



JOINT NEWS RELEASE

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NTU Singapore to develop technologies to extract hydrogen from liquid organic hydrogen carriers, supported by industry collaborators

Nanyang Technological University, Singapore (NTU Singapore) is developing new technologies for the extraction of hydrogen from liquid organic hydrogen carriers, with the support of **National University of Singapore (NUS)** and industry collaborators in Singapore and Japan - including **Chiyoda Corporation, PSA Corporation, Sembcorp Industries, City Energy, Jurong Port, Singapore LNG corporation** and **Mitsubishi Corporation** - to power Singapore's green energy future.

Liquid organic hydrogen carriers are flexible media for the storage and transportation of renewable energy. The research project thus has the potential to allow for more efficient and economical transport of hydrogen, which can in turn contribute to the expansion of global hydrogen supply chains.

The project was mentioned by Singapore's Trade and Industry Minister, Mr Gan Kim Yong, during this year's Committee of Supply (COS) debate in Parliament, where he highlighted that the project aims to contribute to the design of a cost-effective hydrogen supply chain network for Singapore.

The collaboration is made possible by a grant awarded under the **Low-Carbon Energy Research Funding Initiative (LCER FI)**, which was started by the Singapore Government to support research, development, and demonstration projects on low-carbon energy technology solutions.

The Singapore Government's investments in low-carbon energy solutions are part of the Singapore Energy Story and will support the country's ambitions under the Long-

Term Low-Emissions Development Strategy and the Singapore Green Plan.

Consortium of companies to support research and commercial development

Chiyoda Corporation, which is headquartered in Japan, will serve as NTU's key partner in the project, and will offer technical contribution based on their proprietary dehydrogenation catalyst technology, SPERA Hydrogen™, to the University to be developed and implemented on a national scale.

In addition, the Japanese government is supporting Singapore's energy transition by leveraging on Japanese companies' technologies such as Chiyoda's SPERA Hydrogen under the Asia Energy Transition Initiative.

The project builds on previous work by the group of companies, along with researchers from NTU and the NUS. Together, the group of companies have been developing a more cost-effective way to implement and operate a hydrogen supply chain, following a Memorandum of Understanding (MOU) among the consortium in March 2020.

Under the collaboration, the consortium of companies aims to accelerate the commercial usage of hydrogen in Singapore, with a goal of also semi-commercialising the technology by the year 2025, and full commercialising by 2030.

Professor Lam Khin Yong, Senior Vice President (Research) at NTU Singapore, said: "Liquid organic hydrogen carriers (LOHCs) technology is one of the promising solutions for safe transportation of hydrogen. NTU researchers will work closely with our partners to develop better catalysts, and more efficient reactors for extracting hydrogen. This collaboration comes at a timely moment, on the back of rising oil prices. As a nation with no natural resources, it is all the more important for Singapore to have an alternative source of energy that is reliable and economical. This will not only benefit its citizens, but also support the country's vision of becoming a more sustainable nation. We are committed to supporting this goal, in line with the NTU 2025 strategic plan which prioritises the university's commitment to environmental sustainability through R&D with real-life impact."

Professor Liu Bin, Senior Vice Provost (Faculty & Institutional Development) at NUS, said, "NUS is pleased to contribute to this exciting project, in tandem with our ongoing university-wide efforts to develop integrated and commercially viable low-carbon solutions. We look forward to working with the consortium partners to realise the vision of a robust, affordable hydrogen value chain for a greener Singapore."

Mr Masaji Santo, President & COO, Chiyoda Corporation, said: "We are delighted to join the team as a member of this program which will lead to long-term CO2 emission reductions in Singapore and contribute to global decarbonisation by applying

our proprietary technology, SPERA Hydrogen, using Methylcyclohexane (MCH) as LOHCs. Chiyoda will further accelerate the expansion of its hydrogen value chain business towards a sustainable future environment by maximizing the advantages of our SPERA Hydrogen system, such as its stability under ambient temperature and pressure, its safe and easy-to-handle characteristics and its cost competitiveness, intensified by using existing petrochemical infrastructure, regulations and standards.”

Mr Ong Kim Pong, Regional CEO Southeast Asia, PSA International, said: “PSA is committed to decarbonising our business operations through innovations and emerging new technologies. We are excited to embark on this joint initiative with like-minded partners to explore and pioneer ways to utilise hydrogen as a viable low-carbon energy source in Singapore. Besides the use of hydrogen-powered horizontal transport, PSA also recognises hydrogen’s role as a strategic enabler for smarter integration of energy systems, furthering decarbonisation efforts for a sustainable Tuas Port and its supply chain ecosystem.”

Mr Hong Howe Yong, Head, Group Centre of Excellence, Sembcorp Industries, said: “Natural gas replaced fuel oil 20 years ago as the primary power generation source, reducing harmful emissions in Singapore. As Singapore’s top natural gas importer, Sembcorp is committed and well-placed to support Singapore’s transformation to the next greener technology. We are pleased to partner the government and industry leaders to accelerate the development of the hydrogen supply chain, and the commercial usage of decarbonised hydrogen in Singapore.”

Mr Perry Ong, Chief Executive Officer, City Energy, said: “As the sole producer and retailer of piped town gas, City Energy believes in the potential of harnessing hydrogen from the town gas manufacturing process to lower carbon emissions and to support the development of more sustainable energy solutions for various industry sectors. Helping the environment by reducing carbon emissions is also in line with Keppel Infrastructure Trust’s ESG initiatives.”

Mr Ooi Boon Hoe, Chief Executive Officer, Jurong Port, said: “Jurong Port is very encouraged by the grant as it reinforces the commitment by Singapore to develop low carbon alternative energy options. Working in tandem with the consortium members and Mitsubishi Chiyoda, Jurong Port believes that with our strategically located infrastructure will bring significant supply chain benefits to the project.”

Mr Tan Soo Koong, CEO, SLNG, said, “SLNG is proud to be a part of this very important project to enable a more sustainable energy future for Singapore; and we are especially delighted to have the strong support of the Singapore Government, in the form of the LCER funding. We very much look forward to making significant strides on the project with our partners, and eventually enabling a sustainable eco-system that can make hydrogen a long-term low carbon energy option for Singapore.”

Mr Koji Ota, EVP of Mitsubishi Corporation and CEO of the Industrial Infrastructure Group, said, “This grant is indicative of the commitment of Singapore to play a leading role in energy transition challenge. We are both honoured and excited to be a part of this project with NTU along with other esteemed partners. We look forward to contributing to the project with our global business development experience as we believe that the challenges, we face require a collaborative approach as exemplified in this project.”

Professor Low Teck Seng, Chief Executive Officer, National Research Foundation Singapore, said: “This multidisciplinary collaboration will harness the strengths and expertise from academia and industry to develop cost-effective low-carbon energy technologies for Singapore and beyond. This allows us to explore pathways to import clean fuels, particularly hydrogen, at scale and sustainably, which also supports the Singapore Green Plan. NRF will continue to invest in such research collaborations that strengthen Singapore’s overall sustainability and resilience.”

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About Nanyang Technological University, Singapore

A research-intensive public university, Nanyang Technological University, Singapore (NTU Singapore) has 33,000 undergraduate and postgraduate students in the Engineering, Business, Science, Humanities, Arts, & Social Sciences, and Graduate colleges. It also has a medical school, the Lee Kong Chian School of Medicine, established jointly with Imperial College London.

NTU is also home to world-renowned autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies, Earth Observatory of Singapore, and Singapore Centre for Environmental Life Sciences Engineering – and various leading research centres such as the Nanyang Environment & Water Research Institute (NEWRI) and Energy Research Institute @ NTU (ERI@N).

Ranked amongst the world’s top universities by QS, NTU has also been named the world’s top young university for the last seven years. The University’s main campus is

frequently listed among the Top 15 most beautiful university campuses in the world, and it has 57 Green Mark-certified (equivalent to LEED-certified) building projects, of which 95% are certified Green Mark Platinum. Apart from its main campus, NTU also has a campus in Singapore's healthcare district.

Under the NTU Smart Campus vision, the University harnesses the power of digital technology and tech-enabled solutions to support better learning and living experiences, the discovery of new knowledge, and the sustainability of resources.

For more information, visit www.ntu.edu.sg