WHAT'S DRIVING ORDERS FOR NEW BREED OF AMMONIA GIANTS

As ammonia usage rises significantly, so will the opportunities for shipping — but what about now?

SHAPE OF THINGS TO COME: Ammonia is transferred from Mitsui OSK Lines' 35,200-dwt LPG carrier Green

Eric Priante Martin
Miami

Here is a fact that may get overlooked in all the announcements about shipowners ordering ammonia carriers: they may not carry much ammonia for the first few years of their life.

Shipping and clean fuel experts expect long-term growth in demand for shipping ammonia, greener versions of which are expected to become a decarbonisation tool in multiple industries.

The scale of growth of the ammonia trade depends largely on regulation, and thus the political winds of greenhouse gas reduction efforts.

But for the most part, ammonia carriers on the orderbook are much more than their name implies. They can, and likely will, trade in other gas markets until trade in the zero-carbon fuel materialises.

Christopher Wiernicki, chief executive at classification society American Bureau of Shipping, described ammonia as a "wild-card" market for shipping amid various demand drivers.

Those include demand from the fertiliser market, power sector and shipping, in addition to its use as a carrier of hard-to-transport hydrogen.

"There's a lot of potential for ammonia," he said. "It may not be all in shipping, but it's clearly a story that's going to be written over the next five years."

MARTIN CARTWRIGHT: Global business director for gas carriers and FSRUs at DNV Photo: DNV

Today, ammonia is mainly used in the fertiliser industry.

Ammonia's promise in decarbonising other industries is that it has no carbon atoms in its chemical formula, NH_3. It can have a net-zero supply chain when produced from natural gas in conjunction with carbon capture, or zero emissions when made from renewable electricity.

And for those industries that want to cut their greenhouse gas emissions using hydrogen, ammonia is a simpler way to move that fuel.

Today, some 200m tonnes of ammonia are produced each year.

Poten & Partners, a ship and commodities broker, forecasts 300m tonnes per year in ammonia demand in 2030 and 735m tonnes in 2050.

That is one of three very different scenarios in a forecast by Aline Ingram, Poten's senior consultant for clean fuels and chemicals.

In a conservative case, based on current policies, 222m tonnes are expected to be traded in 2030. In the most optimistic case, based on what countries would really need to do to achieve net-zero greenhouse gas emissions, 735m tonnes of ammonia demand is expected.

"All this new demand is regulatory based," Ingram said.

"Our base case is driven by the nations' pledges to meet net zero, which are quite under what is required to meet net zero by 2050. You've got some countries that do not pledge to meet net zero before 2060 or 2070."

Today, most ammonia is used where it is produced, with just 10% traded between regions, primarily transported on small or medium gas carriers.

She said: "That's about to change significantly because of the role of ammonia in the energy transition that we foresee."

POWER DEMAND

In the near future, ammonia will be particularly needed in the power sector in North East Asia to help reduce CO_2 emissions, Ingram said.

For power plants, that ammonia could be either co-fired with coal or cracked into hydrogen and then co-fired with natural gas.

"Also in Western Europe, where [ammonia is] a means to transport hydrogen, and hydrogen is going to be required to decarbonise the industry there," she said.

Clarksons' database shows some 63 very large ammonia carriers on order at shipyards in South Korea and China.

Classification society executives said these ships are basically VLGCs — the biggest class of LPG carriers — enhanced to carry ammonia, which is heavier and more toxic.

Martin Cartwright, gas segment director at Norway's DNV, highlighted the relatively small cost of ordering a VLAC compared with an LPG carrier of the same size.

"Will any of them ever see ammonia as cargo? Probably not. They're all just VLGCs that offer flexibility for ammonia," he said of the VLAC newbuildings that have been ordered.

"Why wouldn't you? It will only cost $1m to $1.5m more to make it flexible to carry ammonia. So you may as well hedge your bets."

Cartwright said LPG trade growth alone is enough to absorb all 60-plus newbuildings on order.

However, as the ammonia market matures, they expect these ships to transport it more frequently, as the trade will rely on these vessels.

Cartwright said that if all the clean ammonia production projects that have been announced come to fruition, then there will be a significant rise in demand.

However, he warned that only some of those projects will be built.

And, Cartwright said, the first wave will generate demand for medium gas carriers in inter-regional trades.

"We need more medium gas carriers ... The volumes that are going to be produced are going to increase, and they're going to fill the medium gas carrier segment," he said.

"So keep ordering medium gas carriers."

Cartwright believes there will be demand for VLACs to carry ammonia only after 2030.

Wiernicki said there could be

t 2010) to Navigator Gas' 22,600-cbm Navigator Global (built 2011) off Australia

Photo: Global Centre for Maritime Decarbonisation

another 90m to 100m tonnes per annum of ammonia trade in 2035, and he estimated that could require between 100 and 180 vessels.

That could grow significantly towards 2050.

Cartwright said that some 250 VLACs could be needed by 2050 if projects currently announced come online and all their volumes are seaborne, but he said there is a high risk of the ammonia market not rising to that level.

BIGGER, SPECIALISED VLACS

But as the volumes grow, Wiernicki said there will eventually be a need for a different kind of 80,000-cbm to 90,000-cbm "modified" VLGC newbuildings.

"You're going to see bigger ships," he said. "You're going to see something like 100,000 to 200,000-cbm ships — specialised for ammonia."

Much smaller ships currently carry all of the world's seaborne ammonia and expect growth, but there are differences in the demand drivers.

For VLACs, which will carry ammonia on long-haul trades, such as US to Japan, the electricity sector is the first big source of demand growth, in its efforts to reduce emissions from coal and gas-fired power plants.

But in handysize and midsize gas carriers, the first big source of growth is expected to be the shipping industry, as owners begin adopting ammonia as a marine fuel to meet regulations in Europe and elsewhere.

Oeyvind Lindeman, chief commercial officer at New York-listed shipowner Navigator Gas, said that by 2030, some 14m to 15m tonnes of ammonia will need to be shipped per year.

"It might sound small, but it equates to the current total global seaborne demand of ammonia for fertiliser," he said. "So it's a big thing for a little market."

And Lindeman said, that is just the start.

MARINE FUEL DEMAND

Navigator has 10 vessels that can move ammonia, and they are hauling about 1m tonnes per year.

Lindeman said regulatory incentives favour using ammonia as a shipping fuel in the early years of his forecast, but Japanese and South Korean demand for co-firing it in power plants will follow.

He believes there will be a mismatch between demand and the number of ammonia carriers, given that most existing LPG carriers can haul ammonia as well.

However, Lindeman said that is only a short-term issue.

Another factor in how fast the ammonia trade will grow is associated with the cleaner versions of the fuel.

Wiernicki said the factors include the cost of carbon capture, which is used to make blue ammonia, and the electrolysers, which use electricity to produce hydrogen that is used to produce green ammonia.

"Those costs have to go down for this market to begin to develop and really to take off," he said.

ALINE INGRAM: Poten & Partners senior consultant for clean fuels and chemicals

Photo: Poten & Partners

FOUR DEMAND DRIVERS

Four key markets could drive the ammonia market.

- **Fertilisers:** This is ammonia's main market today. Demand could grow as the trade expands or as fertiliser producers look for green ammonia to reduce their greenhouse gas footprint.
- **Marine fuel:** When ammonia-fuelled engines become available, shipowners are expected to adopt green or blue versions of the fuel to meet rules in the European Union and beyond. This could generate more demand for handysize and midsize gas carriers.
- **Power sector:** Electricity producers in Asia are looking to co-fire ammonia in power plants that use coal, or to convert it to hydrogen to use in gas-fired plants. This is expected to see green and blue ammonia shipped on very large ammonia carriers.
- **Hydrogen market:** As hydrogen adoption increases for decarbonising economies, especially in Europe, converting it to ammonia provides a more practical and efficient way for transport overseas.