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FUELS FOR THE FUTURE

Summer 2024 / Sustainability / Big Picture
Business Unit: HUTCHISON PORTS (HEADQUARTERS)

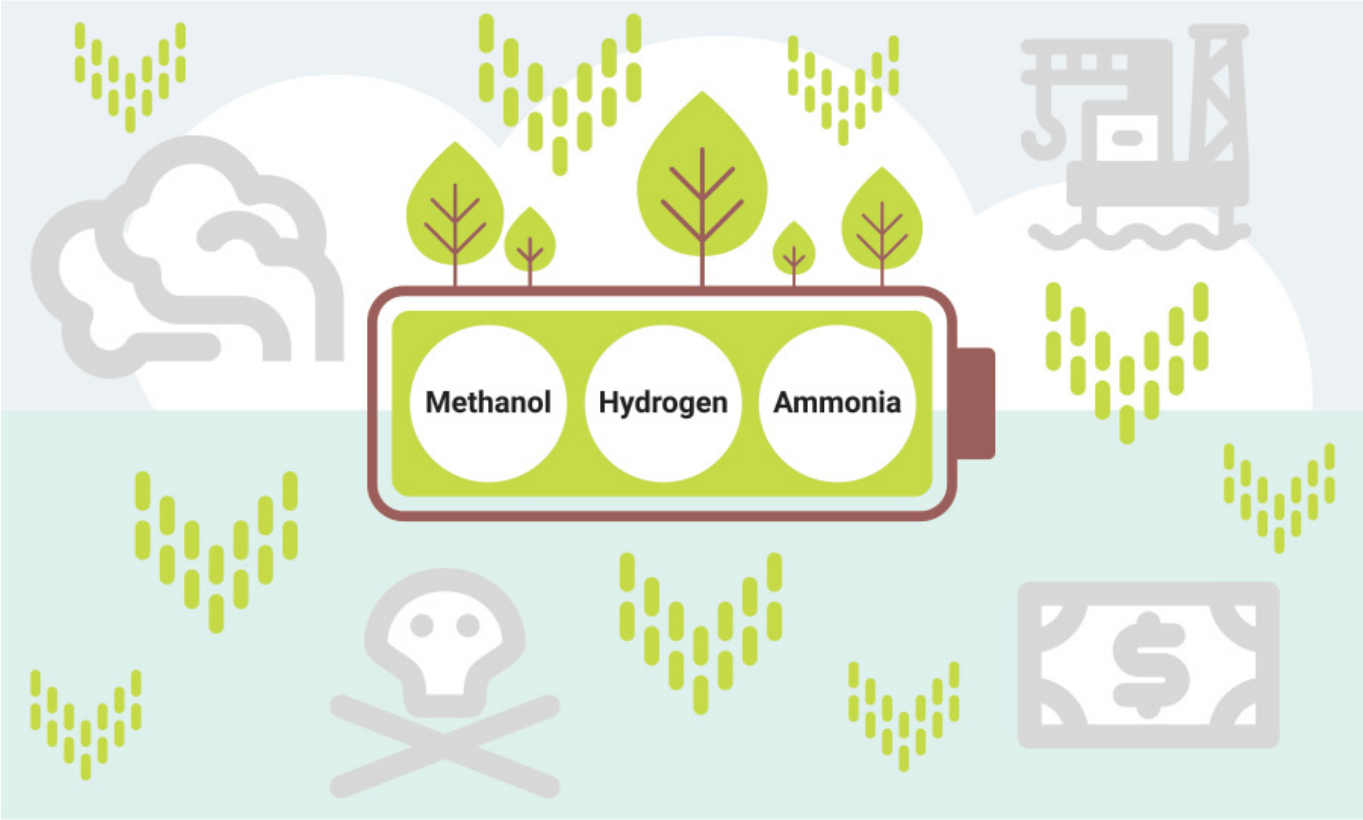
As the shipping industry enters a new era, transitioning from fossil fuels to using cleaner energy sources, a comparison has been made to the launch of commercial long-haul steamships in the 1860s, which challenged the primacy of sail.

Fast forward to today and efforts to reach net zero, have resulted in a multitude of alternative fuels being developed for shipping and other transportation modes, with trials underway using methanol, hydrogen and ammonia. The challenges include sourcing sufficient quantities of new fuels produced in a 'green' way, developing bunkering capacity and networks as well as safety concerns over the use of ammonia and hydrogen, and increased costs when compared to bunker fuels.

The driving force behind shipping's green fuel transition differs from the commercial drivers of the past, now the transition is because of environmental imperative, government policy and corporate social responsibility.

The other major challenge is to find sufficient sustainable energy to produce green fuels in the quantities required by the global shipping industry. With hydroelectric, wind and solar in demand across a range of industries to produce green fuels, production capacity will fall short of demand, resulting in increased prices.

We look at the progress that has been made in rolling out new fuels including current favourite methanol and other front- runners hydrogen and ammonia.

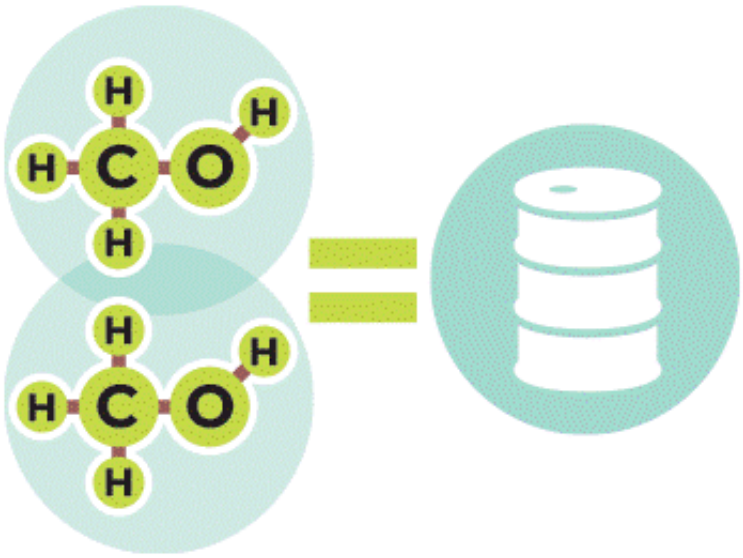


FUTURE FUEL INITIATIVES

There are many new initiatives underway using green methanol, hydrogen and ammonia with orders for dual-fuelled blue water fleets and shortsea vessels using hydrogen cell technology as an energy source. We review a selection of the first movers in developing green energy solutions.

Shipping giant Maersk has ordered six mid-sized container vessels with dual-fuel engines which can operate on green methanol. The 9,000 TEU vessels which will be delivered in 2026 and 2027 could bring a reduction in Maersk's annual CO_2 gas emissions by nearly 450,000 tonnes per year, on a fuel lifecycle basis, when operating on green methanol.

Methanol has only about half the energy content of fossil oil. This means about twice as much fuel is needed. Bio-methanol emits around two-thirds less greenhouse gases than fossil fuel (ultra-low sulphur oil).



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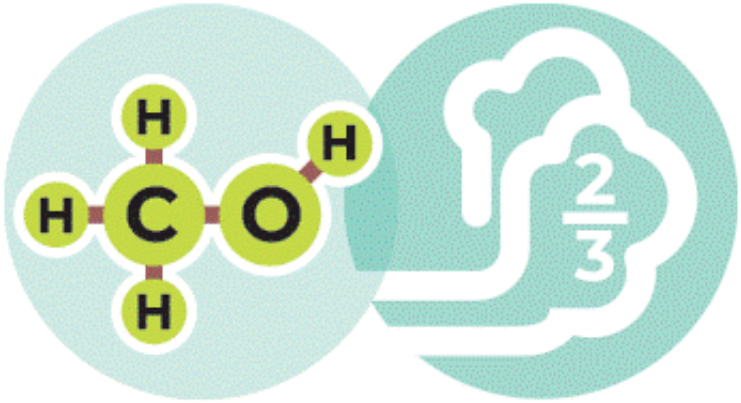


Synthetically produced e-methanol* could reduce emissions by well over 90 percent in the future. Production plants for e-methanol are currently under construction in Denmark.

Due to the still limited availability of green methanol worldwide, these methanol-powered ships can also run on biodiesels thanks to dual-fuel technology. Methanol has the advantage of being non-toxic and easy to handle as a marine fuel.

* Methanol is one of the most practical alternatives to conventional fuels, as it can reduce carbon emissions by up to 95 percent. It is designated as e-methanol when produced with renewable energy.

THE WORLD'S FIRST GREEN HYDROGEN BOX SHIP LABELLED 'MAKE IN INDIA'

Cochin Shipyard Ltd., in Kerala, India started cutting steel for the first of two green hydrogen-powered ships after it landed the country's inaugural hydrogen fuel cell ferry order in February 2024. The ships have been ordered by a Netherlands-based shipping line as part of its SeaShuttle project, funded by the Norwegian government green funding programme, according to cochinshipyard.in.

The two SeaShuttle vessels, set for delivery in the latter half of 2025, will be fitted with 3.2MW hydrogen fuel cells while the ship will also be fitted with a diesel engine as a back-up power source, making them the first container ships of their size in the world to run on hydrogen and fossil fuel.

The ships, classified as smaller 'feeder' container vessels, will travel between continental Europe and Scandinavian markets.

2026 LAUNCH DATE FOR FIRST AMMONIA-POWERED BOX SHIP

Yara Eyde, which has been described as the world's first containership to be powered by pure ammonia, is scheduled to enter the market in 2026 serving routes between Norway and Germany.

The vessel is being developed by ammonia producer and shipowner Yara Clean Ammonia and the Norwegian container operator North Sea Container Line.

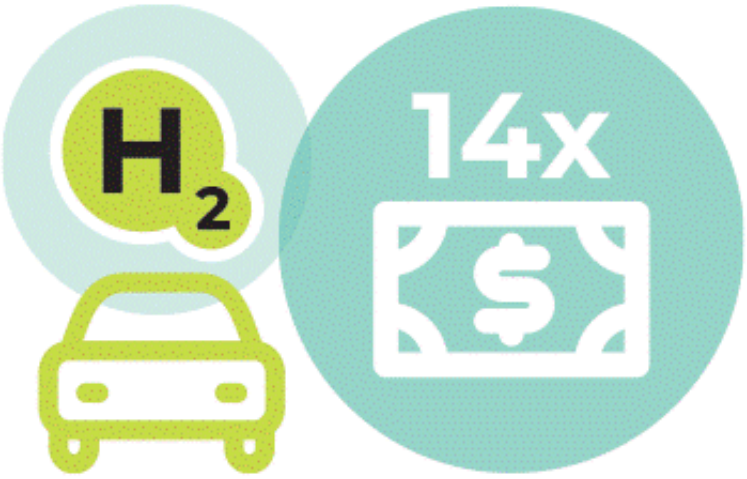
The duo plans to set up a joint venture, NCL Oslofjord AS, which aims to become the world's first line operator to focus exclusively on ammonia-powered container ships.

The ship is scheduled to be fitted with a battery pack of 250 kWh and the option to connect to shore power.

HYDROGEN VS AMMONIA VS METHANOL

Many shipping companies around the world are looking at using hydrogen for shorter routes and ammonia for international journeys, the optimal environmental method would be to produce both from renewable energy sources.

Hydrogen, when compressed, can be used for short haul shipping and the vessel can then be refuelled frequently. However, pioneers in the automotive sector state that the cost of hydrogen mobility is sky-high and 'far from being affordable', said Carlos Tavares, CEO of the world's third-largest automaker Stellantis in an article in hydrogeninsight.com.



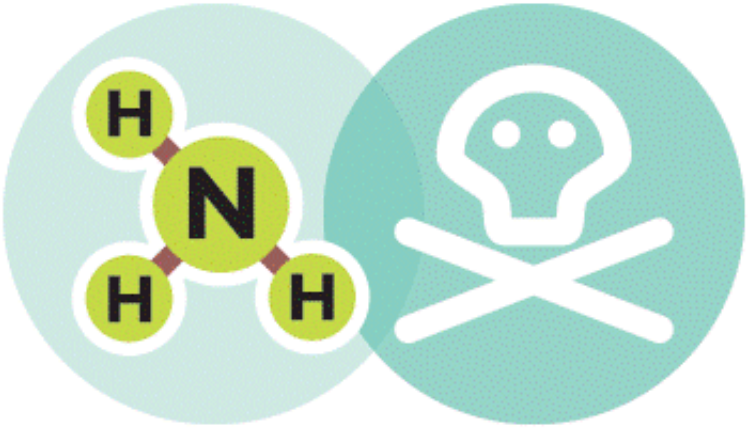
Tavares said that hydrogen is twice as expensive as an electric vehicle, however, a leading Japanese vehicle manufacturer has calculated it is 14 times more expensive to drive a hydrogen fuel-cell car than a comparable electric vehicle, according to an article in hydrogeninsight.com.

AMMONIA GOOD FOR LONG-HAUL

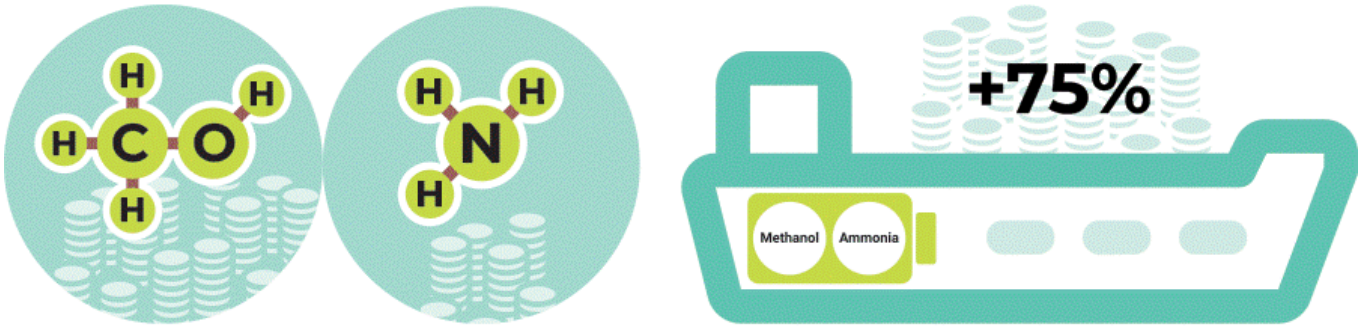
Ammonia, a compound of nitrogen and hydrogen that emits no CO_2 when burned, is the best option for container ships transporting cargo over long distances.

Even though ammonia is produced globally in vast quantities as a fertiliser, the current method of production requires large amounts of energy, which is traditionally through fossil fuelled power stations releasing large amounts of CO_2 and methane.

Ammonia also releases nitrogen oxide (NOx) emissions when burned, so ships will require to install catalytic reduction (SCR) technology to convert NOx from exhaust fumes into water vapor and nitrogen. Lastly, ammonia is highly toxic which raises significant environmental and safety concerns, because of its potential harm to human and marine life.



METHANOL MOVING FORWARD



Methanol is more expensive to produce than ammonia which comparatively is more expensive to handle, vessels running on either fuel would have approximately a 75 percent increase in total cost when compared to traditional fossil-based heavy fuel oil (HFO).

The great leveller to make the cost of green fuels more competitive is the plan to introduce a carbon tax which will entail higher taxes on polluting fuels and zero tax on green fuels. The EU Emission Trading Service for shipping will be phased in starting this year. In 2025, shipping companies will have to pay for 40 percent of their emissions reported in 2024. In 2026, this will increase to 70 percent of the emissions reported in 2025.

THE COST OF A GREEN FUTURE

The new green fuels will ultimately add costs for all, including shipping lines, terminal operators, logistics operators, freight companies and finally the consumer. Throughout the supply chain there is also significant investment in utilising green energy to tackle climate change to meet the 2030 and 2050 emission reduction targets set by the IMO. The ultimate goal is to slow down the rate of increase in global warming and shipping has implemented a clear strategy and plan to achieve those targets.

Climate Change is the defining issue of our time and many generations to come. From shifting weather patterns, to rising sea levels that increase the risk of catastrophic flooding, the impacts of climate change are global in scope and unprecedented in scale. It is up to each person and company in the shipping sector to contribute to a greener future for our planet. Without drastic action today, adapting to these impacts in the future will be more difficult and costly.

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