Alternative marine fuels

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The sulphur limit of 2020

The first great change in marine fuels came from the regulation of sulphur. From 1 January 2020 the International Maritime Organization reduced the permitted sulphur content of marine fuel outside emission control areas to 0.5 per cent under Annex VI of the MARPOL Convention.[1] Ships could comply by burning very low sulphur fuel oil or marine gasoil, or by installing exhaust gas cleaning systems, known as scrubbers, that allow them to continue burning high-sulphur fuel oil. Singapore prepared for the change by extending mass flow metering to distillates and by supplying the new low-sulphur blends.

The market adjusted faster than many had expected. Low-sulphur fuel oil became the largest product, as the figures for 2025 cited at the beginning of this chapter show. Sales of high-sulphur fuel oil recovered as the number of ships with scrubbers increased. The experience of 2020 showed that the port can switch its product slate within months when regulation demands it. It also showed that compatibility problems between new blends can cause engine trouble, which keeps quality control in the foreground.

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Biofuel blends

Biofuels are the alternative fuel most easily used by the existing fleet. Fatty acid methyl esters and other biofuels are blended with fuel oil or gasoil and burned in conventional engines. The port of Singapore offers blends up to B100, that is pure biofuel. Blends above B30 require additional approvals, since engines and fuel systems are not necessarily certified for them. For Singapore-registered ships, blends up to B30 require notice to the MPA as flag state before trials, while higher blends require an exemption through the classification society. Blending may not take place on board the bunker tanker in port, while the mass flow meter must be approved for the measurement of biofuel.[2]

Sales of biofuel blends reached 1.36 million tonnes in 2025, an increase of more than 54 per cent on the previous year.[3] The growth reflects the demand of shipowners who must report their emissions under European and IMO rules and who use biofuels to reduce the carbon intensity of their fleets. The MPA encourages suppliers to provide biofuel certified under the International Sustainability and Carbon Certification scheme, without making it mandatory. Certification matters because the environmental value of a biofuel depends on its origin, and because fraudulent sustainability claims are a known risk in the biofuel trade.

Liquefied natural gas

LNG was the first alternative fuel for which Singapore built a dedicated framework. The Technical Reference TR 56, launched on 28 April 2017, sets out requirements for custody transfer, procedures, safety distances and personnel competency in LNG bunkering.[4] LNG is supplied by specialised bunker vessels from the LNG terminal on Jurong Island and requires separate licences. As at 1 October 2026 the MPA listed ten licensed LNG bunker suppliers, among them FueLNG, Pavilion Energy, TotalEnergies, ExxonMobil, Aramco Trading, PetroChina, Sinopec, Shell, Equatorial Marine Fuel Management Services and Vitol Bunkers.[5]

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LNG sales reached 571,400 tonnes in 2025, 24 per cent more than in 2024.[6] On 14 January 2026 the MPA opened applications for additional LNG bunker supply licences and published standards for port limit LNG bunker vessels. Growth continued in 2026, with LNG bunker sales in the first eight months about 23.5 per cent higher than a year earlier.[7] LNG reduces emissions of sulphur, nitrogen oxides and particulates, although methane slip from engines limits its climate benefit. Its supporters see it as a bridge, since engines built for LNG can later burn bio-LNG or synthetic methane.

Methanol and ammonia

Methanol is the second alternative fuel for which the MPA has created a licensing framework. An expression of interest launched in December 2023 attracted more than fifty proposals. On 26 March 2025 the MPA opened applications for methanol bunkering licences for the period from 1 January 2026 to 31 December 2030. Licensees must secure methanol supply to Singapore, own and operate at least one IMO Type 2 chemical tanker, supply methanol within a specified well-to-wake carbon intensity and adopt mass flow meters and digital bunkering. The technical requirements are set out in TR 129, published in early 2025.[8] Three suppliers, Global Energy Trading, Golden Island and PetroChina, were listed for methanol in September 2026.[9] Volumes are still small, at about 1,600 tonnes in 2024, about 3,000 tonnes in 2025 and about 6,300 tonnes in the first nine months of 2026.[10]

Ammonia is the most ambitious candidate. It contains no carbon and can be produced from renewable electricity, but it is toxic and its combustion can produce nitrous oxide, a potent greenhouse gas. The MPA's statistics record a first sale of about ten tonnes of ammonia as marine fuel in 2024.[11] Singapore has also studied ammonia bunkering and power generation on Jurong Island.[12] Regulation of ammonia bunkering must address safety distances, crew training and emergency response far more demanding than for any existing fuel. The MPA's experience with LNG and methanol, where standards preceded licences and licences preceded volumes, is likely to guide that work.

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The regulatory horizon

The demand for alternative fuels depends on global regulation more than on Singapore's own choices. In April 2025 the IMO's Marine Environment Protection Committee drafted a Net-Zero Framework that would combine a global fuel standard with a price on emissions above that standard for ships above 5,000 gross tonnage. The two-tier system of compliance units drew on a proposal by Singapore. Its adoption, planned for October 2025, was postponed by one year under pressure from the United States.[13] At the date at which the law in this book is stated, September 2026, the framework had not been adopted. The IMO has scheduled the resumed extraordinary session for 4 December 2026, subject to confirmation by the committee.[14]

The uncertainty affects investment decisions in Singapore. Suppliers must commit capital to new tankers and storage, since the MPA requires new bunker tankers to be compatible with low-carbon fuels. Shipowners order ships able to burn LNG, methanol or ammonia without knowing which fuel will prevail. The port's strategy is to offer all of them under a common framework of licensing, metering, digital documentation and quality control. Alternative fuels together accounted for 1.95 million tonnes in 2025, against 1.35 million tonnes in 2024.[15] The share remains below four per cent of total sales, but the infrastructure now being built will determine whether Singapore keeps its position when the fuels change. Chapter II of Part K examines the wider sustainable finance framework of which the fuel transition forms part.

Notes

1. gCaptain (Reuters), 27 April 2018 (n above): the IMO's global sulphur cap of 0.5 per cent takes effect on 1 January 2020; Wikipedia, "Bunkering" (accessed November 2026): from 1 January 2020 the IMO began enforcing the IMO 2020 regulation of MARPOL Annex VI. ↩
2. MPA, "Biofuel Bunkering" (mpa.gov.sg, accessed November 2026): biofuels up to B100 available; different approval paths for blends at or below B30 and

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above B30; no blending on board bunker craft in port; mass flow meters to be intended for biofuel measurement with an uncertainty not exceeding 0.5 per cent; biofuels to meet ISO 8217:2024 and the provisional specification WA 2:2022; FAME testing required under Port Marine Circular No. 3 of 2024; suppliers encouraged, but not required, to supply ISCC-certified biofuel. ↩

3. Baird Maritime (Reuters), 13 January 2026 (n above): biofuel blend sales of 1.36 million tonnes in 2025, up more than 54 per cent from 2024, rising for a third consecutive year. ↩
4. MPA, "LNG Bunkering" (mpa.gov.sg, accessed November 2026): Technical Reference 56 officially launched on 28 April 2017, covering custody transfer requirements, procedures and safety distances and personnel competency. ↩
5. MPA, "List of licensed LNG bunker suppliers", correct as at 1 October 2026 (PDF, mpa.gov.sg, accessed November 2026): ten licensed LNG bunker suppliers, including Aramco Trading Singapore, Equatorial Marine Fuel Management Services, ExxonMobil Asia Pacific, FueLNG, Pavilion Energy Singapore, PetroChina International (Singapore), Shell Eastern Trading, Sinopec Fuel Oil (Singapore), TotalEnergies Gas & Power Asia and Vitol Bunkers (S). ↩
6. Baird Maritime (Reuters), 13 January 2026 (n above): LNG sales of 571,400 tonnes in 2025, up 24 per cent; MPA to open applications for new LNG bunker supply licences from 14 January 2026; MPA, "LNG Bunkering" (n above): on 14 January 2026 the MPA opened applications for additional licences to supply LNG as marine fuel and launched the Standards for Port Limit LNG Bunker Vessels. ↩
7. LNG Prime (lngprime.com, accessed November 2026), headline of August 2026 on Singapore LNG bunkering: January–August volumes up 23.5 per cent year on year. ↩
8. MPA, "Singapore Opens Applications for Methanol Bunkering Licence" (media release, 26 March 2025): more than 50 proposals under the expression of interest launched in December 2023; licensing period from 1 January 2026 to 31 December 2030; applications by 28 May 2025; criteria including secure

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supply, at least one IMO Type 2 chemical tanker, a specified well-to-wake carbon intensity, a transparent chain of custody and adoption of mass flow meters and digital bunkering; Technical Reference TR 129 and Standards for Port Limit Methanol Bunker Tankers launched in early 2025. ↩

9. MPA, "List of licensed bunker suppliers", 4 September 2026 (n above): methanol listed among the fuels supplied by Global Energy Trading, Golden Island and PetroChina International (S). ↩
10. MPA, "Bunker Sales" (Excel file bunker-sales_Sep-2026.xlsx, mpa.gov.sg, Research and Statistics, accessed November 2026): methanol 1.63 thousand tonnes (2024), 3.01 thousand tonnes (2025) and 6.31 thousand tonnes (January–September 2026). ↩
11. MPA, "Bunker Sales" (Excel file bunker-sales_Sep-2026.xlsx, mpa.gov.sg, Research and Statistics, accessed November 2026): ammonia 0.01 thousand tonnes in 2024, none in 2025 or January–September 2026. ↩
12. MPA and the Energy Market Authority, studies and pilot projects on ammonia power generation and bunkering on Jurong Island (2023–2026), including ship-to-ship ammonia transfer trials in the port. ↩
13. Wikipedia, "IMO Net-Zero Framework" (accessed November 2026): drafted at MEPC 83 on 11 April 2025; application to ships above 5,000 gross tonnage; two-tier system based on a Singapore proposal; adoption scheduled for October 2025 and delayed by one year after US pressure. ↩
14. IMO, "Meeting Summaries" (imo.org, accessed November 2026): MEPC ES.2 held on 14–17 October; MEPC/ES.2 session on 4 December "subject to confirmation by MEPC 85"; MEPC 85 from 30 November to 3 December. ↩
15. Baird Maritime (Reuters), 13 January 2026 (n above): total alternative fuels of 1.95 million tonnes in 2025, compared with 1.35 million tonnes in 2024. ↩

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