



LOW COST DESALINATION TECHNOLOGY FOR LAKSHADWEEP INLAND SALINE WATER SOURCE

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ABSTRACT



- ★ The Lakshadweep Island located in Arabian Sea face significant challenges related to freshwater scarcity due to their remote location limited rainfall, And dependence on groundwater formation
- ★ Conventional desalination technology has been economically prohibitive for these island communities
- ★ The development and implementation of low cost desalination technologies examines innovative approach such as solar power desalination community scale membrane filtration system and locally source material to reduce cost and environmental impact
- ★ By integrating renewable energy sources and optimising operational efficiency the solution aim to provide a sustainable and reliable fresh water supply to support the livelihood and well being of island inhabitants

INTRODUCTION

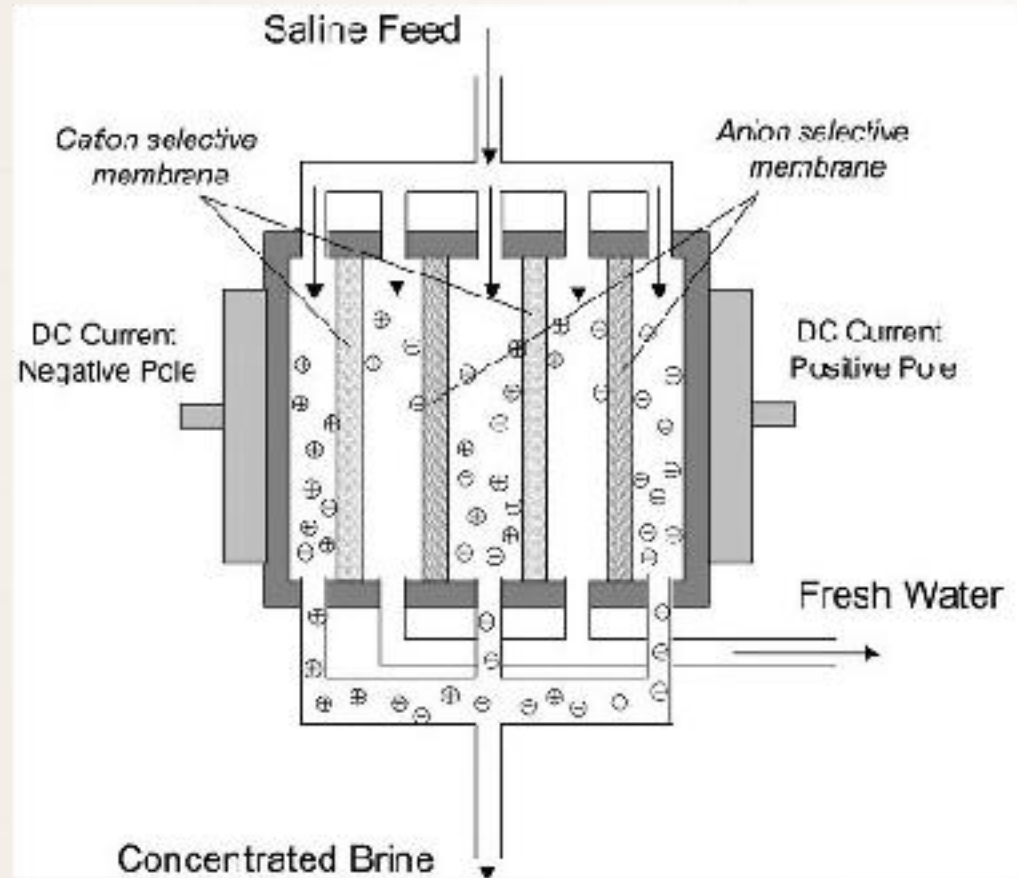


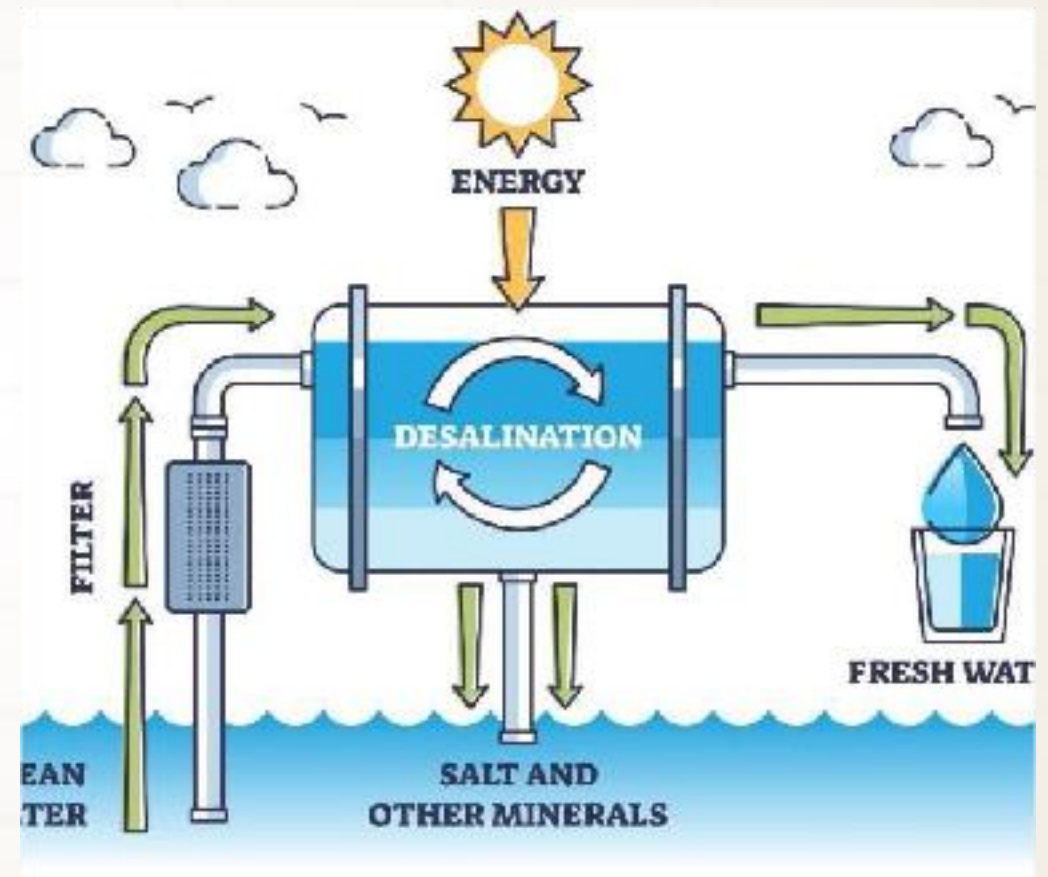
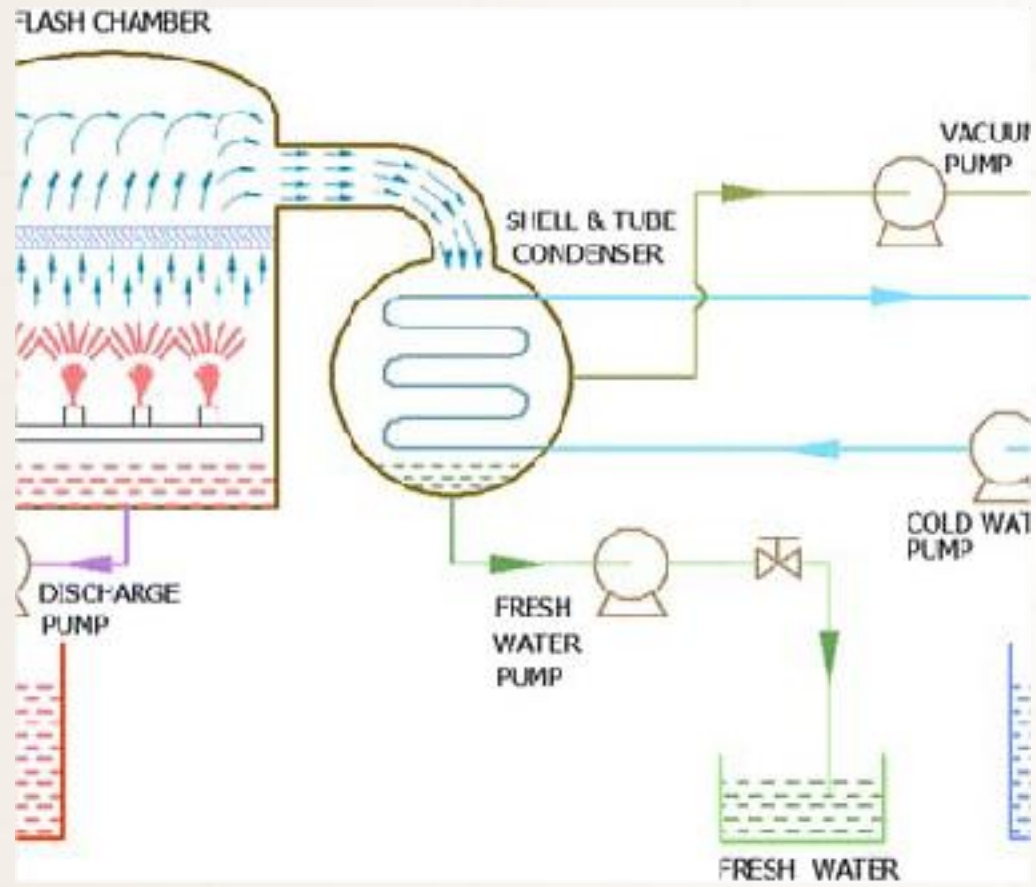
- ★ Desalination technology refers to the process of removing salt and other impurities from seawater or brackish water to make it suitable for human consumption or agricultural use
- ★ There are several methods of desalination, including reverse osmosis, distillation, and electrodialysis
- ★ Each method has its advantages and disadvantages in terms of energy efficiency, cost, and environmental impact. Desalination plays a critical role in addressing water scarcity in arid regions or areas with limited freshwater resources

EXISTING SOLUTION

- ★ The major desalination technology used in Lakshadweep is Reverse Osmosis (RO). It is widely employed due to its efficiency, relatively low energy consumption compared to thermal desalination methods, and suitability for treating seawater to produce potable freshwater
- ★ RO systems are commonly used in small-scale and decentralized desalination plants across the islands of Lakshadweep to meet the local freshwater demands
- ★ The LTTD is a process under which the warm surface sea water is flash evaporated at low pressure and the vapour is condensed with cold deep sea
- ★ The National Institute of Ocean Technology (NIOT), Chennai has developed the world's first Low Temperature Thermal Desalination (LTTD) plant in Kavaratti







PROPOSED SOLUTION

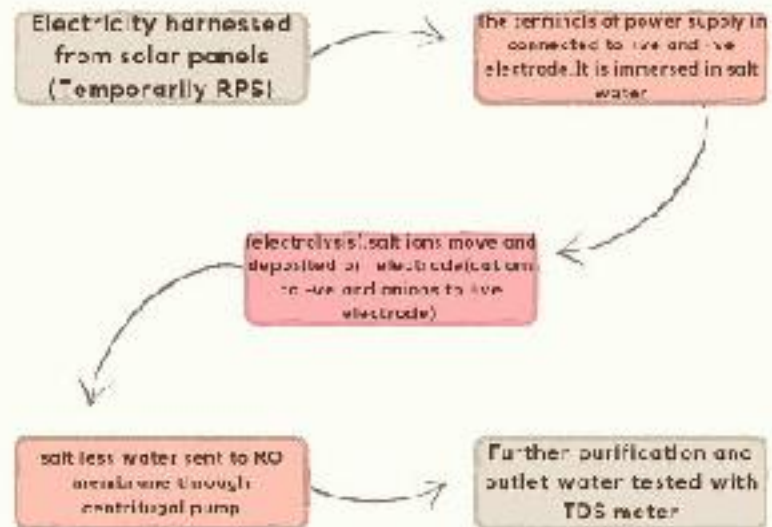


- ★ The electricity is being harnessed using the solar panels
- ★ The harnessed electricity is passed through the glass container containing salt water or brine solution through the graphite electrode (the terminals of power supply is connected to the +ve and -ve electrode)
- ★ Basically, electrolysis process is done
- ★ In this electrolysis process, salt ions gets separated out of salt water and get deposited on the electrodes (anions deposit on +ve electrode and cations deposit on negative electrode)

The salt free water is sent through the RO membrane through the centrifugal pump and water(supply is given to pump)

- ★ Water is again purified finally and through the outlet fresh water is obtained which is being tested using TDS meter

FLOWCHART



BLOCK DIAGRAM





HARDWARE

1. Solar panels
2. Graphite electrodes
3. Glass container
4. Centrifugal pump
5. Pipes
6. Wires
7. RO membrane
8. TDS meter



CASE STUDY



- ★ Water scarcity has been a recurring issue in Lakshadweep, but notable instances of acute water shortages occurred during periods of low rainfall or disruptions in water supply infrastructure
- ★ One such instance was in 2017 when several islands in Lakshadweep faced severe water scarcity due to a prolonged dry spell and malfunctioning desalination plants. This led to water rationing and disruptions in daily life, prompting authorities to implement emergency measures such as airlifting freshwater supplies to the affected islands. Additionally, in 2020, Lakshadweep experienced another water scarcity episode exacerbated by the COVID-19 pandemic. The islands, heavily reliant on tourism for revenue, faced challenges in maintaining adequate water supply infrastructure due to restrictions on travel and economic activities. This highlighted the vulnerability of the islands' water supply systems to external shocks and underscored the need for improved resilience and sustainable water management practices in the region

CONCLUSION



In conclusion, the development of a low-cost solar desalination technology holds immense promise for addressing water scarcity challenges in regions with abundant sunlight and limited access to freshwater resources. By harnessing solar energy efficiently and employing cost-effective materials and designs, such technology can offer a sustainable solution to produce clean drinking water while minimizing environmental impact and operational expenses. Further research and investment in this area are essential to optimize performance, scalability, and accessibility, ultimately benefiting communities worldwide.



THANK YOU