

Setting Sail Towards Net-Zero: *Empowering Sustainability in Maritime Singapore*

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Er. Tham Wai Wah

Chief Sustainability Officer

Senior Director / Chief Engineer (Engineering & Project Management)

Maritime and Port Authority of Singapore



OVERVIEW OF



WORLD'S
BUSIEST **CONTAINER**
TRANSSHIPMENT
HUB



MARITIME
SINGAPORE



SUPPLIED
47.9 MILLION
TONNES

OF BUNKER IN 2022




VESSEL ARRIVAL
TONNAGE
REACHED

2.83
BILLION
GT IN 2022

MORE THAN
5,000
MARITIME
ESTABLISHMENTS



37.3 
MILLION TEUs
OF CONTAINER
THROUGHPUT IN 2022

APPROXIMATELY

1,000
SHIPS

IN THE PORT OF SINGAPORE
AT ANY ONE TIME



THE SINGAPORE
REGISTRY OF SHIPS
IS ONE OF THE
WORLD'S
TOP
QUALITY
FLAGS



Raised Climate Ambitions

In Oct 2022, Singapore announced the raising of its national climate target to achieve net zero emissions by 2050.



Long-Term Low-Emissions Development Strategy (LEDS)
Achieve Net Zero Emissions by 2050

2030 Nationally Determined Contribution (NDC)
Reduce 2030 Emissions to 60 MtCO₂e after Peaking Emissions earlier

In Jul 2023, IMO adopted the revised strategy to reduce greenhouse gas emissions from international shipping, with enhanced targets to tackle harmful emissions.



Revised 2023 IMO GHG Strategy - International Shipping GHG emissions reduction targets:

- At least 20%, striving for 30%, by 2030
- At least 70%, striving for 80%, by 2040
- Net-zero by or around, i.e. close to 2050 compared to 2008.
- Uptake of zero/near-zero GHG emission technologies, fuels and/or energy sources to represent at least 5% (striving for 10%) of the energy used by International Shipping by 2030.
- Reduce CO₂ emissions per transport work by at least 40% by 2030, compared to 2008.

Maritime Singapore Decarbonisation Blueprint 2050

Accelerating Decarbonisation 7 Key Focus Areas

DOMESTIC MARITIME

PORT TERMINALS

Transit towards a low-carbon future through the adoption of cleaner energy, automation and digitalisation



in emissions from 2005 levels by 2030



emissions by 2050



DOMESTIC HARBOUR CRAFT

All harbour craft will operate on low-carbon energy solutions by 2030



in emissions from 2021 levels by 2030



emissions by 2050



INTERNATIONAL SHIPPING

FUTURE MARINE FUELS, BUNKERING STANDARDS AND INFRASTRUCTURE

Be ready for a multi-fuel transition to support the future of international shipping

Multi-Fuel Bunkering Transition

Supply low and zero-carbon marine fuels and enable green technologies



SINGAPORE REGISTRY OF SHIPS (SRS)

Recognise and incentivise owners to operate green ships



50% of SRS fleet

to be green ships by 2050



EFFORTS AT INTERNATIONAL MARITIME ORGANIZATION (IMO) AND INTERNATIONAL PLATFORMS



Standard-Setter and Bridge-Builder

Advocate strong, credible and inclusive climate action at the IMO and international fora

RESEARCH & DEVELOPMENT AND TALENT



Global Hub for Maritime Decarbonisation R&D

Enabled by a vibrant ecosystem with the talent and expertise to develop and deploy innovations

CARBON AWARENESS, CARBON ACCOUNTING AND GREEN FINANCING



Green Maritime Finance Hub

Promote green financing landscape and strengthen carbon accounting and reporting



Developing a Sustainable Port of the Future

Cutting Emissions from Port Terminals

Singapore's port terminals will transit towards a low-carbon future, through the adoption of cleaner energy, automation and digitalisation.



Electrified Quay Cranes



Automated Guided Vehicles (AGVs)

By 2030, our port terminal operators aim to collectively achieve **at least 60% reduction of total emissions** from port operations as compared to 2005 levels, and to reach **net zero emissions by 2050**.



Exploring potential solarization of Tuas Port with key stakeholders such as PSA.

Tuas, Sustainable Port of the Future

Sustainability is at the heart of the planning, design and construction of Tuas Port

Coral Relocation



Studying the use of landfilled material as alternative fill material



Incinerated Bottom Ash



Incinerated Fly Ash





Spearheading Decarbonisation of Domestic Harbour Craft

Cutting Emissions from Domestic Harbour Craft



Looking ahead

2030

2050

From 2030 onwards, *new harbour craft* operating in our port waters must be **fully-electric**, be capable of using **B100 biofuels**, or be compatible with **net-zero fuels** such as hydrogen.

Harbour craft sector is required to achieve **net zero emissions by 2050**

Fully Electric Harbour Craft

Charging Infrastructure

Passenger Craft (<12pax)

Lighters

Passenger Craft (>12pax)

Tugboat

Bunker Tanker



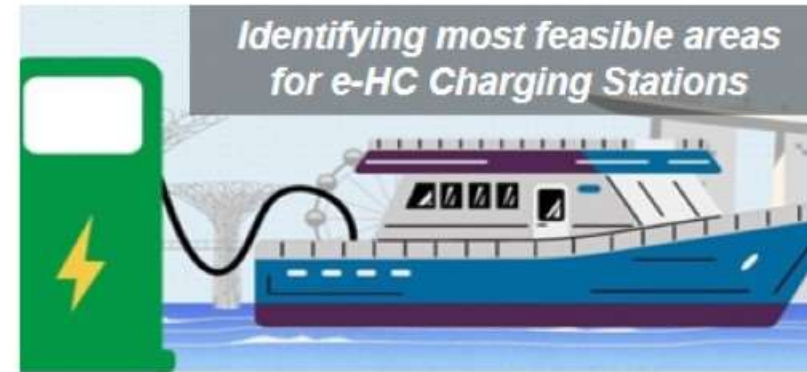
Cutting Emissions from Domestic Harbour Craft

Full-Electric Harbour Craft



- Two consortia to pilot trial full-electric harbour craft (e-HC)
- Expression-Of-Interest (EOI) to design and promote adoption of full-electric harbour craft (e-HC)

Charging Infrastructure



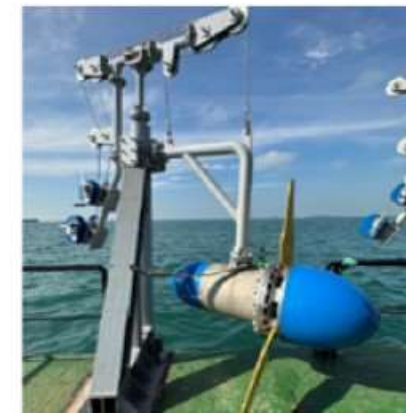
- Development of Charging Infrastructure Standards
- Maritime Electrification of Singapore's Harbour Craft (MESH)
- Call For Proposal (CFP) to submit proposals to **develop, commission, maintain and operate** e-HC charging points

Harnessing Renewable Energy to Support Harbour Craft Electrification



Nearshore Solar PV deployment at MPA's Piers

Industry collaboration on harnessing Tidal Energy in Singapore waters



Enabling the use of Biofuel in Singapore

Studies and Trials

- ❑ **Nanyang Technological University Maritime Energy & Sustainable Development Centre of Excellence (NTU MESD CoE) Biofuel compatibility study for Singapore harbour craft**
 - Worked with engine OEMs and shipowners to map compatibility of harbour craft engines with various blends of biofuels.
 - All engines surveyed were compatible with biofuels up to B20, and about half were compatible with up to B30. About a quarter were compatible with up to B100.
- ❑ **Sea trials to demonstrate the feasibility of using drop-in biofuel for Singapore harbour craft**
 - NTU MESD's project evaluated the storage stabilities of various blends of biofuels
 - B30 – B100 (UCOME/PME) and R20 – R100 (HVO) were trialled on a cargo launch vessel. No significant issues were observed for the HVOs, but for B100, engine cleaning and regular maintenance is a must.



Enabling the use of Biofuel in Singapore

SS 648 : 2019
(CS 01, 140, 36, 47, 020)

SINGAPORE STANDARD

Code of practice for bunker mass flow metering



ISO 8217 2017
FUEL STANDARD

ISO 8217 2017 Fuel Standard
for marine distillate fuels



Review and Development of Standards

- ❑ **Development:** MPA has developed a framework to allow licensed bunker suppliers to supply biofuel within the Port of Singapore to vessels.
- ❑ **Quality:** MPA, ESG, and industry partners have developed a provisional national quality standard (up to B50) for marine biofuel. Standard to be upgraded progressively as trials for biofuel blends up to B100 are expected to be completed by 2025
- ❑ **Quantity:** Existing Singapore bunkering standards on mass flow metering (SS 648) are being reviewed to incorporate delivery of biofuel by 2Q2024.



International Shipping - Enabling Multi-Fuel Transition

The Maritime Industry is heading towards a Multi-fuel Transition

Ocean-going sector

Examples of ocean-going vessels



Containerships



Oil tankers/ carriers



Bulk carriers

2020 to 2025

2025 to 2030

2030 to 2050

Biodiesel

Bio/e-Methanol

LNG

Bio-LNG

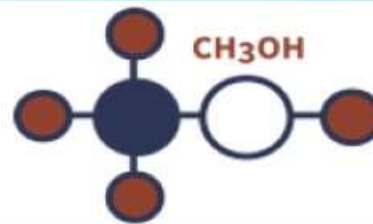
Ammonia

Hydrogen

For international shipping, biofuels (e.g bio-methanol, bio-LNG) as well as hydrogen-related fuels (e.g ammonia, e-methanol, liquefied hydrogen) are promising candidates.

The energy transition in maritime presents new growth opportunities for the offshore sector, including offshore renewables.

Enabling a Multi-fuel Transition - Methanol

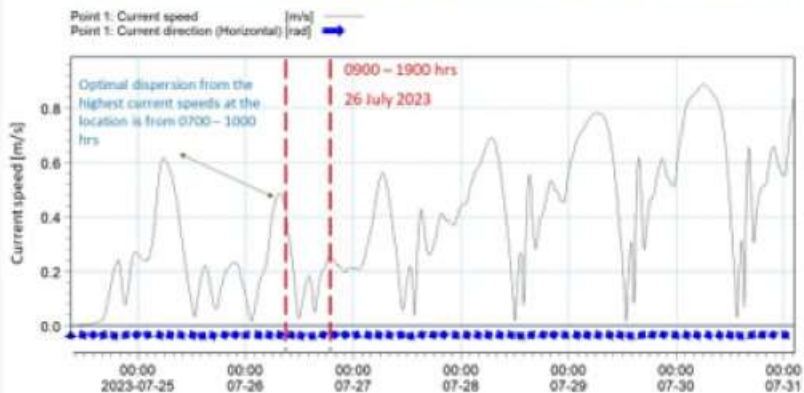


1st Methanol Bunkering Operation in Singapore

World's first ship-to-containership methanol bunkering – 27 July 2023

- **Methanol Plume Model** jointly developed by IHPC, A*STAR, TMSI, NUS, TCOMS to forecast dispersion path in event of accidental release and guide operations.
- **Drones equipped with methanol detector and infrared cameras** to augment detection of potential leaks into atmosphere and methanol flames in event of leak.
- **Methanol Firefighting Awareness Programme** conducted to educate crew members on risks/challenges of methanol fire, and response methods.

Forecasted Current Velocity at the Bunkering Location



Enabling a Multi-fuel Transition - Ammonia

Joint Industry Projects (JIP)



Safety studies with Institutes of Higher Learning (IHLs) / Research Institutes (RIs)



Standards Development

- Drafting of the Technical Reference for ammonia bunkering, with the aim to have a first draft to be completed by 2024.

EOI to develop ammonia power generation & bunkering solutions

- EMA/MPA invited proposals under an Expression Of Interest (EOI) to develop end-to-end low or zero-carbon ammonia power generation & bunkering solutions in Jurong Island.

Emergency Response/Table-top Exercises

Managing accidents involving ammonia as fuel for ships



- Three-day workshop featuring 2 accidental release scenarios and involving 70 participants from 12 countries in May 2023.
- Collaboration between MPA, Embassy of France, Innovation Norway, with support of the EU-funded project "Enhancing Security Cooperation In and With Asia".

Enabling a Multi-fuel Transition - Hydrogen



Suiso Frontier, the world's first liquid hydrogen carrier, came to Singapore on 31 August 2023

MPA continues to discuss on the future of hydrogen and its derivatives as a marine fuel at “Energising the Hydrogen Export with A Strong Supply Chain” conference during Connecting Green Hydrogen APAC 2023 on 26 July 2023, in Melbourne, Australia



As a responsible flag and port State, Singapore will continue to advocate for strong, credible and inclusive climate action at IMO and international fora.

Singapore seeks to **play 3 key roles** on the global stage to **advance maritime decarbonisation**

Standards-Setter



MPA formed the **Future Fuel Port Network** and joined the **Zero-Emission Shipping Mission** to develop harmonised standards for clean marine fuels.

Bridge-Builder



Actively contributed to discussions at IMO on the **Revised IMO Strategy adopted in Jul 2023**, including strengthened levels of ambition for 2030, 2040 and 2050

Advocate for Inclusive Climate Action



Working with the **IMO Secretariat and Norway's Ministry of Climate and the Environment** to develop **"NextGEN"** portal to visualise maritime decarbonisation projects and **"NextGEN Connect"** to facilitate inclusive route-based action plans in developing countries

Green and Digital Shipping Corridors (GDSC)



**Asia-Pacific Green & Digital
Corridor with the Port of
Rotterdam**



**Clydebank Declaration for Green
Shipping Corridors**



**'Slik Alliance' aimed at driving zero
emission shipping across the
Indian & Pacific Ocean**



**Transpacific Green and Digital
Corridor between MPA, Port of LA,
Port of Long Beach**

Strengthening Carbon Awareness and Accounting

MPA continues to support and enable a culture of carbon reporting and accounting amongst maritime companies.

Building the Pipeline for a
Low Carbon Maritime Singapore



- Signed **tripartite MOU** with Singapore Shipping Association, Global Compact Network Singapore and MPA to **raise awareness on carbon management amongst local maritime companies**
- **Recognised** local maritime companies efforts to use the **CERT** and implement **carbon reducing measures** through the **MaritimeSG Low Carbon50 Award**



MARITIME
SINGAPORE



M P A
SINGAPORE

THANK YOU