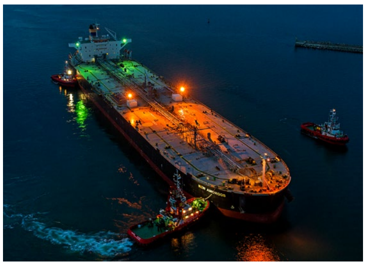
ALTERNATIVE FUELS

BIOFUEL

OPERATIONAL/BUILT: N/A
ON ORDER: N/A

Fatty Acid Methyl Ester (FAME) and Hydrotreated Vegetable Oil (HVO) are two biofuels popular for their status as a “drop-in” fuel. Both help reduce carbon emissions, however HVO is generally more costly.



LNG

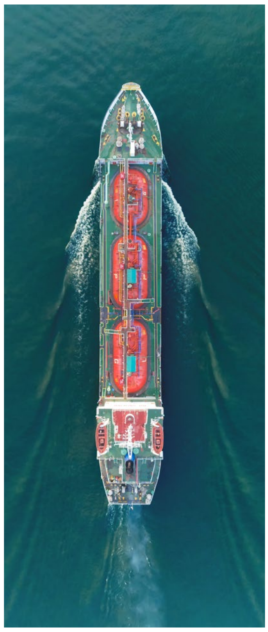
OPERATIONAL/BUILT: 1134
ON ORDER: 907

Liquefied Natural Gas (LNG) is a leading transitional fuel, utilising proven technology, with its bunkering infrastructure rapidly expanding. However, managing ‘methane slip’ is crucial to see the greenhouse gas (GHG) benefits of LNG.

METHANOL

OPERATIONAL/BUILT: 34
ON ORDER: 244

Methanol, primarily derived from natural gas, is becoming increasingly popular in the fuel industry. Its appeal lies in simpler fuel handling and easier risk management compared to LNG. However, methanol is not without drawbacks, including its toxicity and low flash point.



AMMONIA

OPERATIONAL/BUILT: 3
ON ORDER: 26

Entering into a relatively new space, ammonia has been identified as another promising alternative fuel to decarbonise the maritime industry. It produces almost zero carbon emissions when burned (besides pilot fuel) and is generally available in regions with agricultural and industrial demand.

However, ammonia poses challenges due to its toxicity, flammability (though it is difficult to ignite), and the complex storage and handling requirements.

HYDROGEN

OPERATIONAL/BUILT: 14
ON ORDER: 29

Hydrogen, another alternative fuel identified as clean and abundant, is attracting significant investment in technology. Fuel cells using hydrogen are more efficient than combustion engines.

The production of hydrogen remains energy-intensive, and large-scale production is expensive. The bunkering infrastructure for hydrogen is still undeveloped, and storage is costly, requiring temperatures of -253°C.

THE LATEST DEVELOPMENTS IN THE INDUSTRY

BIOFUEL

Recent developments in marine biofuels, particularly FAME and HVO, are making significant strides in decarbonising the shipping industry. For example, a group has adopted HVO for all its port towing operations, reducing CO2 emissions by up to 80%. They plan to fully transition their fleet to this renewable diesel by the end of 2024, marking a major step in sustainable marine fuel adoption.

Meanwhile, a pilot project in Singapore is testing a blend of FAME (~24%) and very-low-sulfur fuel oil (VLSFO) for bunkering, reflecting growing interest in biofuel used to meet decarbonisation targets.

METHANOL

Methanol has been gaining traction as major players invest in methanol-fuelled vessels to comply with future emission regulations and sustainability goals. This interest is driven by methanol's potential to meet low-emission targets and its compatibility with existing infrastructure, making it a viable option for reducing the carbon footprint of shipping operations.

In addition, some companies are pushing innovation by ordering the world's first battery-electric tug with methanol-dual fuel engines (for backup), to maximise efficiency and further reduce carbon emissions.

LNG

LNG continues to dominate the marine fuel landscape as a leading option for reducing emissions, especially as shipowners look for immediate and practical solutions to meet environmental regulations. In an article by Drewry, over 1,100 LNG-fueled vessels are expected to be in service by 2029, solidifying LNG's role in the decarbonisation of the shipping industry.

There is also a growing focus on transitioning from fossil LNG to bio-LNG and e-LNG, which are produced from renewable sources, further enhancing the sustainability of LNG as a marine fuel.

Somewhat related but rather niche, ethane carriers, designed with engines capable of consuming the ethane cargo they transport, have emerged more recently in response to the increasing production and export of ethane.

AMMONIA

Ammonia-powered vessels are advancing quickly, with Fortescue conducting a groundbreaking trial in Singapore using ammonia in combination with diesel as marine fuel. This trial showcases ammonia's potential as a clean alternative while supporting ongoing efforts to refine safety protocols and reduce emissions.

And more recently, in September 2024, the world's first ship-to-ship transfer of ammonia was successfully conducted in Western Australia, marking a key milestone in enabling ammonia as a practical marine fuel. This fuel transfer, involving approximately 2,715 tonnes of ammonia, represents a significant step towards decarbonising large vessels, such as iron ore carriers, in the global shipping industry.

The IMO's CCC 10 finalised interim guidelines for the safety of ships using ammonia, these are expected to be approved at MSC 109. Additionally, amendments to the IGC Code regarding ammonia cargo as fuel are anticipated to enter into force on 1 July 2026, with early implementation possible. Supporting guidelines will be developed before CCC 11 next year.

DISCLAIMER

The data used in this article is sourced from Clarksons. We acknowledge and thank them for providing the valuable information that has contributed to this publication. The data is current as of July 2, 2024. Due to some ships having multiple declared fuel types there are minor overlaps of data.

THE LATEST DEVELOPMENTS IN THE INDUSTRY CONTINUED

HYDROGEN

In September 2024, a company delivered its first maritime hydrogen fuel cell system for the hybrid passenger ship in Japan, which uses both hydrogen and biodiesel. When powered solely by hydrogen fuel cells, the vessel achieves zero emissions, showcasing hydrogen's potential for greener shipping solutions.

There has been research and development in incorporating advanced sail technology to create, store, and transport green hydrogen using offshore wind energy. Ideally, the ship operates without fossil fuels, generating hydrogen through the electrolysis of seawater. This hydrogen is then converted into methylcyclohexane (MCH) for safe storage.

As a hydrogen carrier, MCH is easy to handle, efficient, and safe for storage and transportation at ambient temperature and pressure. The ship's production also aims to supply hydrogen energy for land-based applications to achieve zero emissions.

OTHER INTERESTS

Carbon Capture Technology – In the maritime sector, carbon capture technology refers to advanced systems designed to capture carbon dioxide (CO2) emissions from ship exhausts. This process, known as onboard carbon capture (OCC), prevents CO2 from being released into the atmosphere. This technology aims to reduce the carbon footprint of maritime operations by capturing CO2 and either storing it or converting it into other useful products.

In recent years, particularly over the past decade, LCO2 carriers - specialised ships designed for transporting liquefied carbon dioxide - have gained traction in supporting carbon capture and storage (CCS) initiatives aimed at reducing greenhouse gas emissions. Although still in development, several companies are striving to make these vessels commercially viable, representing a significant step forward in the global effort toward decarbonisation.

While efforts have traditionally focused on improving the energy efficiency of vessels and switching to carbon-neutral fuels, carbon capture provides an additional avenue for reducing emissions. As the industry seeks to meet stringent environmental regulations and contribute to global climate goals, carbon capture offers a promising solution for achieving lower emissions and promoting sustainable shipping practices.

USEFUL LINKS

BIOFUEL	ssa.org.sg (FAQ on Bio Fuels) britanniapandi.com (LP Insight-Biofuels) lr.org (Challenges for biofuel adoption in shipping)
METHANOL	methanol.org (Marine Methanol Report) lr.org (Fuel for Thought | Methanol) britanniapandi.com (LP Insights-Methanol)
HYDROGEN	dnv.com (Five lessons to learn on hydrogen as ship fuel) man-es.com (Hydrogen | Future fuels) japantimes.co.jp (Japan certifies hydrogen-fueled ship)
LNG	dnv.com (Why LNG as fuel) wastsila.com (Expert answers to 17 important questions) britanniapandi.com (LP Insight-LNG)
AMMONIA	shipandbunker.com (Full-scale testing for MAN Energy) globalmaritimeforum.org (Ammonia as a shipping fuel) lr.org (Fuel for Thought: Ammonia report)