



Challenge of Hydrogen & Ammonia as Global Fuels

July 2023



In the past three years, consumers and investors have shown their strong support for the UN's goal of carbon free emissions by 2050. As a result, companies and countries have been forced to finally address the key problem of replacing carbon based fuels as opposed to changing from the worst carbon fuel to a better carbon fuel. The challenge is significant because the world consumes about 8 billion tons of coal and 185 billion tons of oil annually and 2050 is only 27 years away.

Industry leaders and proactive governments are aggressively attacking the challenge by developing hydrogen and ammonia as global fuels. Hydrogen is an obvious choice because pound for pound, it shreds all other fuels in power content. The challenge is that as a liquid it has to be maintained at $-253^{\circ}\text{C}/-423^{\circ}\text{F}$. Ammonia has never been considered a fuel source but it's also carbon free and contains one nitrogen and three hydrogen atoms. The hydrogen components make it a suitable but less robust fuel and a viable carrier of hydrogen. Unlike hydrogen, it's routinely stored and shipped at a manageable $-32^{\circ}\text{C}/-26^{\circ}\text{F}$. Clean ammonia is differentiated from the traditional "Gray" version by the production process. "Blue" ammonia is achieved by capturing the CO₂ emissions from the traditional Gray process and sequestering them. "Green" ammonia is produced by electrolysis of water using green power (solar, wind, hydro-electric). So how can ammonia support the Net Zero initiative?

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Marine Fuel

The global shipping fleet contributes 2% of the world's emissions and if unchecked will represent 3% by 2030. In support of the UN regulations leading engine manufacturers have developed dual fuel options which include natural gas, ethane, propane, methanol, and most recently ammonia. Shipping is a capital intensive business and vessels take 2 years to build and operate for 20 -25 years. We're entering the time period where a new vessel will have to operate in a Net Zero environment for part of its life and to date ammonia is the only alternative that fits the requirement. The delivery of the first ammonia capable vessel is expected in 2025. Most of the initial candidates will be ammonia carriers to simplify fuel supply but as the distance to 2050 closes other sectors are expected to transition to the carbon free choice. Some engine manufacturers forecast that +90% of newly constructed vessels will be ammonia capable by 2040.

Despite the benefits of its carbon-free status, ammonia as a marine fuel has several technical challenges. Its power output is lower than other options and therefore larger quantities must be consumed and larger storage tanks will be needed onboard the ship. Secondly, a global network that can accommodate vessels in port as well as at anchor will have to be developed and licensed.

Hydrogen Carrier

Where there is a more near term opportunity to tap into the cleaning burning properties of Ammonia is in the Industrial Power Supply space. The first shipment of clean ammonia was sent from the Middle East to Japan in January of 2022 in small iso tanks where quantities are measured in liters. Subsequent shipments have been delivered to Europe, India, Southeast Asia, and the Far East. The quantities have increased to 5,000 - 25,000 ton parcels and refrigerated ammonia ships used for transport. The frequency and quantities are increasing and we expect that trend to continue.



In the Far East and Southeast Asia, coal fueled power plants have started to inject ammonia into the combustion process to gauge its thermal capabilities and potential reduction in emissions. We understand the test injection rate varies between 5% - 20%. The results of the injection tests have not been published but a small percentage of this market would represent a significant uplift in ammonia consumption and shipping.

With only 5% of the current seagoing gas fleet deployed in Ammonia, we anticipate increasing demand for vessels as the industry grows and more nations look to tap into the benefits of Ammonia as a clean burning fuel. Of the first generation dual (NH3) fuel carriers there will likely be a premium as shippers look to extract additional value from the supply chain.

Quincannon Associates is actively tracking all major initiatives in the ammonia and hydrogen market. Contact ship@quincannon.com with any inquiries.



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For up to the minute market intelligence and support, please reach out to one of our New York-based shipping specialists.

ABOUT QUINCANNON ASSOCIATES

Founded in 1974, Quincannon Associates is a privately owned Company with fully owned subsidiaries in Dubai, Singapore, and Shanghai. Quincannon Associates continues to push the boundaries of the role of the Ship Broker and value brought to each transaction. Using an innovative approach to analyze shipping data and the markets, Quincannon strives to give the customer heightened insight and visibility into all marine transactions. Its network of companies enables solutions to gases and chemical shipment needs in the customer's local time zone.

For 50 years, Quincannon Associates has been providing a variety of services that help businesses safely and cost-effectively manage their bulk marine logistics, including voyage chartering, ship sale and purchase agreements, demurrage calculations, port operations, logistics terminology, and ship finance, as well as provide consultation on marine insurance and legal matters.

