsonval envisioned achieving sustainable and continuous power by tapping into the vast thermal energy reservoirs of the world’s oceans.

Over the ensuing decades, OTEC saw further development as early designs and concepts paved the way for the emergence of operational OTEC systems. In the 1930s, the first OTEC patent was granted to Georges Claude, a pioneer in the field. However, in the latter half of the 20th century, significant strides were made in realizing the practical application of OTEC technology.

At its essence, OTEC operates by harnessing the temperature gradient between warm surface seawater (typically 25 to 28 degrees Celsius in tropical regions) and cold water from deeper ocean layers (around four degrees Celsius).

The warm water initiates the evaporation of a refrigerant-type fluid like ammonia. This expands, creating vapor to drive turbines and generate electricity. Cold deep-sea water is then used to condense the vapor back into a liquid, facilitating a continuous energy cycle.

This system can generate electricity reliably around the clock, and at a constant rate so that it is suitable for baseload usage. It can also easily be scaled up and down to account for changes in demand.

In the 1970s, significant research and development efforts were directed toward OTEC, spurred by the energy crisis. Experimental OTEC plants were constructed, showcasing the feasibility of the technology. Lockheed Martin’s involvement in the 21st century further propelled OTEC into the spotlight, with projects in Hawaii and China demonstrating a commitment to commercializing this sustainable energy solution.

“Although OTEC is not a new technology, it has been forgotten in the renewable energy mix over the years due to lack of investment, popularization of other sources, and limited application of OTEC in countries financing R& D advancements,” Grech told Interesting Engineering (IE).

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