

Desalination and OTEC – Indian Context

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The National Institute of Ocean Technology (NIOT) has been at the forefront of harnessing ocean energy to address water scarcity in India's island communities. The implementation of Low Temperature Thermal Desalination (LTTD) plants is a testament to this effort, with the first plant established at Kavaratti in 2005, followed by installations in Minicoy, Agatti, Amini, Kalpeni, Kadamat, Chetlat, and Kiltan. These plants have had a profound impact on the health and well-being of island residents, providing access to high-quality potable water.

However, the current reliance on island grid power for LTTD operation poses a challenge. To address this, NIOT is pioneering Ocean Thermal Energy Conversion (OTEC) at Kavaratti, aiming to generate 100 m³/day of fresh water using the natural temperature gradient between warm surface waters and cold deep-sea waters. This innovative project will not only provide a sustainable energy source but also reduce dependence on diesel generators, contributing to a cleaner environment.

The OTEC plant's open cycle system is designed to optimize energy production while minimizing environmental impact. Warm water is flash-evaporated in a chamber, producing water vapour that drives a turbine to generate electricity. This vapour is then condensed using cold water drawn from the ocean depths, yielding potable water without any additional power from external grid/source. This process has been successfully tested in laboratory scale level at NIOT, currently demonstrating OTEC's viability for Lakshadweep islands.

Comprehensive studies, including bathymetry, temperature and depth profiles, have identified the optimal location for the OTEC plant on Kavaratti's shore. NIOT's approach focuses on reducing environmental impact, capital costs, and energy consumption. The institute has introduced novel techniques and technologies to achieve these goals, making this project a significant step towards scaling up OTEC technology and integrating it with other renewable energy sources, such as solar power, to meet the energy demands of desalination systems.

This pioneering effort has the potential to transform the way India's island communities access clean water and energy, showcasing a sustainable model for other regions.

BIO DATA



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Dr. G.Venkatesan is scientist - “G” at the National Institute of Ocean Technology, an autonomous institute of Ministry of Earth Sciences.

He has more than twenty years of experience in design, fabrication, erection, installation and commissioning of mechanical engineering system of low temperature thermal desalination system both for on shore and offshore applications. His main research work includes optimization and enhancement on low temperature thermal desalination. He has filed patent applications for four inventions in the area of Desalination. He has also received certificate of merit award from the government in the field of desalination. He is a member of the scientific sub-committee on energy for Science City - Chennai Science Festival; Internal Auditor for Quality Management System based on ISO 9001: 2008 and life member of Indian Desalination Association (InDA) & Ocean Society of India (OSI). He conducted theory and practical classes on Ocean energy and fresh water for ITI course for staff members.

He also guided projects for both bachelor and master students for their partial fulfillment of award of engineering degree. He has been interviewed by doordarshan on “Different techniques used for desalination of seawater, their advantages, limitations etc” by Prasar Bharathi and telecasted for 30 minutes by All India Radio.

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