



JOINT NEWS RELEASE

30 March 2020

COMPANIES COLLABORATE TO EXPLORE HYDROGEN AS A LOW-CARBON ALTERNATIVE FOR SINGAPORE

Emerging low-carbon alternatives can help to power Singapore's energy future. To capture the opportunities offered by low-carbon alternatives, five Singapore and two Japanese companies today enter into a Memorandum of Understanding (MoU) to study how hydrogen as a low-carbon alternative can contribute to a clean and sustainable energy future for Singapore.

Under the MOU, PSA Corporation Limited (PSA), Jurong Port Pte Ltd (Jurong Port), City Gas Pte Ltd, Sembcorp Industries Ltd, Singapore LNG Corporation Pte Ltd, Chiyoda Corporation (Chiyoda) and Mitsubishi Corporation (Mitsubishi) will develop ways to utilise hydrogen as a green energy source. This involves the research and development of technologies related to the importation, transportation and storage of hydrogen.

Working closely with Chiyoda, a key technology and supply chain solution partner, the companies will identify and demonstrate use cases using Chiyoda's *SPERA Hydrogen, Liquid Organic Hydrogen Carrier (LOHC) technology* to allow hydrogen to be safely transported in chemical tankers at normal atmospheric temperature and pressure. Mitsubishi will support this development as the main shareholder of Chiyoda. The five Singapore companies will work closely with Chiyoda and Mitsubishi to evaluate the technical and commercial feasibility of hydrogen usage, to develop a business case for hydrogen import and utilisation in Singapore.

"We are delighted to be underlining PSA's commitment to green initiatives with the signing of this MOU. Lowering carbon emissions to reduce the impact of climate change is a vital pillar of our business, and the direct impact of reducing

our carbon footprint through this project is exciting. Powering our horizontal transport with hydrogen is just the beginning, and we will see its application expanding in the future, playing a part in our Smart Grid systems with EMA, and augmenting business adjacencies in our future Tuas Ecosystem.” said Mr Ong Kim Pong, Regional CEO Southeast Asia, PSA International.

“Jurong Port is working with Chiyoda as we believe that the port is well placed to accelerate the development of hydrogen as a viable fuel option for power generation in Singapore’s transition to a low-emissions future”, said Ooi Boon Hoe, Chief Executive Officer, Jurong Port.

“As the producer and retailer of piped town gas for more than 860,000 homes and businesses, City Gas believes in harnessing green energy and technology to support eco-conscious manufacturing and operations. We look forward to study and develop the viability of using green hydrogen in the town gas manufacturing process to further lower carbon emissions.” said Mr Kenny Tan, Chief Executive Officer, City Gas

Neil McGregor, Group President & CEO, Sembcorp Industries said: “Sembcorp has long held a strong commitment to sustainability and has made it central to our business strategy and operations. Sembcorp’s experience in the region as a provider of renewable energy and sustainability solutions, coupled with our deep technology integration know-how will greatly support the development of the hydrogen economy in Singapore. We look forward to this exciting partnership and developing more significant contributions to reducing Singapore’s carbon footprint.”

“This MOU marks an important first step towards making another sustainable energy option, namely hydrogen, available for Singapore. SLNG is pleased to be a part of this pioneering and very exciting collaboration, through seeking synergistic ways of using our terminal infrastructure. We are in the midst of a global energy transition, and SLNG is committed to doing what we can to facilitate and catalyse this process.” said Mr Tan Soo Koong, CEO, SLNG

Prompted by the very real challenge of climate change, the Singapore Government is engaging various stakeholders to co-create solutions for

Singapore's Energy Story. The National Research Foundation (NRF) Singapore will also work with Maritime and Port Authority of Singapore (MPA) to tackle the maritime decarbonisation challenge through research and technology development.

Professor Low Teck Seng, Chief Executive Officer, NRF said: "Singapore needs to stay ahead in the research and development of alternative energy sources in our transition towards a low-carbon and low-emission economy. We are encouraged that companies are coming together, leveraging each other's expertise, to study how hydrogen can be used as an emissions-free alternative to existing carbon sources. These companies will work alongside our researchers to look at how technologies in this area – such as catalysis and membrane technologies – can be further developed for the production and distribution of hydrogen. This effort will be supported by public sector agencies, to accelerate the potential use of hydrogen as a low-carbon solution that will reduce Singapore's carbon footprint.

Background

About PSA Corporation Limited (PSA)

PSA Singapore operates the world's largest container transshipment hub in Singapore, handling 36.9 million TEUs of containers in 2019. With connections to 600 ports globally, shippers have access to daily sailings to every major port in the world, operating 24/7 all year round. Beyond port operations, PSA also offers cargo solutions to customers operating in advanced manufacturing, cold chain, e-commerce, and energy & chemicals. This value adding service is enabled by CALISTA™, a digital platform that facilitates trade and helps shippers to better manage their physical movement of goods, trade financing and compliance.

About Jurong Port Pte Ltd (Jurong Port)

Jurong Port is a world-class multipurpose port operator serving as Singapore's premier gateway for general and bulk cargo. Its port operating expertise includes efficient handling of general, bulk and containerized cargo, management and operations of the Tuas Offshore Marine Centre, and Lighter Terminals in Penjuru and Marina South as well as overseas ports in China and Indonesia. In 2019, its Jurong Port Tank Terminals joint venture successfully commenced operations in

Singapore to store and handle clean petroleum and petrochemical products. Jurong Port caters to regional and domestic markets across diverse industry segments which includes construction, shipbuilding, offshore, transport, logistics, petroleum and manufacturing industries. Jurong Port's local and overseas terminals handled a total of about 37 million tons of general and bulk cargo and over half a million TEUs in 2018.

Amongst others, Jurong Port won the Lloyds List Asia Pacific Port/ Terminal Operator of the Year Award in 2018 and the National Infocomm Award for Most Innovative Use of Infocomm Technology (Private Sector) in 2016.

For more information, please visit our corporate website: www.jp.com.sg

About City Gas

City Gas Trust was constituted as a private trust on 5 January 2007 and is a wholly owned subsidiary of Keppel Infrastructure Trust. With a long heritage of more than 150 years, the core business of City Gas Trust is the production of town gas distributed island-wide to residents and commercial and industrial customers. City Gas Trust also supplies natural gas to these businesses. City Gas is ISO 9001 certified and committed to delivering excellent customer service. The company provides safe and reliable gas supply, 24-hour customer service, day and night maintenance, gas appliance servicing, regular safety inspections, installation of internal gas pipes and consultancy services. Its one-stop shop, City Gas Gallery, which is located at Plaza Singapura, features a wide selection of kitchen appliances for residential and commercial customers, provides live demonstration of gas appliances and manages all enquiries with regards to town gas installations.

About Sembcorp Industries

Sembcorp Industries is a leading energy, marine and urban development group, operating across multiple markets worldwide.

As an integrated energy player, Sembcorp is poised to benefit from the global energy transition. With a strong track record in developing and developed markets, we provide solutions across the energy and utilities value chain, with a focus on the Gas & Power, Renewables & Environment, and Merchant & Retail

sectors. We have a balanced energy portfolio of over 12,600MW, including thermal power plants, renewable wind and solar power assets and battery storage. In addition, Sembcorp is a world leader in offshore and marine engineering, as well as an established brand name in urban development. Sembcorp Industries has total assets of over S\$23 billion and over 7,000 employees. Listed on the main board of the Singapore Exchange, it is a component stock of the Straits Times Index, several MSCI and FTSE indices including the FTSE4Good Index, as well as the SGX Sustainability Leaders Index and the Dow Jones Sustainability Asia Pacific Index.

About Singapore LNG Corporation Pte Ltd

Singapore LNG Corporation Pte Ltd (SLNG) was incorporated in June 2009 to build, own and operate Singapore's very first open-access, multi-user LNG Terminal. This is a key infrastructure that supports Singapore's energy diversification strategy and future developments in the energy sector.

SLNG's primary mandate is to provide Throughput (Send-out) Services for the domestic market. Beyond this, SLNG also offers ancillary services such as Vessel Cool-down, Storage & Reload (including for Small-Scale LNG), LNG Transshipment and LNG Truck Loading. SLNG will continuously explore new LNG business opportunities as it pursues its vision to be a world-class LNG terminal operator enabling the growth of the energy market and LNG hub in Singapore.

For more information on SLNG, please visit www.slng.com.sg

About Mitsubishi Corporation(Mitsubishi)

Mitsubishi Corporation (Mitsubishi) is a global integrated business enterprise that develops and operates businesses together with its offices and subsidiaries in approximately 90 countries and regions worldwide, as well as a global network of around 1,400 group companies.

Mitsubishi has 10 Business Groups that operate across virtually every industry: Natural Gas, Industrial Materials, Petroleum & Chemicals, Mineral Resources, Industrial Infrastructure, Automotive & Mobility, Food Industry, Consumer Industry, Power Solution and Urban Development. Through these 10 Business Groups, Mitsubishi's current activities have expanded far beyond its traditional trading

operations to include project development, production and manufacturing operations, working in collaboration with our trusted partners around the globe. With an unwavering commitment to conducting business with integrity and fairness, Mitsubishi remains fully dedicated to growing its businesses while contributing to a prosperous society.

About Chiyoda Corporation (Chiyoda)

Chiyoda is a world-leading, fully integrated international engineering company and EPC contractor.

Chiyoda apply its technology expertise and extensive project execution experience by providing planning, engineering, procurement, construction, operation and maintenance services in a wide range of business fields including oil & gas, chemicals and petrochemicals, pharmaceuticals, environmental technology, renewable energy, social infrastructure and industrial facilities. Since its founding in 1948, Chiyoda has provider Project Lifecycle Services in the successful completion of numerous projects in over 60 countries around the world. Chiyoda is trying to expand its business portfolio from energy to environment, from EPC to Investment & Service, and hydrogen supply chain business is one of focused area as its new business portfolio.

Media Contacts:

PSA Corporation Limited

Chong Shin Yen (Manager, Corporate Communications)

Telephone: +65 6279-4616 / +65 9834-9750

E-mail: sychong@globalpsa.com

Jurong Port Pte Ltd

Lee Jek Suen (Vice President, Strategic Planning and Optimisation)

E-mail: mediarelations@jp.com.sg

Phone: +65 6265 0666

City Gas Pte Ltd (as Trustee)

Diana Neo (Manager, Corporate and Marketing Communications)

E-mail: diananeo@citygas.com.sg

Phone: +65 9221 0000

Sembcorp Industries

Jeff Siaw (Manager, Group Strategic Communications & Sustainability)

E-mail: jeff.siaw@sembcorp.com

Phone: +65 6723 3114

Singapore LNG Corporation Pte Ltd

Simon Ang (Senior Manager, Corporate Communications)

E-mail: SimonAng@SLNGCorp.com

Phone: +65 9664 6161

Mitsubishi Corporation

Press Relations Team, Corporate Communications Dept.

Telephone: +81-3-3210-2171

Facsimile : +81-3-5252-7705

Chiyoda Corporation

IR, PR & CSR Department

URL : <https://www.chiyodacorp.com/en/contact/index.php>

Annex A – Industry Use Cases

PSA Corporation Ltd

As part of its commitment, PSA will develop the first proof-of-concept hydrogen use project for horizontal port transport in Singapore, and aims to augment its core business of port operations and adjacent ecosystems by 2030 through:

- i. Usage as a potential sustainable green energy source for inter-terminal and intra-terminal horizontal transportation, fueled by SPERA hydrogen refueling stations. This will be a potentially viable and significant pathway to lower carbon emissions;
- ii. Usage as sustainable green Distributed Energy Resources (DERs) for the Smart Grid within the port, and as an alternative to electricity supply from the national power grid for enhancing energy security and resiliency.
- iii. Exploration of cargo solutions business adjacencies with Tuas Port as a hydrogen import gateway as well as a storage and production hub.

Jurong Port Pte Ltd

Jurong Port will explore cost-effective proof-of-concept solutions to advance the transport and storage of hydrogen as part of its port-centric ecosystem approach to support the renewable energy push by Singapore and the maritime sector.

This will involve setting up a potential hydrogen hub that can safely receive, store, extract and transfer green hydrogen to domestic markets by utilising the port's existing liquid bulk storage and handling infrastructure, as well as national gas pipelines in the vicinity. Jurong Port is also home to the world's largest port-based solar power generation facility, which could conceivably serve as a renewable energy source to power the dehydrogenation process and in turn achieve a zero-carbon hydrogen supply.

In catalysing the development of the hydrogen market, Chiyoda's SPERA Hydrogen system opens up opportunities for Jurong Port to play a role in building

a hydrogen supply network for future maritime use, thereby reinforcing Singapore's position as the world's leading energy and chemicals hub.

City Gas Pte Ltd

City Gas envisages to gradually replace the existing hydrogen in town gas that is produced utilizing the steam methane reforming process (natural gas base) with imported hydrogen (green hydrogen).

Sembcorp Industries

Sembcorp will leverage on our capabilities in providing integrated end-to-end energy and environmental enterprise solutions to explore the use of hydrogen as a green energy source for power generation and industrial processes. Some of these include:

- i. Using hydrogen as a fuel for our vehicles;
- ii. Injecting hydrogen together with natural gas to decarbonise power generation;
- iii. Building infrastructure to support the importation, storage and distribution of hydrogen;
- iv. Hosting refueling hubs to support ground transport supply chain; and
- v. Leveraging on waste heat integration for hydrogen extraction.

Singapore LNG Corporation Pte Ltd (SLNG)

Through the use of its LNG terminal on Jurong Island, and/or a potential SPERA Hydrogen receiving facility at a neighbouring site, SLNG will facilitate the import, storage, processing and distribution of hydrogen on a commercial scale in Singapore, for (but not limited to) the following purposes:

- i. Introduction of hydrogen to energy users;

- ii. Possible use of hydrogen as marine fuel; and
- iii. Re-exporting hydrogen to other destinations.