

# Water Desalination System

Highly cost and energy efficient system for water desalination



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## IP Status

Patent application submitted, Provisional patent

## Seeking

Licensing

## About **University of Birmingham**

At the University of Birmingham our research leads to new inventions and fuels innovation and business growth.

# Background

United Nations Organisation predicts that by 2025 half of the global population will live in water-stressed conditions, while almost 2 billion people will have a very limited access to fresh water. There are multiple efforts to provide for the growing needs of humanity in fresh water, and one of the most crucial of them is desalination of brackish, underground and sea water. The biggest two challenges in desalination is (A) to achieve maximum recovery of fresh water using less energy during the process so that cheap renewable source could be used; (B) to minimise the machine 'down' time while increasing the fresh water output.

## Tech Overview

The technology developed by researchers from the University of Birmingham is a novel desalination method and apparatus, significantly reducing the energy consumption during desalination process, and minimising discharge of harmful brine to the environment. The desalination apparatus can be assembled from off-the-shelf components, thus capping the capital and maintenance costs. The novel method is a full-batch system that operates in two stages: 1) pressurisation stage and 2) purge-refill stage. At pressurisation stage, the saline water is supplied to the semi-permeable membrane by a system of pistons and the desalination occurs by reverse osmosis. At purge-refill stage, the salt concentrates are washed away by another portion of saline water while refilling the piston system.

## Benefits

- **Energy-efficient:** high water recovery (>75%) at low energy consumption (down to 0.4 kWh/m<sup>3</sup>).
- **Effective:** the apparatus yields up to 50,000 L per day in a multi-vessel system.
- **Time-efficient:** the purge and refill stages of the process are combined into one stage to minimise the machine down time.
- **Flexible:** The apparatus consists of readily available parts and components and can be scaled up for even higher fresh water yields.
- **Environmentally friendly:** the apparatus can be assembled to use solar and local wind power renewable energy sources.
- **Cost-effective:** inexpensive and available parts decrease the costs of maintenance and repair.

## Applications

Brackish and seawater desalination.

# Patents

- PCT/GB2019/051208