

## Australian Demonstration Plant Begins Operation toward the Development of a CO<sub>2</sub>-free Hydrogen Supply Chain

ENEOS Corporation (President: Saito Takeshi, hereinafter “ENEOS”) announces that it has constructed a demonstration plant<sup>\*1</sup> in Brisbane, Queensland, Australia, to produce methylcyclohexane<sup>\*2</sup> (hereinafter “MCH”), a type of hydrogen carrier, using its proprietary low-cost “electrochemical synthesis of organic hydride” method<sup>\*3</sup> (Direct MCH<sup>®</sup><sup>\*4</sup>). The opening ceremony was held today, January 30, and the plant will begin operation in February.



ENEOS has worked to scale up electrolyzers using Direct MCH<sup>®</sup> technology in order to mass produce MCH derived from renewable energy (Green MCH). The operation of this demonstration plant is a part of this effort.

The 150-kilowatt-scale medium-sized electrolyzer (approximately 200 times larger than the electrolyzer used in the 2021 demonstration<sup>\*5</sup>), which ENEOS recently succeeded in developing the technology for, consists of stacked electrodes with a surface area of 3 square meters. The electrolyzer realizes increased efficiency in MCH production with electrodes which are nearly the largest by size that is used industrially.

The demonstration plant will produce green MCH by combining the medium-sized electrolyzer with a 250-kilowatt solar power system in Queensland, which is ideal for solar power generation. With the aim of maximizing production efficiency, the plant will confirm the durability of the electrolyzer under subtropical conditions as well as develop optimal operation and control technologies for it when plant operation is adjusted to match fluctuations in solar power during the approximately eight-month-long demonstration period from February to September 2023.

Additionally, during the demonstration period, MCH equivalent to approximately 2 to 3 tons of hydrogen for 400 to 600 fuel cell vehicles (FCVs) will be produced and transported to Japan, where hydrogen will be extracted from MCH in ENEOS' Central Technical Research Laboratory.

ENEOS will use the knowledge gained from this demonstration plant to develop a larger-sized 5 megawatt-scale electrolyzer (more than 30 times larger than the medium-sized electrolyzer used in this demonstration plant) for commercialization by FY2025.

ENEOS will work to develop production technology for stable and cost-competitive CO<sub>2</sub>-free hydrogen (green hydrogen) in Australia, a country with excellent potential for green hydrogen production due to its favorable climate conditions, including wind and sunlight, and expansive land, in anticipation of a hydrogen-oriented society toward decarbonization.

\*1 This demonstration was conducted as part of Green Innovation Fund Projects of Large-scale Hydrogen Supply Chain Establishment / Direct MCH electrosynthesis technology development commissioned by the New Energy and Industrial Technology Development Organization (NEDO).

Announced on August 26, 2021

[Four Demonstration Projects toward the Development of a CO<sub>2</sub>-free Hydrogen Supply Chain selected as NEDO's Green Innovation Fund Project](#)

\*2 Normal temperature, normal pressure liquid with a volume of 1/500 of hydrogen gas. It is characterized by ease of handling including storage and transport.

\*3 Hydrogen produced via water electrolysis must be stored in a tank and reacted with toluene in order to convert it into MCH, a type of organic hydride (hydrogen carrier) useful for storage and transport. However, the electrochemical synthesis of organic hydride method uses water and toluene derived from renewable energy and other sources of electricity to produce MCH in a one-step reaction.

Announced on March 15, 2019

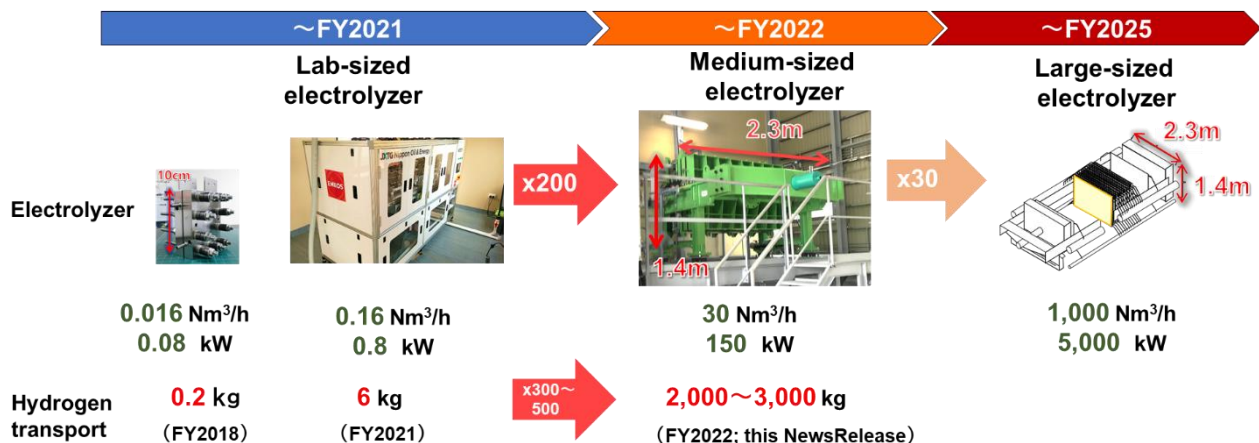
[Succeeded in the world's first technical verification to produce "CO<sub>2</sub>-free hydrogen" at low cost](#)

\*4 Direct MCH® is a registered trademark of ENEOS Corporation.

\*5 Announced on November 2, 2021

[ENEOS, Chiyoda, and QUT Successfully Scaled Up an Australian CO<sub>2</sub>-Free Hydrogen Supply Chain Demonstration using Direct MCH®](#)

## Roadmap for future development of Direct MCH® technologies



Opening Ceremony

(From left to right)

Masuo Ono, Consul-General of Japan in Brisbane

Tomohide Miyata, Executive vice president, ENEOS Corporation

Honourable Dr. Steven Miles, Deputy Premier of Queensland, Queensland State Government

Honourable Mick de Brenni, Minister for Energy, Renewables and Hydrogen, Queensland State Government

Takanori Kugimiya, Project Manager, New Energy and Industrial Technology Development Organization





Plant appearance