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Establishment of International Liquefied Hydrogen Supply Chain

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Abstract

Kawasaki Heavy Industries (KHI) is developing all the key technologies for the realization of a full hydrogen supply chain ranging from production to transportation, storage and utilization. Hydrogen can be produced from various sources in multiple geographies where these sources are abundant, and it produces only water as an emission when used as fuel for industry etc. By diversifying how hydrogen is manufactured, we can contribute to the urgent need to address global de-carbonization in many countries.

KHI's hydrogen expertise, technologies and products stem from the company's decades-long experience in the LNG industry.

For efficient transportation and storage, hydrogen gas is liquefied by cooling it to minus 253 degrees Celsius to reduce its volume to 1/800th. Liquefied hydrogen can be easily converted back to hydrogen gas. After evaporation, it can be utilized upon receipt.

With the support of the Japanese, Australian and Victorian Governments, working with its project partners, KHI successfully completed Hydrogen Energy Supply Chain (HESC) Pilot demonstration project. As a part of the project, leveraging its experience, KHI built the world's first liquefied hydrogen carrier, the Suiso Frontier (SF), with a cryogenic storage tank with vacuum insulation to keep liquefied hydrogen at a very low temperature. The hydrogen, produced in Australia through a coal gasification process using a mix of Latrobe Valley coal and biomass, was liquefied and safely transported from Hastings, to Kobe, in February 2022.

Separately, Japan Suiso Energy (JSE), KHI's subsidiary company, has been awarded support from the Japanese Government's "Green Innovation fund", a large-scale liquefied hydrogen supply chain with demonstration operation to commence in the 2020s. JSE conducted feasibility studies on the location of this project and the HESC was finally selected for it. The project will have a carbon capture and storage (CCS) solution to minimize CO₂ emission.

KHI is currently working to scale up facilities over the next several years to maximize the potential for full commercial operations in the 2030s and mitigate potential financial and technical risks as we increase scale. As a part of it, KHI is developing a commercial scale vessel. KHI has successfully obtained an approval from Class NK (a Japanese ship classification) for designing a large-scale carrier and a cargo containment system with four liquefied hydrogen tanks.

KHI is fully focused and committed to develop the necessary hydrogen technology of the supply chain, and demonstrate the feasibility of hydrogen commercialization. This will deliver a new, clean hydrogen industry to the world, for the benefit of our environment and for the sustainable future of generations to come.

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