



MEDIA FACTSHEET (MARITIME)

STRENGTHENING SINGAPORE'S COMPETITIVENESS AS A HUB PORT AND INTERNATIONAL MARITIME CENTRE

(A) Achieving better efficiency, safety, and productivity through technology

Progress of Tuas Port after its official opening in September 2022

1. When completed in the 2040s, Tuas Port will be the world's largest fully-automated terminal, with a handling capacity of 65 million twenty-foot equivalent units (TEUs), almost double the handling volume of 37.3 million TEUs handled in 2022.
2. Development of Tuas Port is over four phases. Reclamation works for Phase 1 commenced in February 2015 and were completed in November 2021. Reclamation works for Phase 2 commenced in March 2018 and is currently about 60% completed. When the berths in both phases are fully operational, Tuas Port will reach an annual handling capacity of more than 40 million TEUs.
3. The Maritime and Port Authority of Singapore (MPA) has started planning and design works for Tuas Port Phase 3. Reclamation works for Phase 3 is expected to be completed in the mid-2030s.
4. To improve Tuas Port's accessibility for its workers and users, MPA will collaborate with port operator, PSA Singapore, government agencies, industry partners and unions to form a tripartite committee in 2023 to co-create various transportation options for port workers and users.

Maritime 5G

5. To further maritime digitalisation and the development of future concept of operations, MPA and Infocomm Media Development Authority (IMDA) signed a Memorandum of Understanding (MOU) in August 2022 to provide full maritime 5G coverage in our major anchorages, fairways, terminals and boarding grounds by mid-2025.

6. Twelve maritime 5G base stations will be set up to complement the onshore 5G communication infrastructure. Three of the base stations will be ready by 2023 to support testing and development of new digital applications, such as remotely assisted pilotage advisory, digital bunkering, delivery drones, and telemedicine. The remaining nine base stations will be set up by 2025.

Next Generation Vessel Traffic Management System

7. To further strengthen vessel navigational safety and efficiency of the port as we continue to grow our hub port, MPA is developing an artificial intelligence-enabled Next Generation Vessel Traffic Management System (NGVTMS) to replace the existing Vessel Traffic Information System (VTIS).

8. With data analytics and machine learning to identify traffic hotspots as well as advanced algorithms to predict potential collisions, the NGVTMS will allow MPA to provide Ship Captains with more accurate and timely information to take early actions for navigational safety. Secured and reliable data transfer between ship-ship and ship-shore for NGVTMS can be facilitated through various connectivity platforms such as the VHF Data Exchange System (VDES) and the maritime 5G network.

9. The NGVTMS will be developed in three phases.

- i. Phase 1 – Innovation Programme [2018- 2021]: MPA completed a three-year Innovation Programme in 2021 to develop and test new operating concepts and technologies to enhance navigation safety and efficiency of vessel traffic management.
- ii. Phase 2 - Prototyping [2023 - 2024]: MPA will start to develop a system prototype in April 2023 to test various vessel traffic management applications such as the Smart Collision Detection and Proactive Traffic Management in a real-time sandbox operating environment. This will enable MPA to gain insights on potential new capabilities and scope the requirements and specifications for system implementation.
- iii. Phase 3 – System Implementation [2024-2027]: The final phase will consist of design, development, installation, testing, and commissioning of the NGVTMS. The system will be deployed from 2025 for 24/7 operations.

Phase 2 of digitalPORT@SG™

10. With the successful implementation of digitalPORT@SG™ Phase 1 as a one stop portal for port entry and departure in 2020, MPA will roll out Phase 2 of digitalPORT@SG™ in 2023.

11. Phase 2 will provide port stakeholders with real-time information to facilitate just-in-time vessel arrivals to terminals, help vessels access marine services such as bunkering, supplies and repairs, as well as an Active Anchorage Management System to optimise the usage of anchorage spaces. This will enhance port efficiency, reduce ship turnaround time, and cut greenhouse gas emissions by minimising ships' idling time at anchorages.

Singapore Trade Data Exchange Pilot Data Sharing Initiative

12. MPA will work with Singapore Trade Data Exchange (SGTraDex), Jurong Port and their partners to pilot a data sharing initiative under SGTraDex's ship supplies and lighterage optimisation use case that focuses on supplies procurement, fulfilment and lighterage logistics. The pilot aims to help large and small businesses optimise their ship supplies operations by digitalising their ship supplies operations, and encouraging data sharing between supply chain stakeholders in the ship supplies sector.

Maritime Cyber Assurance and Operations Centre

13. As maritime systems become increasingly digitalised, Singapore must also be prepared with the right tools to manage the risk of cyber incidents that could disrupt the flow of vessels and cargo at our ports.

14. MPA will establish the Maritime Cyber Assurance and Operations Centre (MCAOC) by 2025 to provide real-time security monitoring and disseminate information to mitigate cyber threats, advise on system recovery and measures to take following an incident, and facilitate cyber threat information-sharing among maritime stakeholders such as port and terminal operators, shipping lines and marine service providers with digital systems.

15. The MCAOC will enable maritime stakeholders to pool financial and manpower resources, and create economies of scale, to tackle cyber threats in the maritime sector.

16. Equipped with analytics capability, MCAOC will strengthen operational responses to evolving cyber threats by providing insights to maritime stakeholders on advanced malware and modes of attack. MCAOC will also offer training and conduct cybersecurity exercises for the maritime industry.

(B) Reducing carbon emissions in Maritime Singapore

Decarbonising Domestic Harbour Craft and Pleasure Craft

17. MPA will set the target for the harbour craft and pleasure craft sectors to achieve net-zero emissions by 2050 in support of Singapore’s 2050 national net-zero target. To achieve this transition, from 2030, MPA will require all new harbour craft operating in our port waters must be fully electric, be capable of using B100 biofuel, or be compatible with net-zero fuels such as hydrogen.

18. To help the industry meet the 2030 requirement, MPA encourages the industry to consult with MPA on the owners’ electric, B100 or hydrogen compatible harbour craft designs early. The consultation process will be a compulsory requirement from 2027.

19. MPA will support the development of electrification technology through the following initiatives:

Support by MPA for Electrification Technology	Expected Timeline
<p>Research, design, build and operate full-electric vessels</p>	<ul style="list-style-type: none"> • Keppel Offshore & Marine Consortium is working on the retrofit of Eng Hup Shipping’s 30 pax ferry to be full electric and a charging station with solid state transformer technology which will be trialled later this year. • The ‘Goal Zero’ consortium led by SeaTech Solutions with partners such as Yinson Green Technologies and Lita Ocean is building the first full-electric lighter craft with battery swapping technology, which will be trialled later this year. <p>These consortiums, which comprise various industry enterprises and research institutions, were awarded funding by MPA and the Singapore Maritime Institute in 2021, to research, design, build and operate a fully electric harbour craft by 2025.</p> <p>Please refer to Annex A for details of the consortiums.</p>
<p>Conduct trials of full-electric vessels</p>	<ul style="list-style-type: none"> • Shell and Penguin International

	<p>(Singapore’s homegrown aluminium shipbuilder and shipowner) will be commissioning their first full electric ferries and rapid shore chargers, scheduled for operational deployment this year.</p> <ul style="list-style-type: none"> • Concurrently, MPA is working with terminal and harbour craft operators to implement pilot charging stations. The first of these pilot charging stations will be deployed by Shell at the Shell Energy and Chemicals Park Singapore on Pulau Bukom by the 2Q 2023.
Work with research institutes to study the charging infrastructure required to support an electric harbour craft fleet	MPA aims to develop a charging infrastructure implementation masterplan by 2025, and has commenced a study with our research institutes to study the locations of charging infrastructure and the electrical power required to support electric vessels plying our domestic waters. The findings from the study will be released in 2024.
Partner with industry, financial institutions, harbour craft operators and manufacturers to lower costs of adoption and mobilise support for early adopters.	MPA will launch an Expression of Interest in Q2 2023, to call for proposals for the design and development, demand aggregation, and green financing for new electric harbour craft.
Collaborate with industry to enhance energy efficiency and reduce emissions of existing harbour crafts in the near term.	MPA will work with the industry on energy management efforts and studies on the use of higher blends of biofuel for existing harbour craft.

Pathways for Alternative Fuels

20. To prepare Singapore for a multi-fuel bunkering future, MPA has developed the world’s first marine biofuel provisional standard in consultation with the industry and researchers for biofuel blends of up to 50% or B50. This standard will be updated progressively as trials for biofuel blends of up to 100%, or B100 are carried out, and is expected to be completed by 2025. Singapore’s Maritime Energy and Sustainable Development Centre of Excellence will also be releasing the findings of

its compatibility study on various biofuel types and percentage blends for our harbour crafts by end March 2023.

21. Aside from biofuels, MPA is exploring the use of hydrogen and ammonia to support the decarbonisation of international shipping. In December 2022, MPA and the Energy Market Authority launched an Expression of Interest (EOI) to build, own and operate low or zero-carbon ammonia power generation and bunkering solutions on Jurong Island. The EOI is open until end April 2023.

Green and Digital Shipping Corridors

22. In August 2022, MPA signed a MOU with the Port of Rotterdam to establish the world's longest "Green and Digital Shipping Corridor (GDSC)". The corridor will pilot the deployment of digital solutions, support investment in green infrastructure, and develop enablers to accelerate low and zero carbon shipping.

23. Singapore is actively engaging other like-minded ports and country partners to establish more corridors. Recently, MPA, Port of Los Angeles, Port of Long Beach and C40 Cities started discussions to establish a GDSC between Singapore and the San Pedro Bay port complex.

(C) Future-Ready Maritime Talent

24. MPA has put in place several schemes to attract and develop a steady pipeline of maritime talent, who are equipped with the right skills and expertise as the industry transforms.

Internships, scholarships, and pre-employment training for undergraduates

25. **Global Internship Award:** Established by MPA in 2013, the Global Internship Award aims to help undergraduates better understand the international nature of the maritime industry. The 12-week programme gives selected undergraduates an opportunity to gain on-the-job experience working in a leading maritime company. It sponsors the undergraduate for an overseas attachment of up to six weeks in the overseas office of the company. More than 300 undergraduates have benefitted from the programme in the last ten years.

26. **Scholarships:** In 2022, 54 MaritimeONE scholarships, worth about S\$1.7 million in value, were awarded. Since the launch in 2007, 524 recipients have received the scholarships. Additionally, 12 Tripartite Maritime Scholarships (TMSS) valued at about S\$1 million were awarded in 2022 to seafaring cadets. Since the launch in 2002, more than 240 TMSS have been given out.

27. **Work-Study Programmes:** There are currently three maritime-related Work-Study Post-Diploma Programmes targeted at fresh Polytechnic graduates conducted by Singapore Polytechnic (SP), and a Work-Study Diploma by the Institute of Technical Education (ITE). The programmes provide graduates with a head-start in their careers and deepens their skillsets in various roles including seafaring, port operations, cargo operations, and shipboard operations.

- i. Port Management and Operations by SP
- ii. Seafaring Deck Officer by SP
- iii. Seafaring Marine Engineer by SP
- iv. Work-Study Diploma-Maritime Business Management by ITE

Career conversion and mid-career development

28. **Career Conversion Programme:** The Career Conversion Programme (CCP) for Sea Transport Professionals and Associates provides maritime and non-maritime mid careerists with skills conversion opportunities, to enable them to take on roles in Port Operations and Services, Shipping, and Maritime Services. Close to 220 Mid-Careerists have benefitted from the Career Conversion Programmes for Sea Transport since 2018.

29. **Maritime Leadership Programme:** Since its launch in 2021, more than 40 maritime professionals have attended the Maritime Leadership Programme (MLP). The MLP aims to hone participants' leadership skills, build global perspectives on key maritime issues, and strengthen business networks locally and abroad. In 2022, MLP included, for the first time, an overseas site visit to the Port of Rotterdam. MPA will hold the third run of MLP this year.

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Annex A – Information on Consortiums

A.1. Keppel Offshore & Marine Consortium

Keppel Offshore & Marine Ltd (Keppel O&M) through its wholly owned subsidiary, Keppel FELS Limited, has formed a consortium to develop Singapore’s first comprehensive electric vessel supply chain. Keppel O&M’s Floating Living Lab will be used to testbed the electric vessel charging infrastructure, accelerating pilot and scale up of Singapore’s harbour craft electrification adoption.

Eng Hup Shipping has a fleet of over 70 vessels supporting a variety of marine operations across Singapore and Asia. As a harbour craft owner-operator in this project, Eng Hup Shipping’s existing 30 pax ferry would be retrofitted to become fully electric and fulfil the vessel’s new operational profile and technical requirements.

The Energy Research Institute @ NTU (ERI@N) and the Technology Centre for Offshore and Marine, Singapore (TCOMS) are part of the consortium and contribute to the research and development of charging station with solid state transformer technology, marinised energy management system, energy storage performance, modelling and simulation tools.

Further strengthening the overall supply-chain value, key industrial partners in the coalition includes Envision Digital, Surbana Jurong and DNV contributing their core capabilities in the space of marinised smart battery solution, land-based infrastructure standardisation and new technology qualifications respectively.

- Artist impression of the Floating Living Lab and Eng Hup Shipping’s Electric Ferry:



(Please credit the image to Keppel FELS Limited.)

A.2. ‘Goal Zero’ Consortium

SeaTech Solutions International leads the Goal Zero Consortium and provides the optimised hull form design and detailed engineering of the zero-emission electric pilot vessel. This includes the vessel solution development carried out in consultation with the battery and charging solution OEMs as well as detailed engineering of the pilot vessel, modelling, hydrodynamic analysis, design integration of OEM equipment including electric propulsion system, energy management system and battery management system.

Yinson Green Technologies (YGT) leads the programme management of this project. It leverages on its extensive supply chain network for the procurement, construction and integration of the pilot vessel and testbed facility and aims to accelerate the commercial adoption of electric harbour craft in Singapore. YGT will also be the owner of this vessel and also the commercialisation partner to produce more such vessels in Singapore’s harbour craft market.

SHIFT is responsible for design and engineering of a new generation energy storage system for electrification of vessels with charging infrastructure, along with a software management system designed for B2B and B2C aspects of the commercial operation.

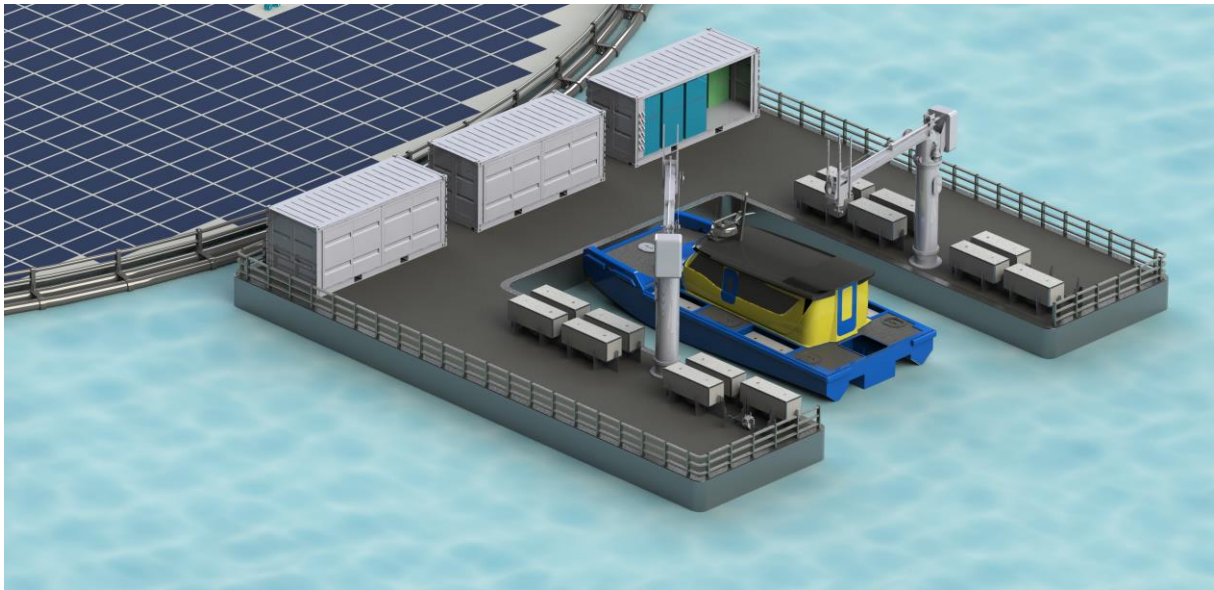
Lita Ocean support analysis of vessels’ operating profiles for electrification, contributes to the design of the vessel and its systems, provides the costs associated with vessel construction and onboard systems. Its role also covers construction of the vessel, installation of the electric propulsion system, provision of waterfront land area for test-bedding.

- Artist impression of first full electric lighter craft with battery swapping technology – “Hydromover”:



(Please credit the image to Yinson Green Technologies & SeaTech Solutions.)

- Artist impression of the Battery Swapping Station:



(Please credit the image to Yinson Green Technologies & SeaTech Solutions.)

- Artist impression of the Shift swappable batteries:



(Please credit the image to Yinson Green Technologies & SeaTech Solutions.)

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Translations

Next Generation Vessel Traffic Management System (NGVTMS)	新生代船只交通管理系统
Vessel Traffic Information System (VTIS)	船只交通资讯系统
digitalPORT@SG™	数码港口
Active Anchorage Management System	锚地主动管理系统
Singapore Trade Data Exchange (SGTraDex)	新加坡贸易数据共享平台
Maritime Cyber Assurance and Operations Centre (MCAOC)	海事网络确信营运中心
Electric harbour craft	电动接驳船 / 电动接驳艇
Green and Digital Shipping Corridor	绿色及数码航运走廊