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Low Carbon Ammonia Special Report

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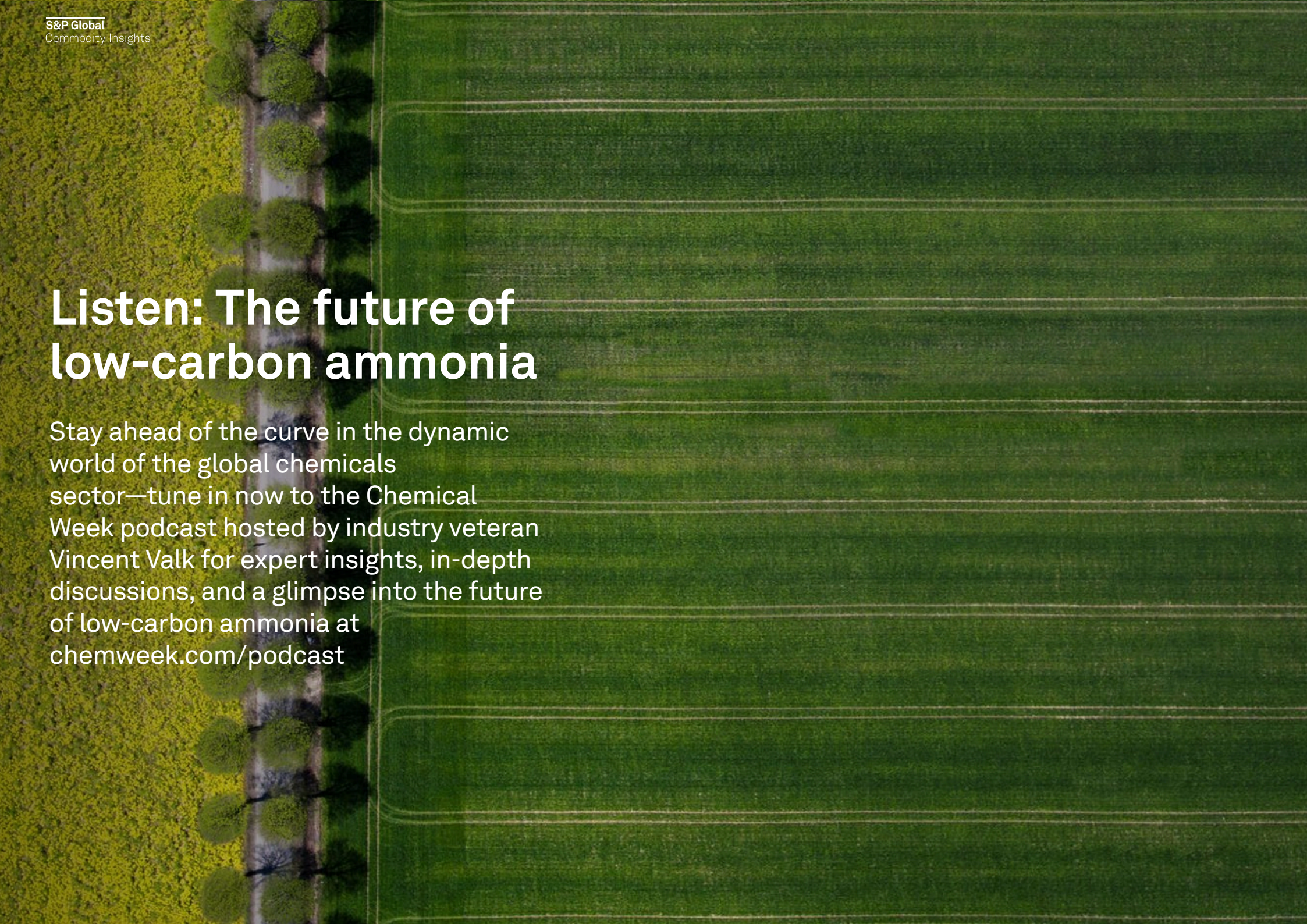

Listen: The future of low-carbon ammonia

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Ryan Monis, director of chemical consulting with S&P Global Commodity Insights, joins Chemical Week senior editor **Vincent Valk** to discuss a new report detailing the future for low-carbon ammonia, including rising demand and ammonia's potential uses as an energy carrier.

The Chemical Week podcast is the industry's premier platform for wide-ranging discussion of issues impacting the global chemicals sector, hosted by veteran industry journalist Vincent Valk and the editors of Chemical Week. Subscribe to the Chemical Week podcast on your favorite platform, or visit chemweek.com/podcast to view our episode archive.

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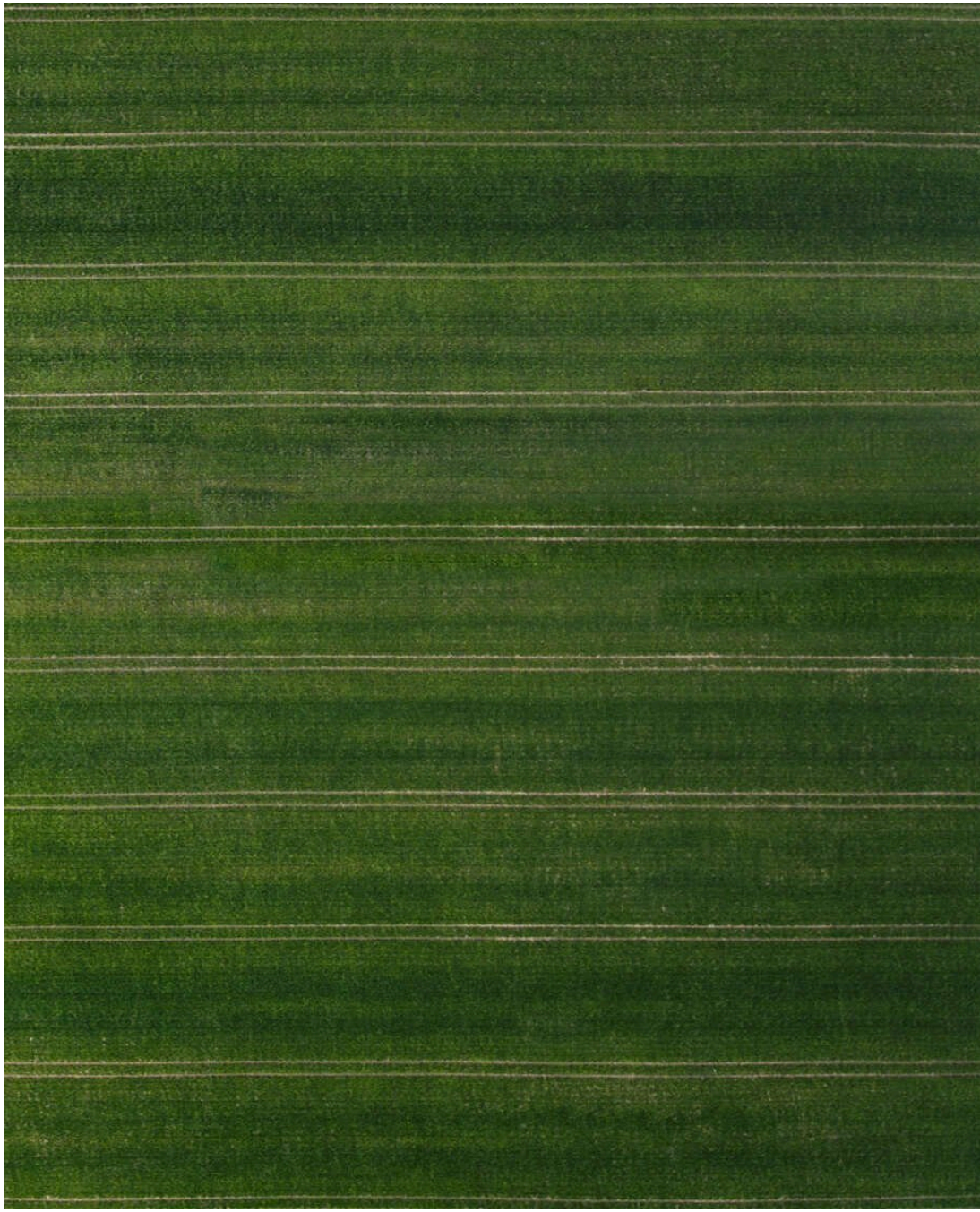

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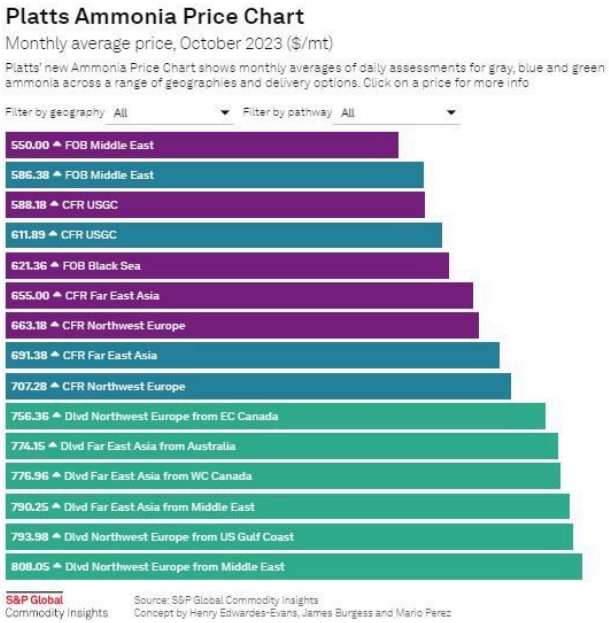
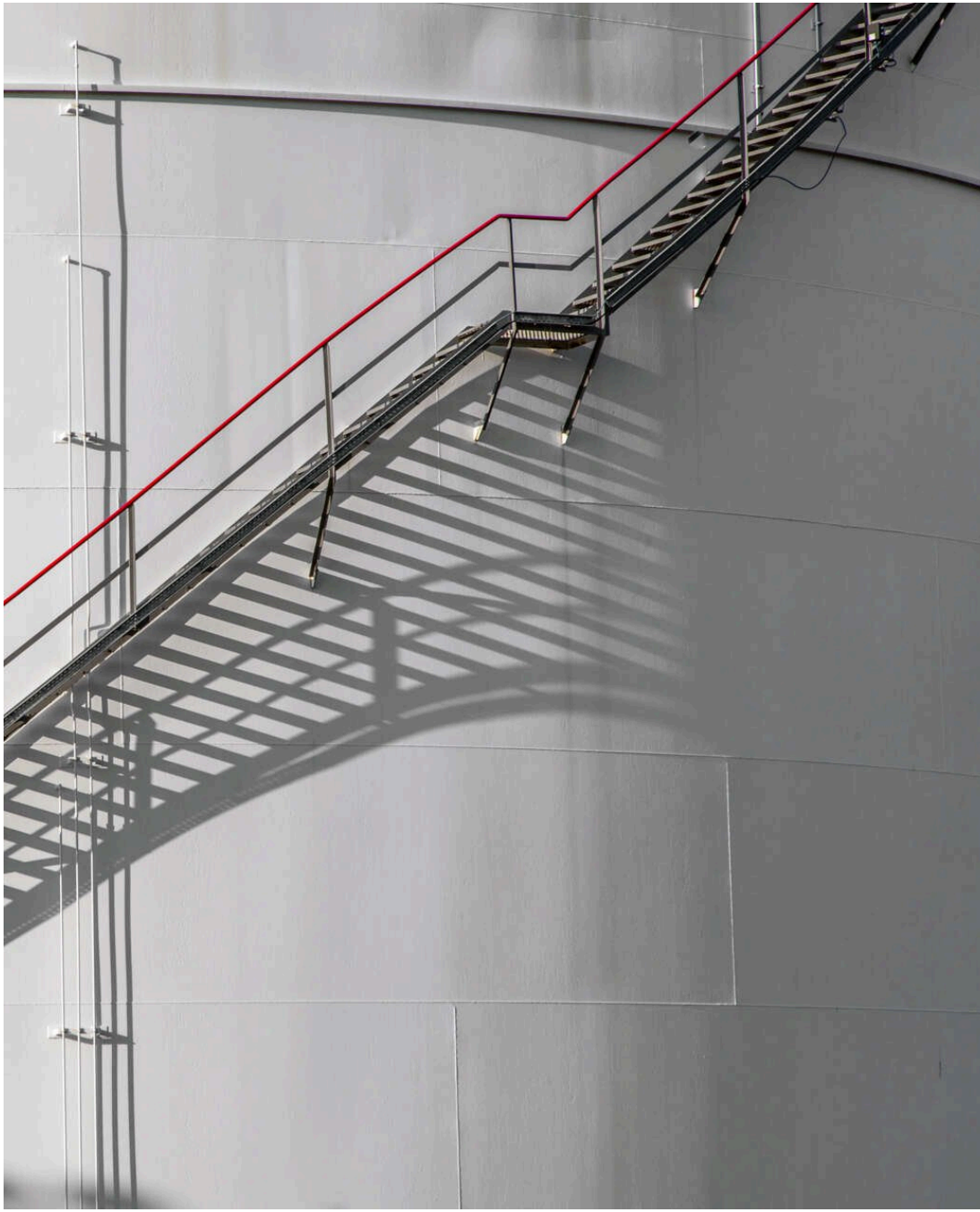
Interactive: Platts Ammonia price chart

Explore the Platts Ammonia Price Chart infographic

Platts Ammonia Price Chart illustrates monthly averages of daily assessments for gray, blue and green ammonia across a range of geographies and delivery options.

This month's feature: Rising blue ammonia production costs close in on green pathways





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Insight: Rising blue ammonia production costs close in on green pathways

- Calculated blue ammonia costs rise by 20%
- Northwest Europe most expensive location
- Green ammonia offered around $750/mt long term

Stronger underlying conventional ammonia prices pushed calculated blue ammonia production costs higher through October, with costs rising to close to green production pathways.

Platts blue ammonia calculated production costs climbed by 20%-30%, tracking conventional markets higher.

Northwest Europe returned to the spot at the top of the most expensive blue ammonia region, with calculated CFR prices averaging $707/mt in October, compared with $691/mt for Far East Asia and $612mt in the US Gulf.

Platts is part of S&P Global Commodity Insights.

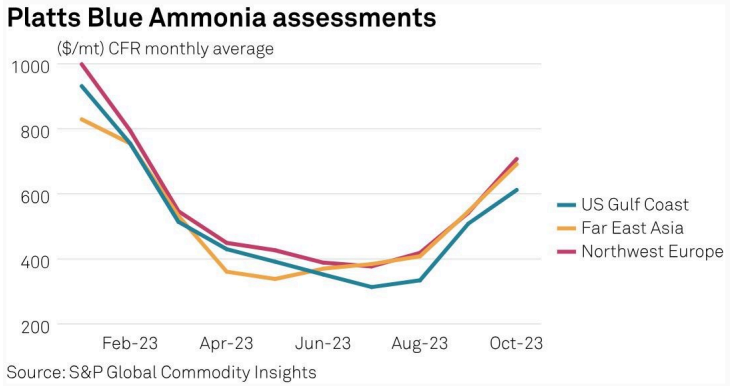
Indicative offers for delivery to Singapore under long-term contracts of 10-20 years were heard around $300-$400/mt for blue ammonia from the Middle East or the US, and around $700-$800/mt for green ammonia from India or Australia.

The Platts Ammonia Price Chart illustrates monthly averages of daily assessments for gray, blue and green ammonia across a range of geographies and delivery options.

Calculated green ammonia production costs delivered to Northwest Europe ranged from $756/mt for east coast Canada origin, to $808/mt from the Middle East.

Platts renewable-power derived ammonia prices are more stable than their gas-derived counterparts as they reflect long-term levelized costs of electricity for both solar and wind generation.

These are relatively static variables month on month, while the "delivered into" component of these assessments reflect weekly shipping prices.



Conventional ammonia

Ongoing supply constraints supported conventional ammonia markets, though some of the heat was coming out, with plants returning, and muted European demand.

Ma'aden restarted its 1.089 million mt/year MPC ammonia plant in Saudi Arabia after a lengthy period of reduced output.

The impact of the restart in Saudi Arabia is yet to be felt, with Ma'aden not expected to reach normal levels of output at the plant until the end of November, but it holds the potential to ease the supply shortage behind recent price developments.

Low demand in Europe limited price rises there, despite a lack of product availability in November.

Clean ammonia offtake

Market participants said it was still difficult to sign long-term offtake agreements for low-carbon ammonia in the absence of common pricing ideas.

Japanese buyers were waiting for details of a contract for difference scheme, a Middle East source said.

A producer in India said there was a bifurcation in the market.

"We are dealing with two different types of markets here," the producer said. "One is Europe which is ready to pay a premium but not willing to commit for more than 10 years. Another is Asia which is ready to sign long-term contracts but not ready to pay a premium price."

A carbon price needed to develop to drive the market, the producer said.

A buyer in Asia Pacific said they had offers for both blue and green ammonia, but could not commit until regulations were clear.

Insight: Regulators push for low-carbon bunker transition for net-zero 2050

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- International GHG rules for marine energy emerge
- Shipping firms required to help mitigate climate change
- Bunkering hubs have varying paces for energy transition

Maritime trades have been powered by residual fuels that emit high levels of air pollutants and greenhouse gases for decades, but a growing number of regulators are pushing vessel operators to use greener energy sources.

Having lowered the global sulfur cap for bunker fuels earlier this decade, the International Maritime Organization has set decarbonization targets for cross-border shipping in the coming decades on the way to net-zero emissions close to 2050 and plans to introduce GHG rules for marine fuels in phases.

With civil society pressuring governments and businesses to act on climate change, the UN agency has emerged as the main driving force for low-carbon shipping with insufficient voluntary efforts from the private sector, said Adrian Tolson, owner of consultancy 2050 Marine Energy.

"Despite some corporations being outliers, it's not realistic to see shipping decarbonize itself out of the goodness of its heart and its concern for environment," Tolson told S&P Global Commodity Insights.

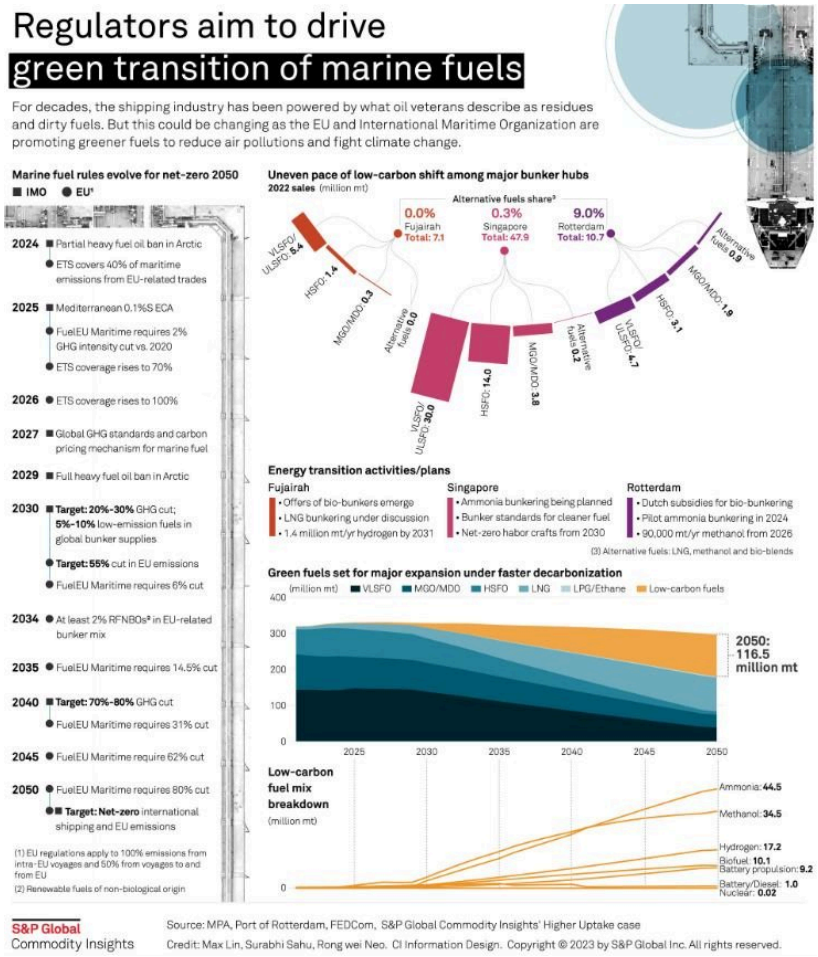
"A level playing field for all owners and operators is essential, and this only comes with clear consistent and preferably global regulation."

Other industry participants said various regional and national governments are also developing maritime emission regulations, with the EU taking the lead in promoting GHG cuts from vessel operations.

Brussels is scheduled to extend the Emissions Trading System to cover shipping from 2024 and usher in GHG intensity requirements for marine energy from 2025, and both sets of rules will cover voyages to, from and between EU ports.

"Whilst there is variation globally, overall, the political and societal pressure for the world to decarbonize is high and we can see this in the regulatory development activity in IMO and the EU," Lloyd's Register's head of regulatory affairs, Andrew Sillitoe, said.

Click to explore this infographic: Regulators aim to drive green transition of marine fuels



Changing focus

Shipping regulations have the ability to shake up the bunker market dynamics, as shown by the IMO rules requiring vessels to burn fuels with 0.5%S limits instead of 3.5%S from 2020 except for those with scrubbers.

Very low sulfur fuel oil didn't exist commercially before the turn of the decade. But the 0.5%S fuel's consumption reached 143.1 million mt globally in 2022, or nearly 45% of total bunker demand, according to S&P Global data.

Aside from some emission control areas with 0.1%S requirements, major regulatory pieces will focus on GHG reduction through the 2020s and beyond, industry participants said.

"The pressure to reduce sulfur oxide emissions from shipping further has reduced [following IMO 2020]," said Sillitoe, adding that SOx is a local pollutant affecting coastal areas whereas climate change is a global issue.

The shifting focus comes as average global temperature continues to rise, with the US National Oceanic and Atmospheric Administration describing July as "likely Earth's warmest month" on record.

"There is a very clear scientific rationale that requires deep GHG reduction," said Tristan Smith, co-founder of consultancy UMAS. "Climate impacts are already affecting every country, some catastrophically, and this creates strong political pressure for governments to take action."

In their Higher Uptake case assuming more decarbonization efforts by governments and businesses, S&P Global analysts expect low-carbon bunker demand to increase from 845,000 mt last year to 12.5 million in 2030 before a further jump to 116.5 million mt in 2050. This would suggest their share in total marine energy would rise from 0.3% in 2022 to 3.8% in 2030 and 39.3% in 2050.

Major hubs

Some major bunker hubs have sought to position themselves for the evolving bunker mix, developing refueling standards and providing financial incentives for new types of marine fuels during the low-carbon transition.

Rotterdam, Europe's largest and the world's No. 2 hub, already saw 9% of its bunker sales last year from alternative fuels like LNG, bio-blends and methanol -- which have lower carbon intensity than oil-based fuels but are not necessarily low-carbon fuels.

The world's top refueling port, Singapore, reported alternative fuels made up 0.3% of its sales in 2022. But bio-blended sales hit a monthly record high and LNG sales surged in July as the first methanol transaction occurred, according to data from the Maritime and Port Authority of Singapore.

"Some ports are clearly more engaged than others," Tolson said. "Singapore was perhaps behind Rotterdam for some time, but with the power of the Singapore government they are clearly catching up."

Despite stating its ambition for a low-carbon transition, Fujairah -- the world's No. 3 -- didn't record any alternative bunker sale last year. "Perhaps they are waiting for commercial interests to do the heavy lifting," Tolson said.

Haris Zografakis, partner of law firm Stephenson Harwood, suggested future bunker ports are likely to require new, specialist bunkering facilities.

"The scale of the investment needed will be considerable, and it remains to be seen whether the public and private investments needed will materialize," Zografakis said.

Bunker ports' ability to access future low-carbon fuels have also been in focus, as the trading routes of "green" methanol and ammonia are expected to differ from oil-based fuels with the Global South potentially emerging as production centers.

"Whether Singapore, Rotterdam and Fujairah remain relevant as bunkering points will [be determined by] how proactively they engage in the energy transition, as well as how the supply chains for new energy commodities develop over time," Smith said.

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