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SPERA Hydrogen™ – Chiyoda’s Hydrogen Supply Chain

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Abstract

Hydrogen is attracting attention as an energy carrier, as a replacement for fossil fuel. Hydrogen, when used as a fuel, generates no CO₂. From the viewpoint of reducing the environmental burden, widespread use of renewable energy is essential. Although renewable energy is unstable and/or highly dependent on the weather, hydrogen can be produced from renewable resources for storage and transportation as energy carrier, contributing to the increased use of renewable energy. On the other hand, it is not been clear how hydrogen value chain will be developed, that is, how it will be produced, stored and transported. Currently, various institutions and companies are developing higher-efficiency, safer production, and storage and transport technology. These technologies to make it safe for energy production are advancing.

While the conventional technologies did not allow a large-scale storage and transportation of hydrogen same as that of petroleum and natural gas, Chiyoda successfully developed a technology named SPERA Hydrogen™, to enable safe, large-scale storage and transportation of hydrogen. Hydrogen is fixed to toluene and converted to methylcyclohexane (MCH). With this technology, hydrogen can be safely handled in a liquid state at ambient temperature and pressure, which makes it possible to utilize the existing petroleum transportation and distribution infrastructure, such as tanks, oil tankers and tank lorries, lowering the capital investment for hydrogen transportation. This is classified as a Liquid Organic Hydrogen Carrier (LOHC).

Chiyoda, which commenced R&D into a high performance dehydrating catalyst in 2002, successfully developed one capable of obtaining hydrogen from methylcyclohexane (MCH) in 2011, which can be used for commercial purposes. As a result, it became possible to transport a large amount of hydrogen safely and easily, one of the main challenges in utilizing hydrogen. With these transport and dehydrogenation breakthroughs, Chiyoda has enabled the building of a global hydrogen supply chain.

Currently, the Japanese Government is actively promoting the use of hydrogen energy. In its Strategic Road Map for Hydrogen and Fuel Cells, compiled in 2014, it is clearly stated that, the technology demonstration of storage and transportation of hydrogen from overseas shall be done by 2020, full-fledged introduction of hydrogen power generation shall be realized by 2030, and full-fledged operation of manufacturing, transportation and storage of zero-emission hydrogen for domestic use shall be materialized by 2040. Chiyoda aims to establish a global hydrogen supply chain, to supply SPERA Hydrogen™ for power generation,

industrial applications, as well as a distributed power generation, mobility energy supply businesses.

Note: This document will be opened to the participants on IERE website before the Workshop and opened to the public afterward.