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### **Toyobo MC's FO membrane achieved a freshwater recovery ratio of over 65% at Trevi System's renewable seawater desalination plant.**

**- Accelerating the practical applications of next-generation energy-saving systems -**

Toyobo MC Corporation (referred to below as "Toyobo MC", Main Office: Kita Ward, Osaka City; President & Representative Director, CEO: Chikao Morishige) has had its hollow fiber forward osmosis (FO) membrane adopted for a demonstration project at a prototype desalination plant in Hawaii, operated by Trevi Systems Inc. (referred to below as "Trevi Systems"). The operation was recently successfully completed, resulting in the production of 500 m<sup>3</sup> of freshwater per day from seawater. The freshwater recovery ratio from sea water exceeded 65%.

This desalination plant is equipped with FO membrane and a Concentrated Solar Power (CSP) system that converts the sun's light energy into heat. The heat generated by CSP covers the majority of the plant's operational energy. The demonstration project was conducted from June 2022 to September 2023, and the freshwater obtained is used for agricultural irrigation.



The demonstration project was conducted  
at Trevi Systems' desalination plant.



Hollow fiber forward osmosis (FO) membrane

Toyobo MC has a long history of making membranes for desalination. In the 1970s, Toyobo MC developed hollow fiber reverse osmosis (RO) membrane, which allows water molecule to pass but not particles or ions above a certain size, by applying spinning technology nurtured in its textile business operations. Since the 1980s, Toyobo MC has provided RO membranes for desalination plants in the Middle East and elsewhere.

Trevi Systems is a U.S. company pioneering forward osmosis technologies for sustainable desalination and brine concentration with their proprietary thermos-responsive draw solutions. With financial support from the U.S. Department of Energy, Trevi Systems built a seawater desalination plant on the Natural Energy Laboratory of Hawaii Authority (NELHA) site, and used our FO membranes in the equipment section. The newer FO method, which harnesses the osmotic pressure difference to facilitate desalination, requires less energy to obtain freshwater from seawater than conventional evaporation or RO methods do.

In 2020, Trevi Systems became an industry leader by developing a water treatment system featuring the FO membrane for commercial use, which has now been adopted at the plant. In 2012, Toyobo MC and Trevi Systems started a partnership on a desalination system. Toyobo MC has contributed to ensuring this system will have practical

applications by developing and improving the FO membrane's performance to reduce pressure loss, thus making it highly efficient. Toyobo MC has invested in Trevi Systems, solidifying the partnership.

In the future, Trevi Systems plans to construct a 6,000 m<sup>3</sup> per day seawater desalination plant on the same site. Through the supply of FO membranes that enable energy-saving seawater desalination, Toyobo MC will contribute to solving environmental issues such as water shortages around the world.

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