Commercial Diving Association Singapore
Diving Safety Seminar 2023
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Decarbonising Maritime Singapore

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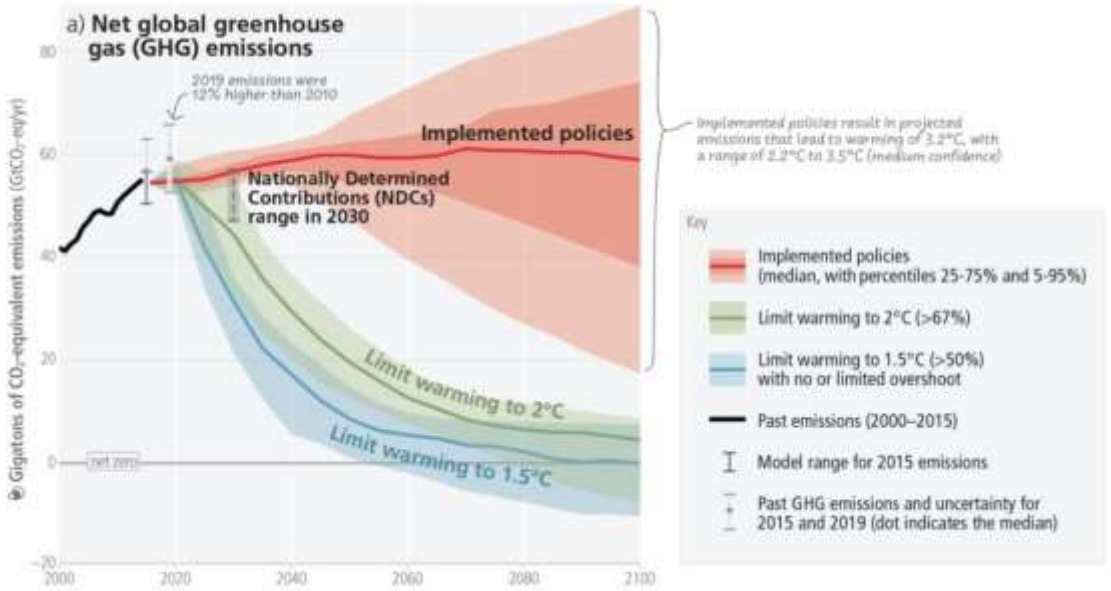
MPA SINGAPORE
MARITIME SINGAPORE

For Singapore, climate change is a real, existential threat



More than **50%** chance that global temperature rise will **reach or surpass** 1.5 degrees Celsius between 2021 and 2040 leading to a global warming scenario of

3.3 – 5.7 degrees Celsius by 2100

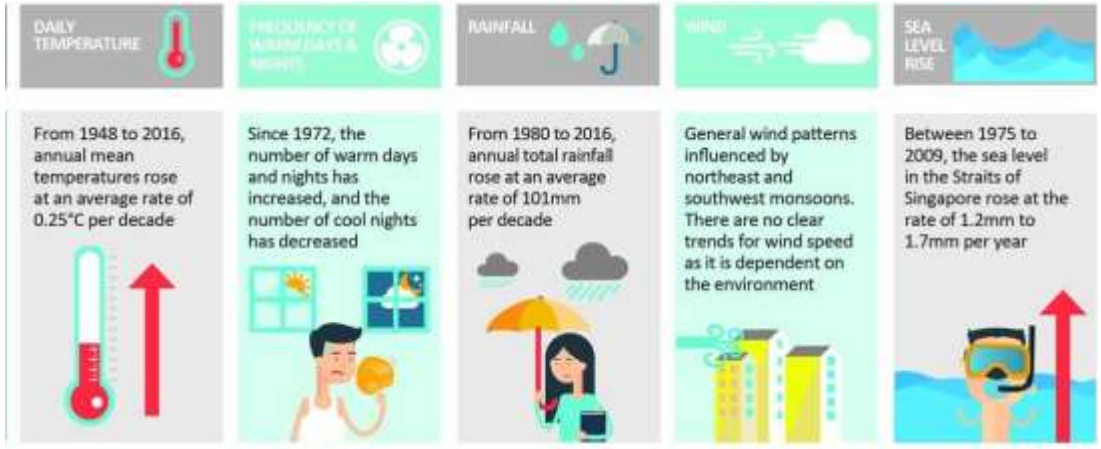
Source: Synthesis Report of the IPCC 6th Assessment Report (AR6)

Mean sea-level around Singapore is projected to rise by up to **1 m** by 2100, but this could go up to **5 m** during

heavy rainfall and storm surges

Overview of Maritime Singapore

Being vulnerable to the threats of climate change, Singapore is committed to decisive climate action as aligned with the Paris Agreement temperature goals



Source: NCCS

As announced by DPM Lawrence Wong at the Singapore International Energy Week in Oct 2022

Daily mean temperatures are projected to increase by **1.4 to 4.6 degrees Celsius**

Achieve net zero emissions by 2050 Long-Term Low-Emissions Development Strategy (LEDS)

Sea levels are projected to rise by up to

about 1 metre

Reduce 2030 emissions to 60 MTCO2e after peaking emissions earlier

2030 Nationally Determined Contribution (NDC)

Maritime Singapore is an important economic contributor and Singapore's

Maritime Singapore

- **Connectivity to the World**
- **Key Contributor to the Economy**
- **Support Local Employment**

Value Proposition for the Port of Singapore

Global Hub Port

- Connected to 600 ports in 120 countries
- World's largest transhipment hub
- World's largest bunkering hub
- Highest vessel arrival tonnage in the past decade

International Maritime Centre

- 5th Largest ship registry
- 170+ International shipping groups
- 30+ Leading international shipbroking firms
- ~20 Banks with shipping portfolios
- 30+ Law firms with shipping practice

gateway to the world

MPA drives Singapore's global maritime aspirations, including in the area of maritime decarbonisation

1 Develop and Promote Singapore as a Premier Global Hub Port

Prepare for the Future of Shipping

- Future-proof port and harbour craft
- Develop bunkering infrastructure for future fuels

Anchor Value-Creating R&D activities

- R&D to develop low-carbon technologies for shipping
- Develop standards and guidelines on alternative fuels

2 Develop and Promote Singapore as an International Maritime Centre

Value-Add to IMC Companies

- Provide clarity on potential decarbonisation pathways
- Identify key enablers and options for companies to tap onto opportunities

Support Green Growth

- Build green competitive advantage
- Harness green opportunities locally & globally
- Create new green job opportunities

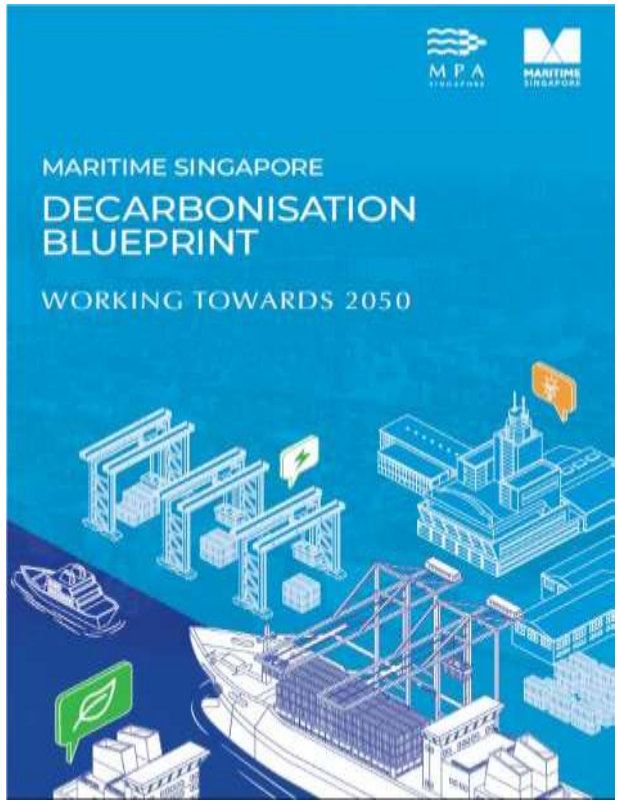
3 Advance and Safeguard Singapore's Strategic Maritime Interests

National Maritime Representative

- Safeguards Singapore's strategic maritime interest at IMO and other international fora.
- Creates enabling factors at international platforms to retain our maritime hub competitiveness

Maritime Singapore Decarbonisation Blueprint

Launched in 2022, the **Maritime Singapore Decarbonisation Blueprint** outlines our approach towards the maritime green transition.



Key objectives

- Outline Singapore's strategic vision for maritime decarbonisation
- Catalyse cross-sector collaboration amongst value-chain partners, locally and overseas
- Support and encourage the development, uptake, and commercialisation of new green technologies

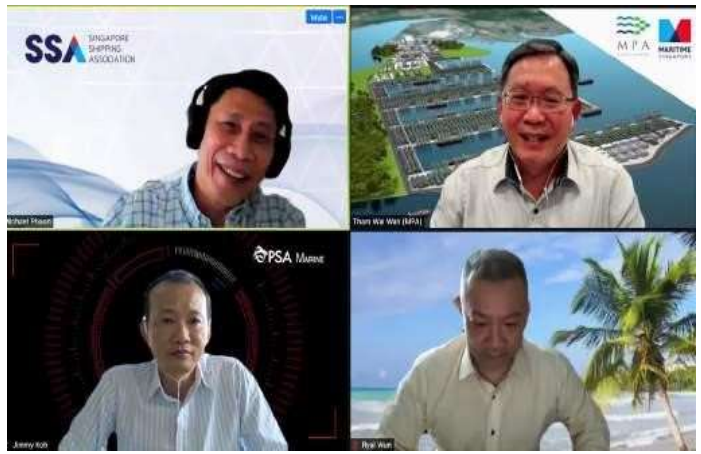
Scan here for a copy of the decarbonisation blueprint:

Domestic Efforts

Port Terminals and Domestic Harbour Craft

Strengthening Carbon Awareness and Accounting

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



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UN GLOBAL COMPACT
Network Singapore

SSA SINGAPORE SHIPPING ASSOCIATION

- 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**

We aim to build a Green and Sustainable Port

Fully Electric Powered Port Equipment

Electric Automated Guided Veh

Electrified Quay Cranes

Solar Photovoltaic Panels

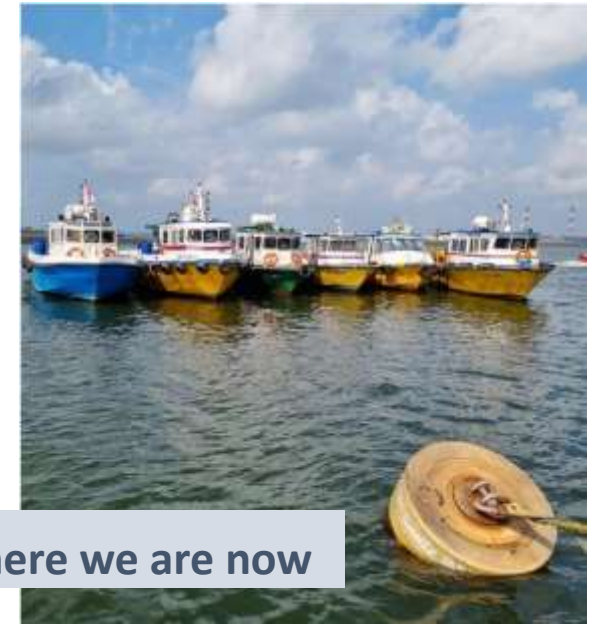
Construction Phase

Corals Relocation Programme

Sustainable Reclamation

Singapore's domestic harbour craft, pleasure craft and tug boat sector will need to reach net-zero emissions by 2050

From 2030, new harbour craft operating in Singapore's port waters must be **fully electric**, be capable of using **biofuel at 100% blend** (or B100 in short) or be compatible with **net zero fuels such as hydrogen**



Where we are now

Where we hope to be

Artistic impression of electric passenger ferry led by Keppel FELS consortium

Artistic impression of electric lighter craft led by SeaTech Solutions International consortium

Artistic impression of electric ferry by Shell and Penguin International Ltd

Source: NTU MESD, MPA, Keppel FELS, SeaTech, Shell, Penguin

MPA will partner the industry to ramp up efforts to build up the electric harbour craft ecosystem

Promoting the use of financially accessible, best-in-class electric harbour craft

Green financing

Design and development

Demand aggregation

and insurance

Implementing the charging infrastructure masterplan for electric harbour craft

EOI to Design & Develop Electric Harbour Craft (e-HC)

Objectives

- Assess the feasibility of designing and developing best-in-class e-HC according to reference designs, engineered according to common design principles
- Establish e-HC design(s) that suits Singapore's port waters *that will support mandatory design review of HC from 2027 onwards*
- ***[Optional]*** Seek industry-led proposals that demonstrate commercial viability of various business models (e.g. aggregated harbour craft fleet) to meet the overall demand in the Port of Singapore
- Encourage wider and early adoption of e-HC by helping businesses access more attractive financing solutions and lower the cost of production through aggregating demand

Details of EOI

- EOI opened on 10 Jul 2023 and will close on 15 Sep 2023
- Local and foreign companies/consortiums are welcomed
- This EOI does not preclude companies from embarking on their own projects

- After the EOI closes on 15 Sep 2023, MPA will assess the submitted proposals and may (i) launch a Request for Proposal (RFP), or (ii) approach EOI participant(s) directly, to refine the e-HC design for implementation

Targeted Approach for Harbour Craft electrification

- The EOI primarily focuses on designing e-HC that will replace a large proportion of conventional harbour craft that are frontrunners for full-electrification and share common parameters suitable for aggregation

Combined shaft power
200 – 400kW

Overall length
10 – 20m

Gross tonnage
20 – 40 GT

- The Participant may propose the following types of e-HC within the targeted demographics (elaborated above), meeting current operational requirements without disruption to routine operations:

Targeted Demographic

Type I Craft

Maximum of 12 passengers at 15 knots for 6 hours, or equivalent performance

Type II Craft

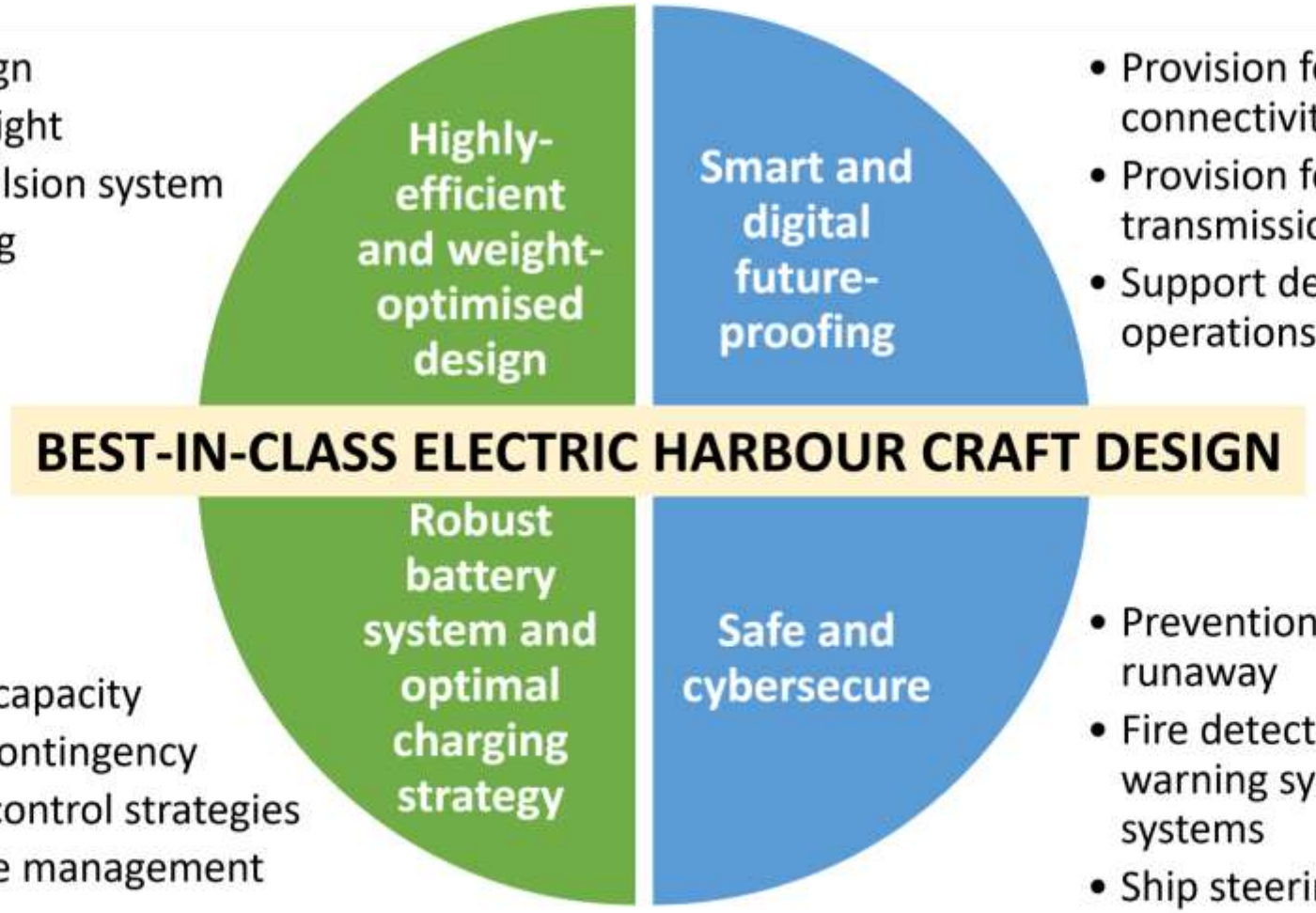
Fully-laden dry/ packaged cargo and/or other purposes (e.g. survey, salvage, garbage collection) at 12 knots for 8 hours, or equivalent performance

[OPTIONAL] Alternative types of Harbour Craft

Tanker

Tugboat

Larger Harbour Craft



- Hull form design
- Optimised Weight
- Efficient propulsion system
- Lower manning

- Provision for communications and connectivity capabilities
- Provision for data storage and transmission of key e-HC systems
- Support development of autonomous operations

- Sufficient Energy capacity
- "Back-to-shore" contingency
- Battery charging control strategies
- Regulated e-waste management system

- Prevention/ Management of Thermal runaway
- Fire detection and monitoring, early warning systems and firefighting systems
- Ship steering and manoeuvrability
- Advanced navigational equipment and monitoring
- Cyber Security

Overview of Requirements for EOI for e-HC

Overview of Requirements for EOI for e-HC – Economic Viability

Total cost of ownership (TCO)

Calculated over its estimated lifecycle, assuming 20, 25, and 30 years of operations

Capital costs for the design, build, testing, and delivery of one fully-equipped and outfitted unit(s) of e-HC

- Due consideration for value-engineering
- Similar financial breakdown and projections for multiple units of e-HC with aggregated demand (e.g. 20, 50, 100 units) clearly indicating capacity and cost projections at different stages of the scale-up

Financial breakdown and projections related to operational costs

- Covers the lifecycle of the e-HC (i.e. hull, propulsion system, battery management system, and electrical equipment, etc.)
- Insurance, consumables (e.g. cost of electricity), maintenance, repair, overhaul, disposal costs, residual value (including battery recycling, etc.
- Lifespan of the battery taken into consideration, assuming 5, 10, and 15 years of operations

MPA is working with industry to develop the charging infrastructure for e-HC

- **Study to determine electricity demand and charging infrastructure requirements to develop Charging Infrastructure Masterplan**
- Collaboration by A*STAR-IHPC, S&TPPO, NTU-MESD, MPA and EMA
- Charging Infrastructure Masterplan in 2025

- **Working with terminal and harbour craft operators to pilot the implementation of charging stations**
- First charging station deployed at Pulau Bukom in April 2023
- MPA is working on piloting Charging Stations at public pier(s)

- **Provisional standards for shipboard and shoreside charging to be ready by 2025**
- Task force on electric vessel charging system standards formed with EnterpriseSG

What the harbour craft sector can do in this green transition:

Improve Energy Efficiency

- Implement measures or new equipment to improve the efficiency of existing vessels (e.g. LED lighting, solar panel, fuel saving marine paint, use of timers/sensors, etc.)

Increase Energy Optimisation / Efficiency & Switch to Clean Fuels

Optimise Energy Consumption

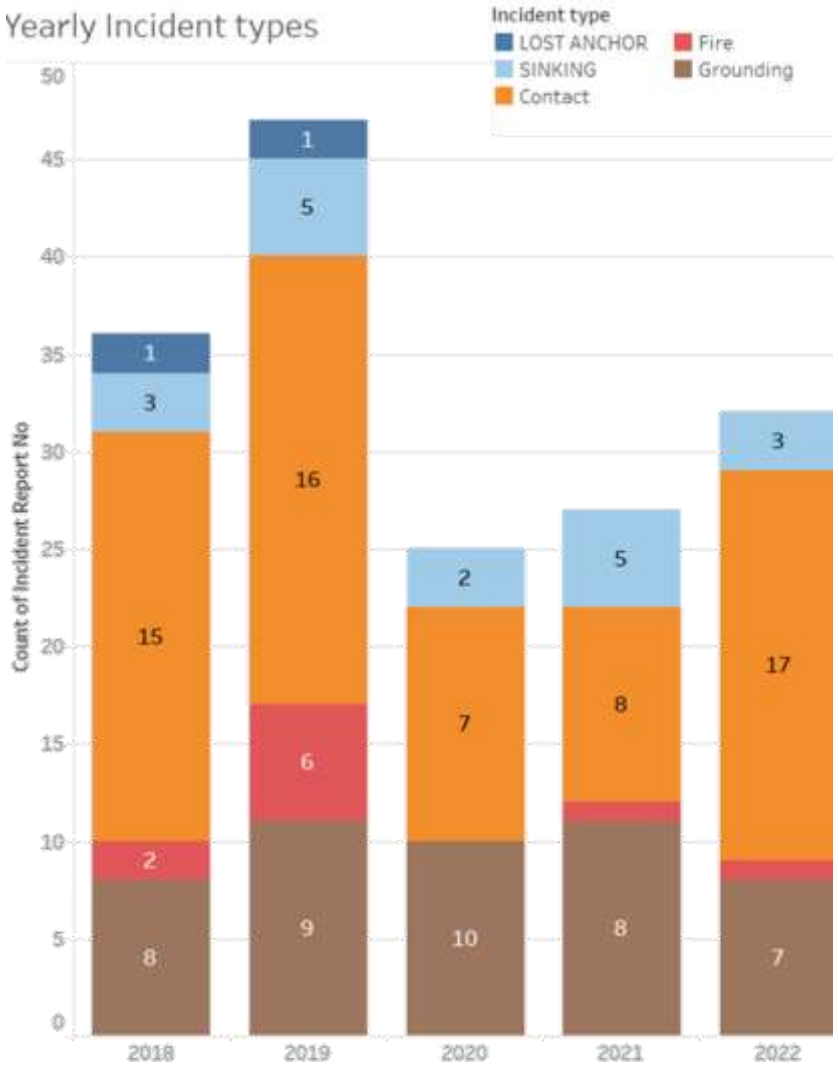
- Reduce energy consumption by reducing redundant usage / optimising operations (e.g. route planning, vessel load management)

Tap on New Clean Fuels

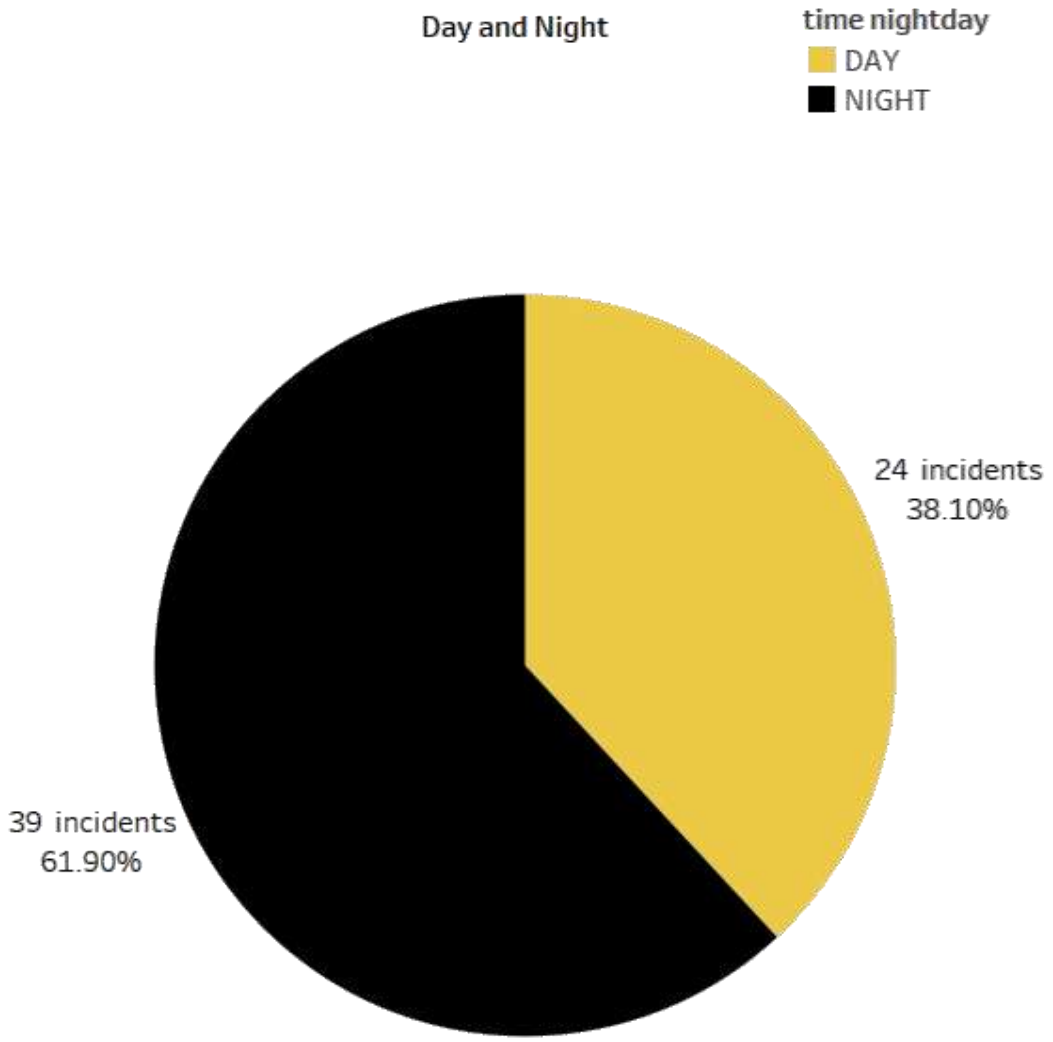
- Get existing fleet to switch to green fuels.
- Plan your fleet renewal exercise with net zero vessels in mind

Safety of Navigation within the Port of Singapore

Harbour craft incidents over the past 5 years



Contact incidents over the past 5 years



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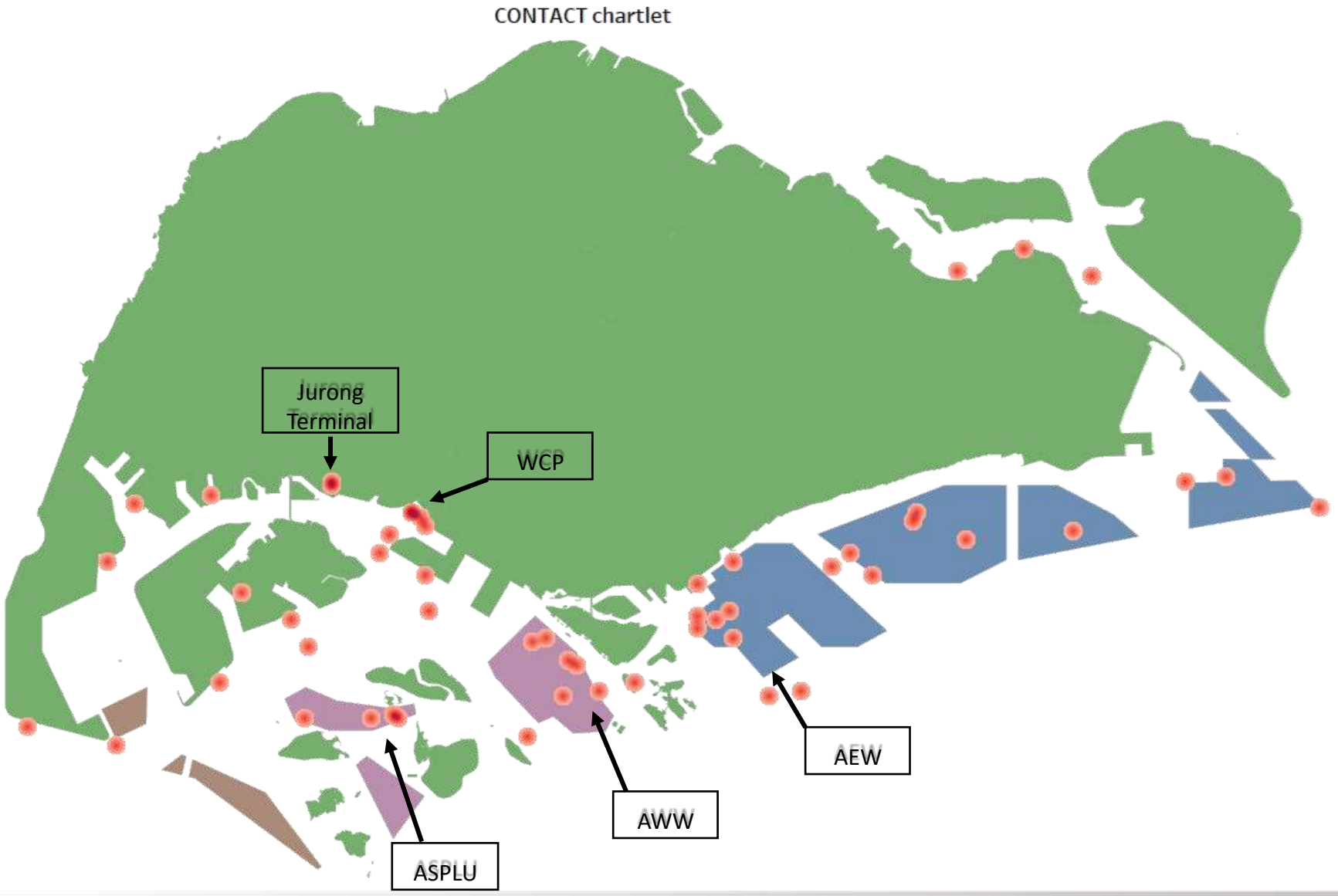


Harbour Craft contacted with anchored ocean-going vessel

Incident

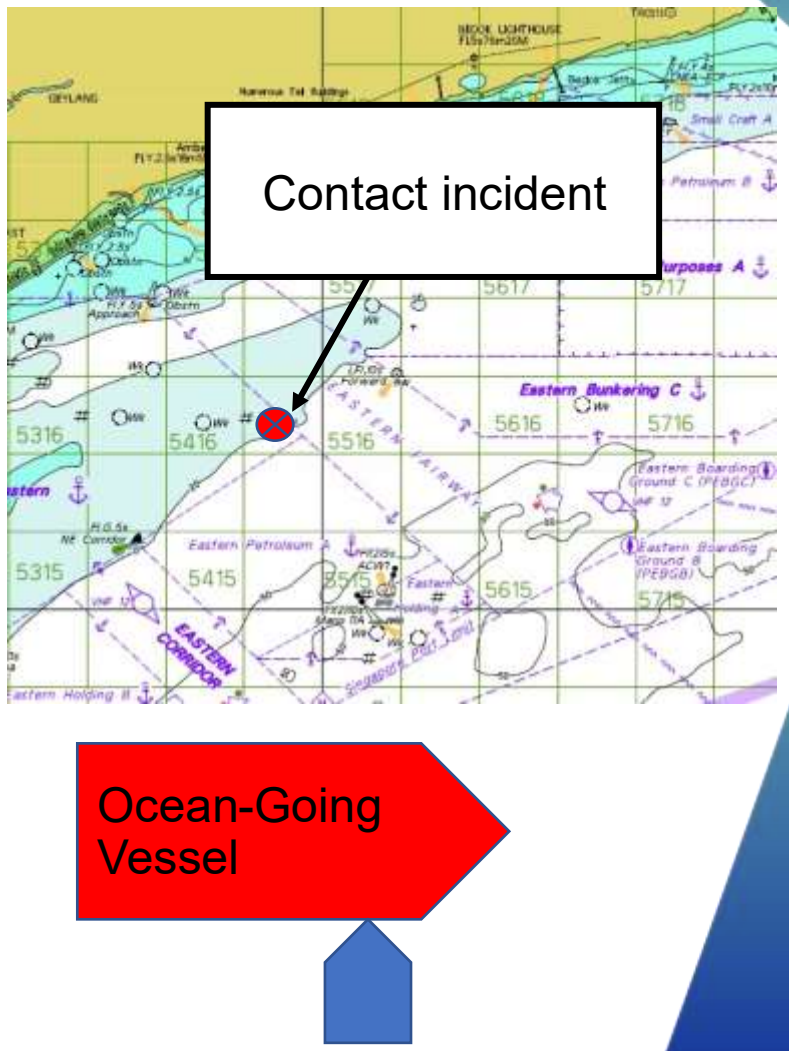
- Ocean-going vessel was at anchor
- Craft contacted stbd bow of ocean-going vessel, and immediately proceeded back to MSP without accounting for passengers & if any injuries.

Findings

- 5 out of the 7 passengers were injured and 1 was admitted
- Insufficient action to account for passengers and MPA reporting
- Master did not keep a proper look out

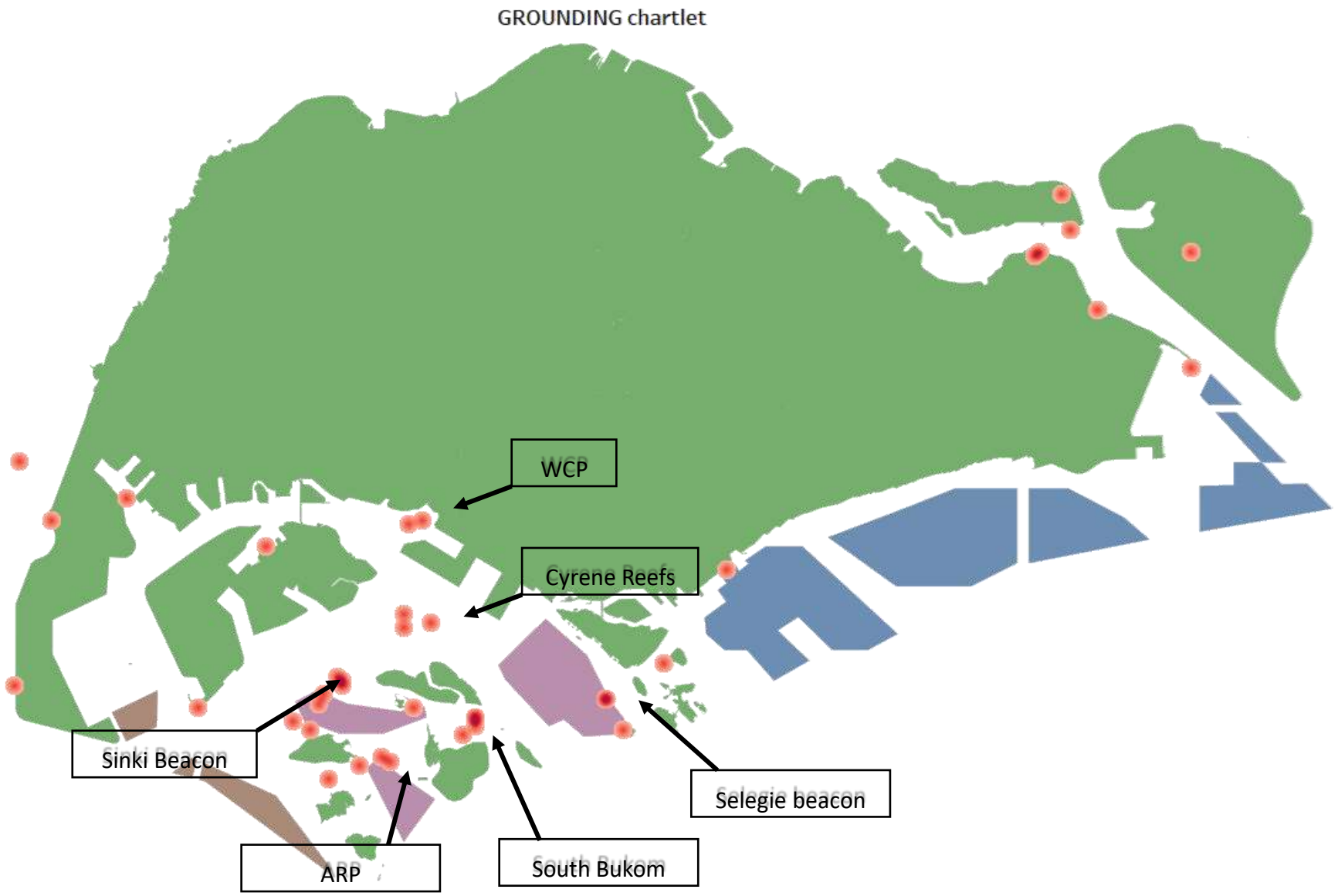
Lessons Learnt

- Master is responsible to keep a proper look out and thoroughly account for the passengers between movements



- Report to MSCC immediately

Grounding incidents for the past 5 years



Harbour Craft ran aground off MSP

Incident

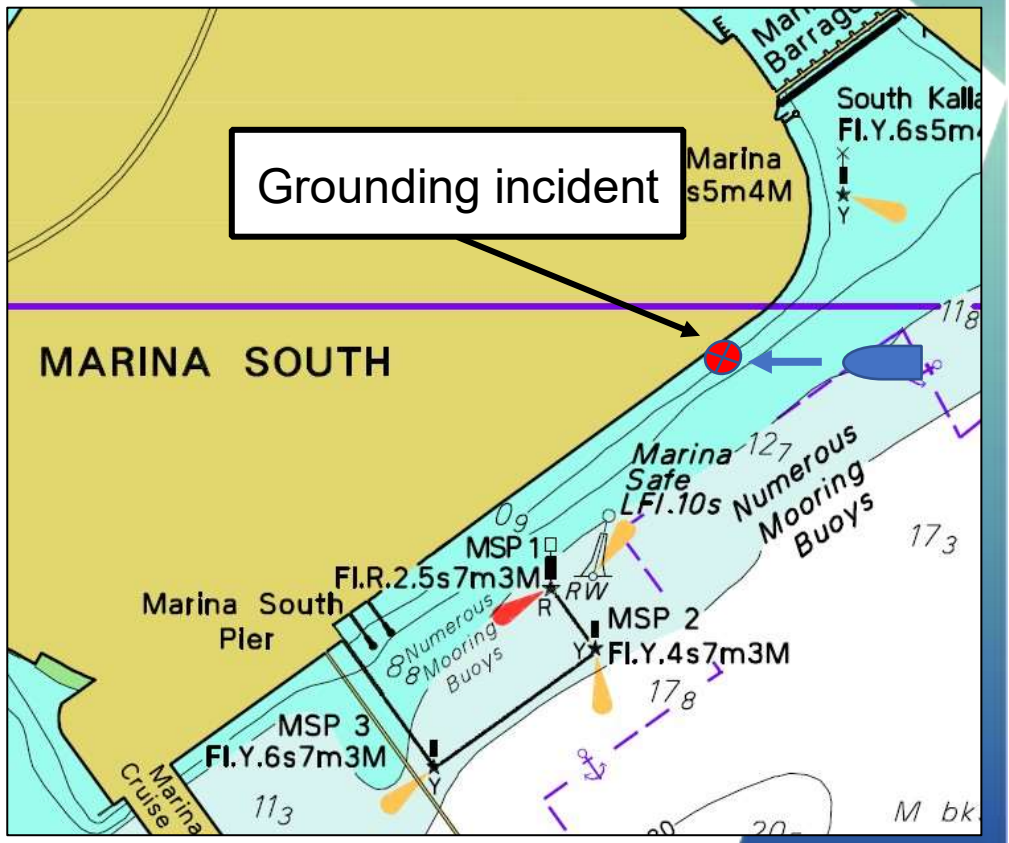
- Craft was proceeding to MSP and kept mooring buoys on her port side
- Master took action to go astern but craft grounded on rock bunds

Findings

- Master misjudged the distance from rock bunds
- ECDIS installed onboard but was not in use
- Actions taken to go astern was not made in ample time due to the speed

Lesson Learnt

- Keep good look out
- Be knowledgeable with the port waters
- Operators with craft installed with ECDIS are encouraged to put it to good use and may refer to MSC.1/Circ.1503/Rev.1 for guidance on good practices
- Transit at safe speed considering:
    1. Sea space



2. State of visibility
3. Proximity to navigation hazards

Safe operation

- MPA takes a serious view of any marine incident including those arising from unsafe boarding
- MPA reminds all personnel who board/ disembark vessels in port during the course of work to adhere to guidelines
- PMC 34 of 2020 – Guidelines for safe transfer of persons between vessels at anchorages
- ALL passengers must wear lifejackets during personnel
- Establish coordination and communications with all persons involved before commencing transfers of person (e.g. ship crew who is supervising, personnel embarking)
- Assess weather conditions and sea state

- All marine incidents shall be reported to the Port Marine Safety department
- PMC 14 of 2008 – Reporting of marine incidents in Port

- MPA encourages the reporting of near misses and practicing of safety time-outs to instill a safety culture

- PMC 4 of 2015 – Near miss reporting
- Report any unsafe practices to MPA using these contacts
- MPA Marine Safety Control Centre (MSCC)
- Email : pms@mpa.gov.sg
- Telephone : +65 6325-2488 / 2489

Speed limits within Port limits

- Strong wakes created by harbour craft proceeding at high speed have raised various safety concerns
- Danger to commuters alighting and boarding craft berthed at landing points/pontoons
- Damage to craft berthed at landing points/pontoons
- Parting of ropes of craft tied at mooring buoys

- Please take note of the prevailing speed limits
- West Coast and Marina South Piers (speed limit 6 kts)
- A total of 49 harbour craft were caught speeding at MSP and WCP in 1H2023 – enforcement actions have been taken

- Speed limits are to be strictly observed at all times, except when a temporary increase in speed is necessary to avoid immediate danger

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Thank you!