

WATER DESALINATION USING SOLAR ENERGY WITH THERMAL STORAGE OPTION



INVENTION

The invention is a method to provide continuous operation of an HDH system by utilizing hot and cold water storage tanks to provide constant heat energy for the desalination process. This technique smoothens fluctuation of energy input through renewable sources and ensures consistent operation.

MARKET SIZE AND GROWTH

Water desalination is a major source of freshwater supply in MENA region. The global desalination market is expected to have CAGR of 13.1% till 2019¹. MENA region alone accounts to 49.2% of the market share and is the major market for the desalination technologies.

Due to abundance of sunshine, thermal desalination solutions remain a preferred choice in the MEA region, with the technology holding 24.5% share of the MEA desalination market in 2015. Reverse Osmosis (RO) based desalination systems, which is highly operationally expensive, holds a major share of 79.4% in the global desalination market followed by thermal storage systems (12.8%).

As the world looks towards cheaper and cleaner desalination solutions, thermal storage-based methods are the next big thing in this area.

APPLICATION

The invention has direct application in the HDH water desalination systems currently implemented in the market. By integrating liquid-based thermal storage tanks, the solar energy can be harvested and used even at night, enabling the system to operate 24-hours a day.

ADVANTAGES

Desalination systems based on solar thermal energy often have limited operating hours and are significantly affected by the solar radiation intensity. This invention offers following advantages for solar energy based desalination systems:

- round-the-clock operation with optimized mass flowrate of the HDH components
- Based on the on-field implementations of this technology, 70-130 liters/day was successfully desalinated compared to a mere 40 liters/day for the non-HDH based thermal system.

PROJECT STATUS

The project, in its current form, is a complete mathematical, experimental study and an energy analysis of the complete system. The systems has been implemented at multiple locations in Saudi Arabia (using water as fluid and 175 Gallon tanks) and the data has been analyzed to develop an optimized solution.

LOOKING FOR A DEVELOPMENT PARTNER

Large-scale on-filed implementation to validate commercial level operation including:

- Using fluids (other than water) with higher thermal capacity to improve performance of the system
- Using tanks of higher capacity

PATENT PROTECTION

A U.S. patent pending application 15/892006 covers the invention.

ABOUT KFUPM

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1. Analysis of global desalination market, Frost & Sullivan, 2015