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Cosmo Energy Holdings Co., Ltd.
National University Corporation Shizuoka University

Cosmo and Shizuoka University Begin Joint Study on Cost-Efficient Green Hydrogen Production Through Seawater Electrolysis

Cosmo Energy Holdings Co., Ltd. and National University Corporation Shizuoka University (hereafter, “Shizuoka University”) have entered into an agreement, effective January 6, 2025, to jointly study the cost-efficient production of green hydrogen through seawater electrolysis.

■Background to the Study

Green hydrogen is a crucial element in the process of converting carbon dioxide (CO_2) into other substances through Carbon dioxide Capture and Utilization (CCU), a technology that transforms and repurposes CO_2 into valuable resources. However, the high cost of electricity in Japan has made green hydrogen production through water electrolysis increasingly expensive, posing a significant challenge to the implementation of CCU. Therefore, more cost-efficient green hydrogen production technologies are essential for successful CCU realization.

The Cosmo Energy Group has set a goal of achieving net zero greenhouse gas (GHG) emissions associated with self-operation, including Scope 3, by 2050. To realize this, the Group is actively developing Carbon dioxide Capture and Storage (CCS) and Carbon Dioxide Capture and Utilization (CCU) technologies.

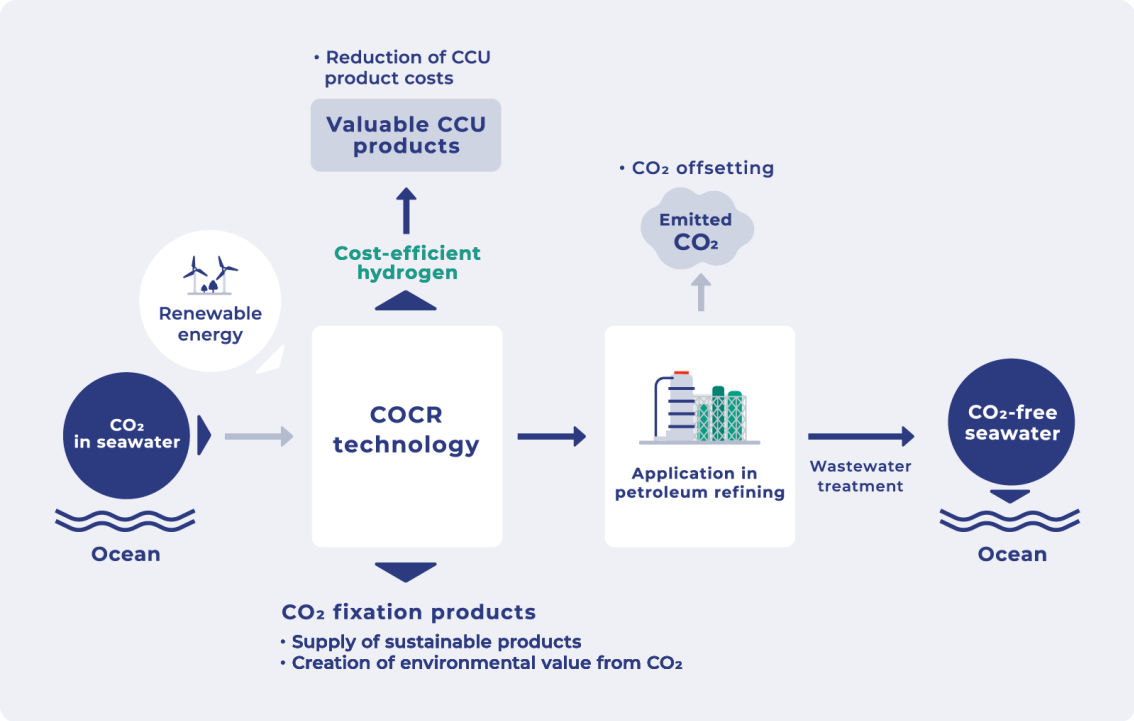
Shizuoka University has developed and patented a Carbon dioxide Ocean Capture and Reuse (COCR) technology, which employs electrochemistry to immobilize CO_2 using minerals dissolved in seawater while producing hydrogen through seawater electrolysis. By utilizing this technology, it is possible to produce and commercialize valuable CO_2 by-products as part of the green hydrogen production process. This approach helps reduce fixed costs in green hydrogen production, making the production of this clean energy source more economically viable compared to existing methods.

■Overview of the Joint Study

The Cosmo Energy Group can procure the renewable energy required for green hydrogen production from its group company, Cosmo Eco Power Co., Ltd. Additionally, the Group

utilizes large volumes of seawater in its petroleum refining operations and possesses the necessary infrastructure for seawater intake.

In this joint study, the two parties will combine the Cosmo Energy Group's renewable energy-derived electricity and seawater intake infrastructure with Shizuoka University's COCR technology to produce more cost-efficient green hydrogen. They will also work on technological development aimed at reducing CO_2 emissions through the utilization of CCU technology.



Through this collaboration, Shizuoka University and Cosmo Energy Holdings are committed to exploring CO_2 reduction effects, investment profitability, and other key factors, with the aim of lowering the cost of carbon-neutral products derived from CO_2 emitted by the Cosmo Energy Group's refineries and other facilities.

Introduction to the Cosmo Energy Group and Shizuoka University

●Cosmo Energy Group

The Cosmo Energy Group announced its *2050 Carbon Net Zero Declaration* and is accelerating decarbonization-related initiatives under *Vision 2030* and the *Seventh Consolidated Medium-Term Management Plan Oil & New ~Next Stage~*. This collaboration is one of a number of concrete measures that the Group is taking to "strengthen competitiveness of the *Oil* Business and pursue low carbonization" as set forth in *Vision 2030*. It is being carried out with the goal of solving societal challenges and achieving sustainable corporate development toward the realization of the *Group Management Vision* of achieving “harmony with humanity, society, and our planet.”

● National University Corporation Shizuoka University

National University Corporation Shizuoka University is steadily advancing basic research and interdisciplinary studies that contribute to reducing greenhouse gases and is proactively working to apply related research outcomes in the real world.

Associate Professor Yoshihiko Sano, a researcher in the University’s Department of Mechanical Engineering, Faculty of Engineering and Research Institute of Green Science and Technology, specializes in environmental and energy-related research. His work focuses on CO_2 fixation and energy creation to achieve carbon neutrality from the perspective of mass transport phenomena.

(End)