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+1 608-238-6001 (Chicago [TEL]
greg@salgenx.com [Email]



This webpage QR code

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Salgenx Desalination System for marine wind turbine generators and freshwater making on cruise ships and cargo ships or shore based reverse osmosis operations including military EABO expeditionary advanced base operations

PDF Version of the webpage (first pages)

<https://salgenx.com/salgenx-saltwater-flow-battery-grid-scale-energy-simultaneous-desalination-of-saltwater-to-fresh-water-as-part-of-process.html>

Desalation from Brine and Seawater

The desalination system operates by using a saltwater flow battery cycle, which involves the movement of ions between two electrodes to store or discharge electricity without a membrane (which is typical with Vanadium or Bromine flow batteries). In this case, the process is used to remove salt from brine or seawater. The system can use a renewable energy source, such as solar power or large wind turbine, to charge the battery, making it both environmentally friendly and cost-effective.

This is very energy efficient since this happens simultaneously to the charging of the battery, so it is in effect a free side benefit of battery charging.

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Marine Vessel Applications

The technology can be used by cruise ships and cargo ships. A more novel approach is to use marine based wind turbine generators to provide power to the grid during demand hours, but then shift the direction of energy into a container based saltwater battery to hold the charge while simultaneously making desalinated water. The stored power can then be released into the grid when needed.

EABO

This type of system also has military implications, especially with EABO (expeditionary advanced base operations) where desalination is a better response than transporting in fresh water, or using expensive RO (reverse osmosis) systems.

Revolutionizing Desalination: Salgenx Introduces Organic Rankine Cycle and Heat Pump Integration

Introduction

Desalination technology is an area ripe for innovation, given the increasing global demand for freshwater. Salgenx, a leading player in sustainable energy solutions, has been at the forefront of such advancements. The company recently announced a groundbreaking technology that aims to make Reverse Osmosis (RO) desalination systems more energy-efficient and cost-effective. The technology integrates heat pumps and incorporates the Organic Rankine Cycle (ORC) to power pressurization pumps. This article delves into the details of this innovative approach, its advantages, and its potential implications for the future of desalination.

The Innovations by Salgenx

Salgenx is no stranger to game-changing technologies. Their grid-scale saltwater flow battery has already disrupted the energy and water treatment sectors by providing simultaneous desalination while charging, without the need for a membrane. The new layer of innovation—integrating heat pumps into RO systems for thermal regulation and pressurization—makes the desalination process even more efficient. The incorporation of the Organic Rankine Cycle further elevates the technology by using waste thermal energy to power the system's pressurization pumps.

The Role of Heat Pumps

Heat pumps serve dual purposes in the RO systems: thermal regulation and pressurization. Maintaining optimal temperature levels in RO membranes is crucial for effective desalination. Heat pumps ensure that the membranes operate at peak efficiency by regulating their temperature. Moreover, heat pumps can also aid in elevating the pressure of water, reducing the workload on the primary pressurization pumps and cutting down energy consumption.

Integration of the Organic Rankine Cycle

The Organic Rankine Cycle, commonly used for waste heat recovery, is now being employed by Salgenx to power the pressurization pumps in the RO system. This approach captures and converts otherwise wasted thermal energy, which reduces the system's reliance on external electrical power and makes optimal use of available resources.

Key Benefits of the Integrated System

Energy Efficiency

The dual integration of heat pumps and ORC offers an opportunity for optimal energy utilization. By recycling heat within the system and leveraging waste thermal energy, the technology significantly reduces the need for external energy sources.

Cost-Effectiveness

Operational costs are among the biggest challenges in maintaining large-scale RO systems. By using ORC to power the pressurization pumps, the need for external electricity is reduced. This, in turn, lowers utility bills and enhances the overall cost-effectiveness of the system.

System Longevity

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Desalination Data

We are currently developing this application. If you charge the battery 1MWh, 1450kg of sodium ions are absorbed into the electrode material. Ocean seawater is about 3.5 percent by weight sodium chloride (NaCl). So you'd remove enough sodium chloride to completely desalinate 41.4m³ of ocean water during each charge. You would want to avoid going to 0% NaCl during charge to avoid diffusion limitations but the output stream could be easily 0.1 percent compared to 3.5 percent entry.

So overall it would be about 1.45kg per kWh charged. Meaning with ocean saltwater you could desalinate about 41.4L/kWh of the saltwater. You could then pump the low or no concentration water away and swap in saltwater for the discharge that is then released at double concentration (7 percent salt).

Alternative strategy is to use with a conventional brine output from a Reverse Osmosis system

Alternatively, you can use this system to use the brine from the discharge of a RO system.

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