



AMMONIA ENERGY
ASSOCIATION

Low-Emission Ammonia Data (LEAD): Vessels

Executive Summary

March 2025

Ammonia Energy Association

Project intelligence database



The AEA's ammonia-fueled vessels (and ammonia-ready vessels) database has been available to members of the AEA since September 2024.

The database is growing quickly:

- September 2024: 263 vessels (96 ammonia-fueled, 167 ammonia-ready)
- December 2024: 322 vessels (129 ammonia-fueled, 193 ammonia-ready)
- March 2025: 355 vessels (130 ammonia-fueled, 225 ammonia-ready)

The database includes both newbuild vessels and potential retrofitted vessels.

Vessels are classified as: (1) Ammonia-fueled, and (2) Ammonia-ready. The vessels classified as "Ammonia-ready" include potential retrofits.

Vessels are categorized according type (including capacity): (1) Ammonia carrier, (2) Gas carrier (non-ammonia), (3) Bulk carrier, (4) Oil carriers, (5) Container ships, (6) Auto carriers (Ro-Ro), and (7) Supply vessels / Tug boats.

Updates this quarter

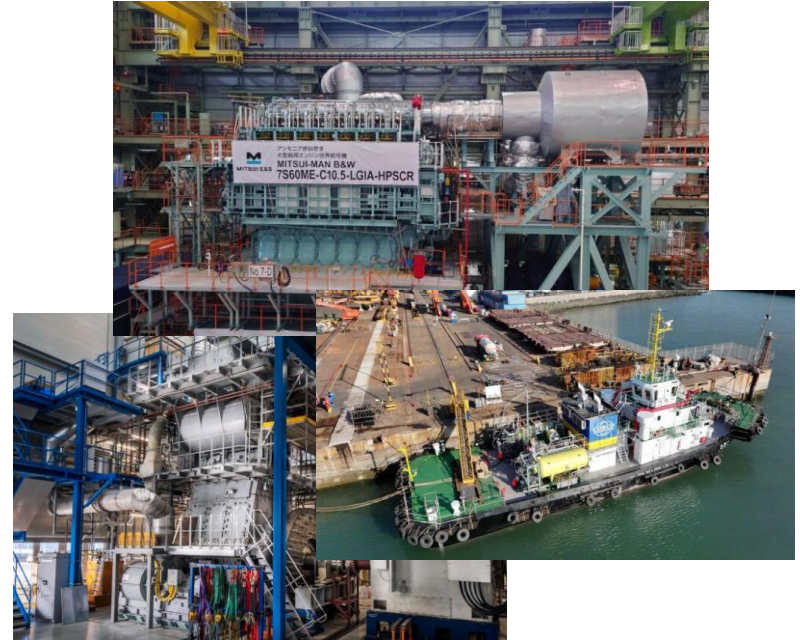


A total of 2 new ammonia-fueled vessels have been announced this quarter, as well as 32 new ammonia-ready vessels.

In January 2025, MAN ES has operated a full-scale ammonia-fueled two-stroke engine at 100% load for the first time at its Research Centre Copenhagen (RCC) in Denmark. In February 2025, Mitsui E&S has also commenced test operations of an ammonia dual fuel engine at its Tamano factory, producing up to 17.43 MW of power.

In January, WinGD completed early testing of its X-DF-A ammonia-fueled engine (52-bore single-cylinder variant) at the Engine Research and Innovation Centre (ERIC) in the city of Winterthur, in northern Switzerland. First engine deliveries are planned for June 2025.

Ammonia bunkering from truck-to-ship was demonstrated for the retrofitted Tugboat Yuantuo 1 of COSCO in Dalian, China. A similar demonstration was previously performed by NYK in Japan.



*Top: Mitsui E&S.
Bottom Left: WinGD. Bottom Right: COSCO.*

Significant Orderbook for Ammonia-fueled & Ammonia-ready Vessels



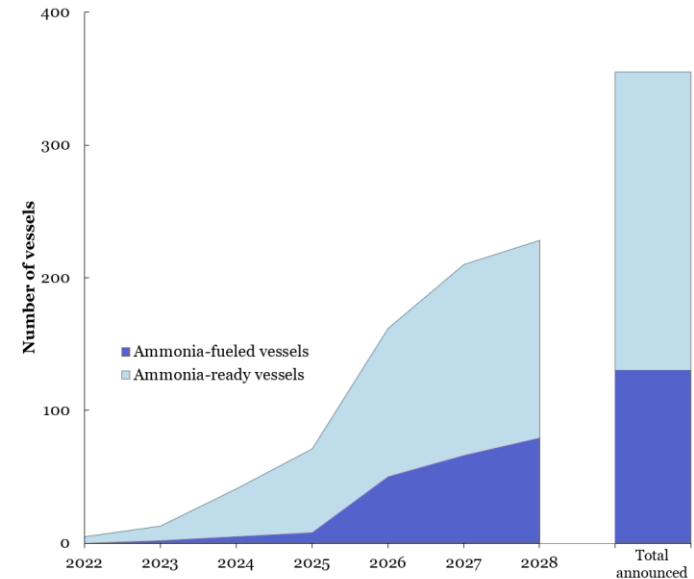
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As of March 2025, the AEA tracks 355 Ammonia-fueled and Ammonia-ready Vessels.

- Out of these, 5 vessels currently operational using ammonia, which are Supply vessels & Tug boats, entering the water in 2023 and 2024.
- The first Ammonia-ready vessel entered the waters in early 2022. 28 Ammonia-ready Vessels are operational, including Ammonia carriers, Bulk carriers, Oil carriers, Container vessels, and Supply vessels.

Ammonia-fueled vessels and ammonia-ready vessels

Global announcements: 130 ammonia-fueled vessels and 225 ammonia-ready vessels 2025 Q1



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<https://ammoniaenergy.org/lead/>

Ammonia-fueled Vessels: Ammonia carriers & Bulk carriers



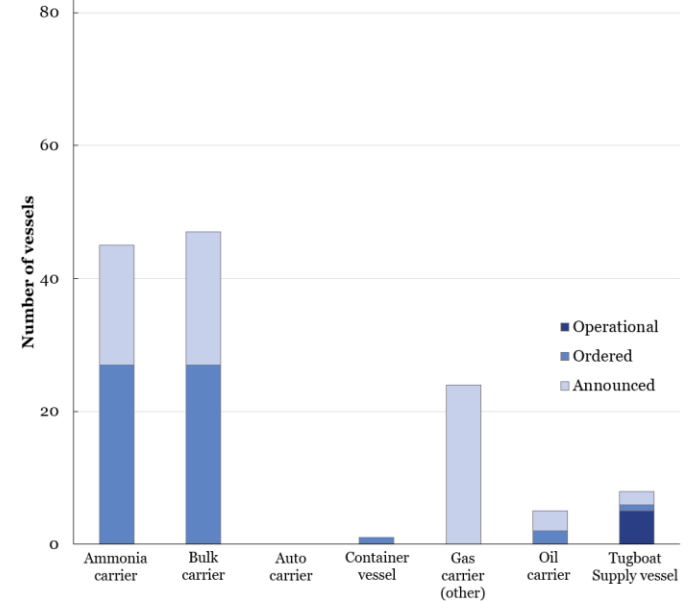
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As of March 2025, the AEA tracks 130 Ammonia-fueled Vessels.

- Out of these, 5 vessels currently operational using ammonia, which are Supply vessels & Tug boats, entering the water in 2023 and 2024.
- Out of the 58 ordered Ammonia-fueled vessels, almost all vessels are Ammonia carriers (27) and Bulk carriers (27), with the first of these vessels expected to hit the waters in 2026 and 2027.
- Although Oil carriers, Auto carriers, and Container vessels represent a small portion of the Ammonia-fueled vessels to date, these Vessel classes are well represented in the Ammonia-ready vessels.

Ammonia-fueled vessels

*By vessel type and status
2025 Q1*



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Ammonia-ready Vessels: Ammonia carriers, Auto Carriers & Containers



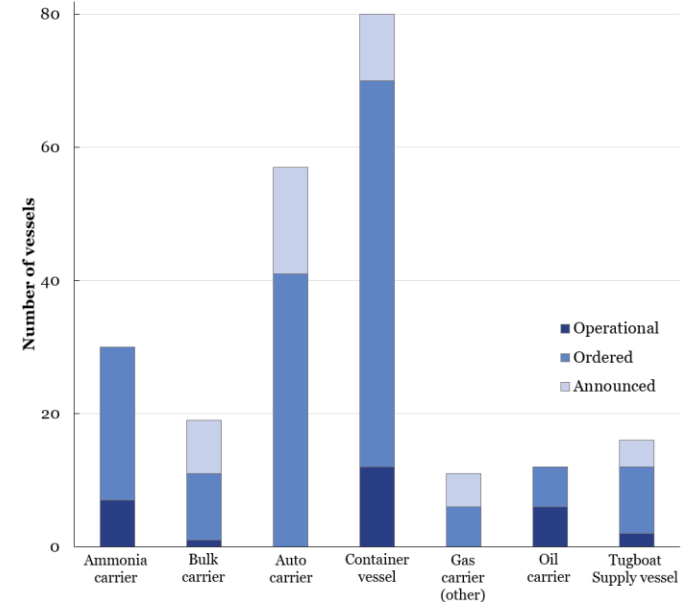
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As of March 2025, the AEA tracks 193 Ammonia-ready Vessels.

- Ammonia-ready vessels typically have provisions for ammonia fuel supply systems, ammonia release mitigation systems, and Tank C tanks for ammonia fuel storage. Also, retrofit packages exist for Engines to use ammonia as fuel.
- The first Ammonia-ready vessel entered the waters in early 2022. As of March 2025, 28 Ammonia-ready vessels are operational, including Ammonia carriers (7), Bulk carriers (1), Oil carriers (6), Container vessels (12) & Supply vessels / Tug boats (2).
- Out of the 154 Ordered Ammonia-ready vessels, most are Ammonia carriers (23), Auto carriers (41), and Container vessels (58).

Ammonia-ready vessels

*By vessel type and status
2025 Q1*



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IMO Guidelines for Ammonia-fueled Vessels are Shaping up

In September 2024, the IMO (International Maritime Organization) Sub-Committee on Carriage of Cargoes and Containers (CCC) finalized interim guidelines for the use of ammonia as a fuel for vessels, ensuring safe handling of ammonia.

Following the 109th meeting of the IMO's Maritime Safety Committee (MSC) in early December, these interim guidelines for the use of ammonia fuel onboard vessels have been approved. Cargo ships weighing 500 gross tons or more and passenger ships using non-cargo ammonia as fuel can now use the guidelines as a basis for vessel design and systems layout, with work to continue on more detailed amendments to the IGF code.

In terms of the use of ammonia cargo as fuel (currently prohibited by IMO regulations), changes to the IGC code will enter into force on 1 July 2026 that allow for this fuel pathway. This aligns with the first large-scale ammonia-fueled vessels hitting the waters in 2026.

<https://ammoniaenergy.org/articles/imo-approves-interim-fuel-guidelines/>



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IMO: Unpacking interim guidelines for ammonia fuel use

WEBINAR

Antti Nironen
Technical Officer,
IMO

Liam Blackmore
Principal Engineer,
Lloyd's Register

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Thursday, January 9
4PM CET (10 AM EST)

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Ammonia-fueled Engines are ready for Deployment



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Engine manufacturers have performed extensive testing of ammonia-fueled two-stroke and four-stroke engines. In fact, first ammonia-fueled engine (a four-stroke engine) was delivered and deployed 2024. Engine manufacturers are ready for scale-up, with 60+ engines ordered. Also, retrofit packages exist for engines to use ammonia as fuel.

A two-stroke engine (the majority of ammonia-fueled engine orders) can operate with up to 95% ammonia as fuel, requiring around 5% pilot fuel such as fuel oil or diesel. In ammonia mode, NO_x emissions are up to 40% lower than in fuel oil mode.

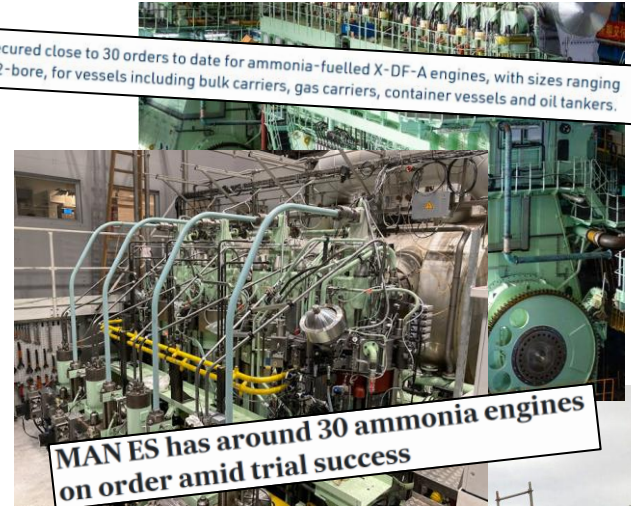
Ammonia-fueled engines are compliant with IMO Tier II NO_x emission limits without a DeNO_x system, and are compliant with IMO Tier III NO_x emission limits with a DeNO_x system.

<https://ammoniaenergy.org/articles/ammonia-energy-conference-2024-ammonia-for-maritime-propulsion-is-full-speed-ahead/>

<https://wingd.com/news-media/news/wingd-seals-ammonia-fuelled-x-df-a-engine-orders-for-chinese-gas-carriers>

<https://www.tradewindsnews.com/technology/man-es-has-around-30-ammonia-engines-on-order-amid-trial-success/2-1-1704861>

WinGD has secured close to 30 orders to date for ammonia-fuelled X-DF-A engines, with sizes ranging from 52- to 72-bore, for vessels including bulk carriers, gas carriers, container vessels and oil tankers.



MAN ES has around 30 ammonia engines on order amid trial success



Top: WinGD. Middle: MAN ES. Bottom: NYK.

Technology toolkit ready for Deployment

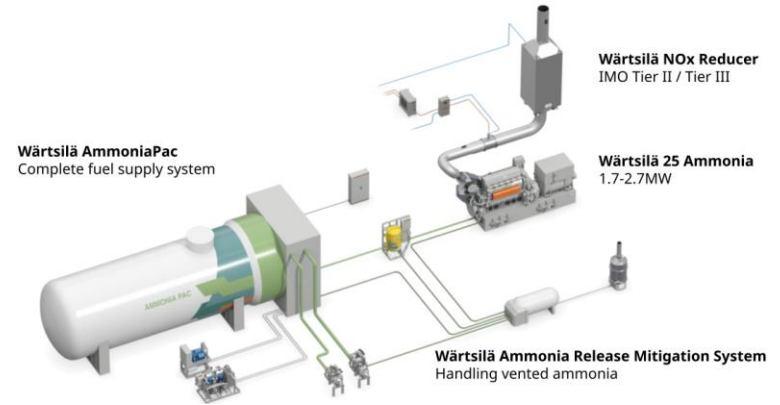
In addition to engines being commercially available, the rest of the technology toolkit is ready for ammonia-fueled vessels, in line with the timeframe for the IMO guidelines:

- **Onboard ammonia fuel storage:** Ammonia fuel will be stored in Type C Tanks on the deck of a vessel. These tanks are also used for LNG, LPG, LEG, Hydrogen, etc.
- **Ammonia bunkering:** Various ship-to-ship bunkering operations have been safely demonstrated in 2024.
- **Ammonia Fuel Supply System (AFFS):** Safe ammonia supply systems (liquid or gas) supply ammonia to the engine
- **Ammonia Release Mitigation System (ARMS):** Safe handling and dilution of vented ammonia at acceptable concentrations.
- **Gas detection:** Potential leaks can be measured with gas detection, allowing for immediate action, and ammonia containment.
- **Emission mitigation:** DeNO_x systems are commercially available, reducing NO_x emissions down to IMO Tier III levels.

<https://ammoniaenergy.org/articles/ammonia-energy-conference-2024-ammonia-for-maritime-propulsion-is-full-speed-ahead/>



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Top: Fuel Supply System, Ammonia Release Mitigation System, DeNO_x (Wärtsilä). Bottom Left: Ship-to-Ship bunkering (GCMD). Bottom Right: DeNO_x system (BUTTING).

Evaluation of status



The AEA tracks criteria:

- Order date
- Engine manufacturer selected
- Shipyard selected

Every vessel order is assigned a status:

- **Operational:** the vessel is operational
- **Ordered:** The vessel is ordered
- **Announced / Optional:** The vessel is not yet ordered
- **Defunct:** The vessel project is on hold or not ongoing

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For more information or questions related to this material, please contact Kevin Rouwenhorst at krouwenhorst@ammoniaenergy.org, Technology Manager, Ammonia Energy Association.

The original data upon which this material is based is available to the members of the Ammonia Energy Association. If you are interested in joining the AEA, please visit ammoniaenergy.org/members for more information. The original data is based on publicly available materials.