In June 2024, Nanyang Technological University (NTU) Singapore, PSA Singapore, and Japan's Chiyoda Corporation launched a joint initiative to evaluate hydrogen as a sustainable energy source. The project focuses on transporting and storing hydrogen using methylcyclohexane (MCH), a liquid organic hydrogen carrier (LOHC), to support green heavy vehicles.

Compacted dehydrogenation skids provided by Chiyoda (Image: Chiyoda)

A hydrogen refueling station has been established at Singapore's Pasir Panjang Terminal, managed by PSA Singapore, as part of the trial expected to run until mid-2025. The refueling station, a key component of the initiative, is testing the viability of LOHCs for industrial storage and on-site hydrogen gas production. This approach could transform refueling processes in heavy vehicle operations by providing a cleaner energy alternative.

PSA Singapore and Chiyoda Corporation: Key players

PSA Singapore, known for operating the world's largest container transshipment hub, handled 38.8 million TEUs of containers in 2023. The company maintains connections to 600 ports globally, providing daily sailings to all major ports year-round. Beyond its core port operations, PSA offers port adjacency services, leveraging bespoke digital solutions to enhance the visibility of supply chains. This involvement in hydrogen technology aligns with PSA's strategy to integrate innovative, low-carbon solutions into its operations.

Also interesting: Hydrogen Fuel Cells and Its Future as a Source of Energy

Chiyoda Corporation, a fully integrated engineering company founded in 1948, specializes in consulting, planning, engineering, and construction across various industries such as gas, electricity, and petrochemicals. Chiyoda's contribution to this project via its SPERA Hydrogen technology underscores its commitment to advancing green applications and promoting global decarbonization.

PSA hydrogen refueling station and fuel-cell electric prime mover vehicle (Image: PSA Singapore)

Connecting hydrogen to green heavy vehicles

The project is particularly significant for the development of green heavy vehicles. Fuel cells, key to this technology, produce electricity through a chemical reaction between hydrogen and oxygen, emitting only water and heat. For regions like Singapore, where natural resources are scarce, hydrogen via LOHCs presents a promising sustainable energy storage and transportation method, potentially revolutionizing how heavy vehicles are powered.

Heavy vehicles can significantly reduce carbon emissions by incorporating innovsativbe technology, aligning with global sustainability goals. The trial's outcomes are anticipated to inform future applications beyond Singapore, potentially influencing sustainable industrial practices worldwide. This collaboration exemplifies the proactive steps the involved parties took to explore and implement cleaner energy solutions, with the potential to make a meaningful impact on global environmental conservation efforts.

YouTube: MCH Dehydrogenation Demonstration Project in Singapore (promotional clip by Chiyoda)

Photo credit: The photographs have been credited directly beneath each position in the image's caption.
Source: NTU press release