



A Consortium Approach to drive Maritime Decarbonisation

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MARITIME SINGAPORE

In a Snapshot

TOP bunkering hub

50.04 M tons total sales volume in 2021



Over **170** international shipping groups in Singapore



About

1,000

vessels in the Singapore Port at any one time



One of the world's

Busiest container hub ports

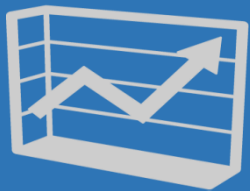


37.5 mil

TEUs of containers handled in 2021

30+

MarineTech Start-Ups and growing



More than

5,000 maritime establishments



5th

largest ship registry in the world



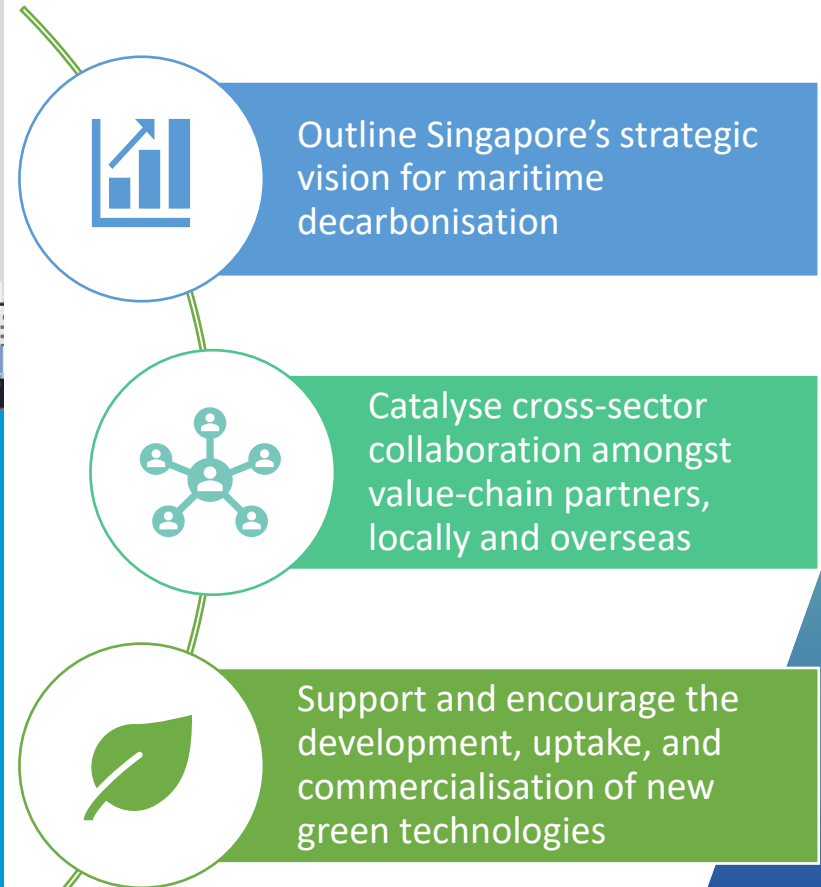
Maritime Singapore Decarbonisation Blueprint 2050

MARITIME SINGAPORE
 DECARBONISATION
 BLUEPRINT
 WORKING TOWARDS 2050

<p>PORT TERMINALS</p> <p>Transit towards a low-carbon future through the adoption of cleaner energy, automation and digitalisation</p> <p>↓ 60%</p> <p>in emissions from 2005 levels by 2030</p> <p>NetZero</p> <p>emissions by 2050</p>	<p>DOMESTIC HARBOUR CRAFT</p> <p>All harbour craft will operate on low-carbon energy solutions by 2030</p> <p>↓ 15%</p> <p>in emissions from 2021 levels by 2030</p> <p>↓ 50%</p> <p>in emissions from 2030 levels by 2050</p>	<p>FUTURE MARINE FUELS, BUNKERING STANDARDS AND INFRASTRUCTURE</p> <p>Be ready for a multi-fuel transition to support the future of international shipping</p> <p>Multi-Fuel Bunkering Transition</p> <p>Supply low and zero-carbon marine fuels and enable green technologies</p>	<p>SINGAPORE REGISTRY OF SHIPS (SRS)</p> <p>Recognise and incentivise owners to operate green ships</p> <p>50% of SRS fleet to be green ships by 2050</p>
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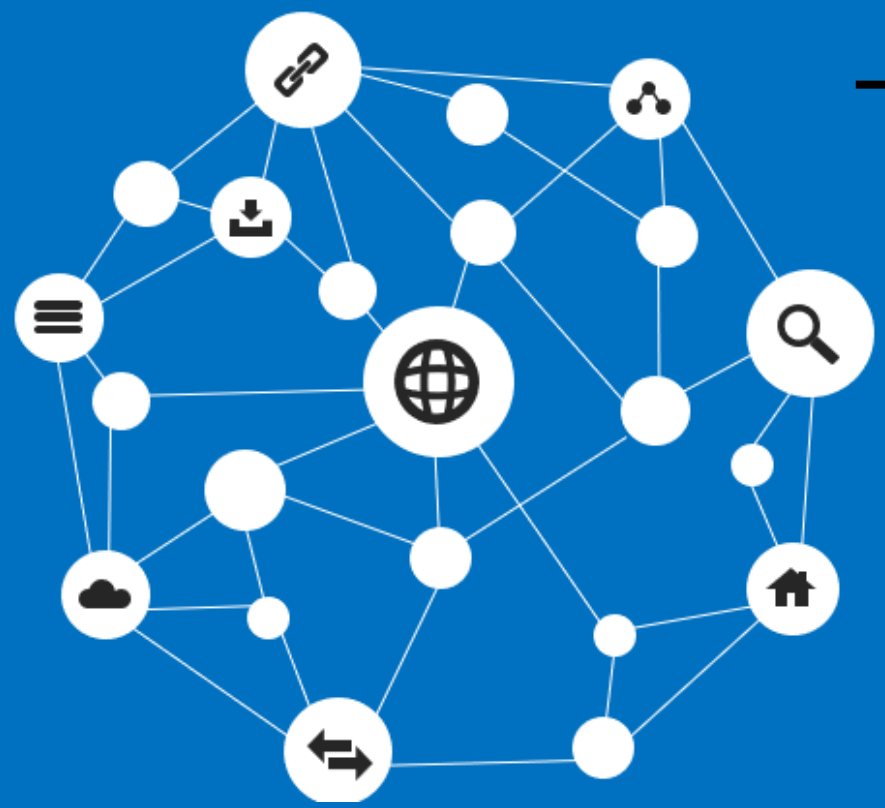
<p>EFFORTS AT INTERNATIONAL MARITIME ORGANIZATION (IMO) AND INTERNATIONAL PLATFORMS</p>	<p>Standard-Setter and Bridge-Builder Advocate strong, credible and inclusive climate action at the IMO and international fora</p>
<p>RESEARCH & DEVELOPMENT AND TALENT</p>	<p>Global Hub for Maritime Decarbonisation R&D Enabled by a vibrant ecosystem with the talent and expertise to develop and deploy innovations</p>
<p>CARBON AWARENESS, CARBON ACCOUNTING AND GREEN FINANCING</p>	<p>Green Maritime Finance Hub Promote green financing landscape and strengthen carbon accounting and reporting</p>

MPA to commit additional \$300 million to support decarbonisation initiatives over next 10 years



As the top global bunkering hub, Singapore will be ready for a multi-fuel transition to support the future of international shipping

We will supply low and zero-carbon marine fuels and enable green technologies including biofuels, methanol, ammonia, and potentially hydrogen, while enabling abatement technologies such as carbon capture, utilisation and storage.



LNG

LNG Bunkering Pilot Programme (LBPP)

Electrification

E.g. MPA-SMI Call for Proposals on electrification of harbour craft

Renewable Marine Fuels

E.g. biodiesel, bio-LNG, bio-methanol

Methanol

E.g. biomethanol, e-methanol

Ammonia

E.g. Castor Initiative, Itochu Consortium, SABRE Consortium

Hydrogen

Supporting Joint Industry Projects, Safety Studies and Pilot Trials



Harbour Craft Electrification

- MPA-SMI awarded funding to 3 consortiums led by Keppel FELS, SeaTech Solutions and Sembcorp Marine to research, design, build and operate 3 full electric harbour craft over the next 5 years
- The electrification pilot project will demonstrate both commercial and technical viability of specific use cases for full-electric harbour craft with interoperable charging stations



Biofuel Trials

- NTU MESD - Biofuel compatibility study for Singapore harbour craft
- Sea trials to demonstrate the feasibility of using drop-in biofuel for Singapore harbour craft
- Findings contribute to adoption of biofuel for marine vessels in Singapore



Ammonia Bunkering Safety

- GCMD awarded funding to DNV-led consortium on the project “Defining the safety and operational envelopes to enable ammonia bunkering pilot and demonstration”
- The project will define a robust set of safety guidelines and operational envelopes that will establish the basis of a regulatory sandbox for trials at two local bunkering sites.



Shipboard CCUS

- Proof-of-Concept and Prototype testing to develop and scale up CCS for shipboard application





On-going efforts: Joint Industry Projects on Feasibility of Ammonia as Marine Fuel

Joint Industry Pilot Trials and Test-Beds

- **Castor Initiative** – Led by MISC and involving Lloyd's Register, Samsung Heavy Industries, MAN Energy Solutions & Yara International to develop an ammonia-fuelled tanker
- **Itochu Joint Consortium** – Joining industry consortium to support ammonia bunkering in Singapore
- **SABRE Consortium** – Led by Sumitomo Corporation and involving A.P. Moller - Maersk A/S, Fleet Management Limited, Keppel Offshore & Marine, and Yara International ASA
- **EPS Consortium** – Led by EPS and involving HHI and ABS



Key Milestones

2025/26* – Expected delivery of first ammonia-powered ship, and first bunkering pilot trial

Leveraging maritime centers of expertise and develop green technology ecosystem with like-minded organisations

Maritime Energy & Sustainable Development Centre of Excellence



To **deepen** Singapore's maritime R&D capability in maritime energy and sustainability, **develop** innovative and sustainability solutions for green port and shipping, **grow** local experts and strong track leaders



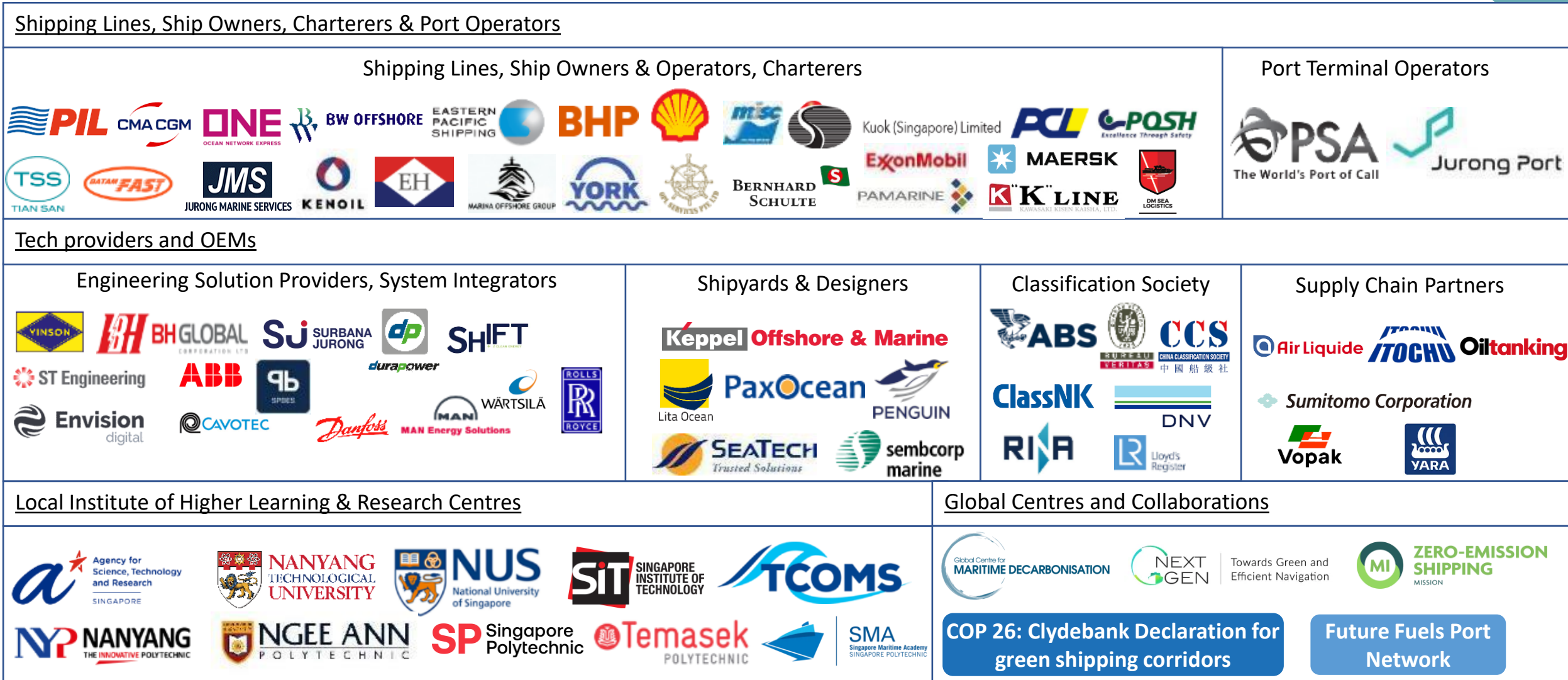
Global Centre for Maritime Decarbonisation



To help the maritime industry eliminate GHG emissions by **shaping** standards, **deploying** solutions, **financing** projects, and **fostering** collaboration across sectors



Join our green technology ecosystem to co-develop decarbonisation solutions for the maritime sector





M P A
S I N G A P O R E



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Thank You