Research Brief

Ammonia Market to Triple by 2050, with Nearly All Growth Coming from Low-Carbon Supply, Says New S&P Global Analysis

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Introduction

Ammonia Market to Triple by 2050, with Nearly All Growth Coming from Low-Carbon Supply, Says New S&P Global Analysis

New S&P Global Commodity Insights strategic report examines ammonia's versatility in energy transition

A new strategic report by S&P Global Commodity Insights examines the versatility and transformative potential of low-carbon ammonia as a key player in the energy transition, especially for hard-to-abate sectors such as marine bunkering, power generation, and steel and cement production.

The new analysis: ***Low-carbon Ammonia: Facilitating the Transition to a Sustainable Future***, addresses potential uses for low-carbon ammonia, policy developments, market mechanisms, as well as efforts by government and industry globally to drive technological development to support the emerging global ammonia value chain.

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Key Takeaways

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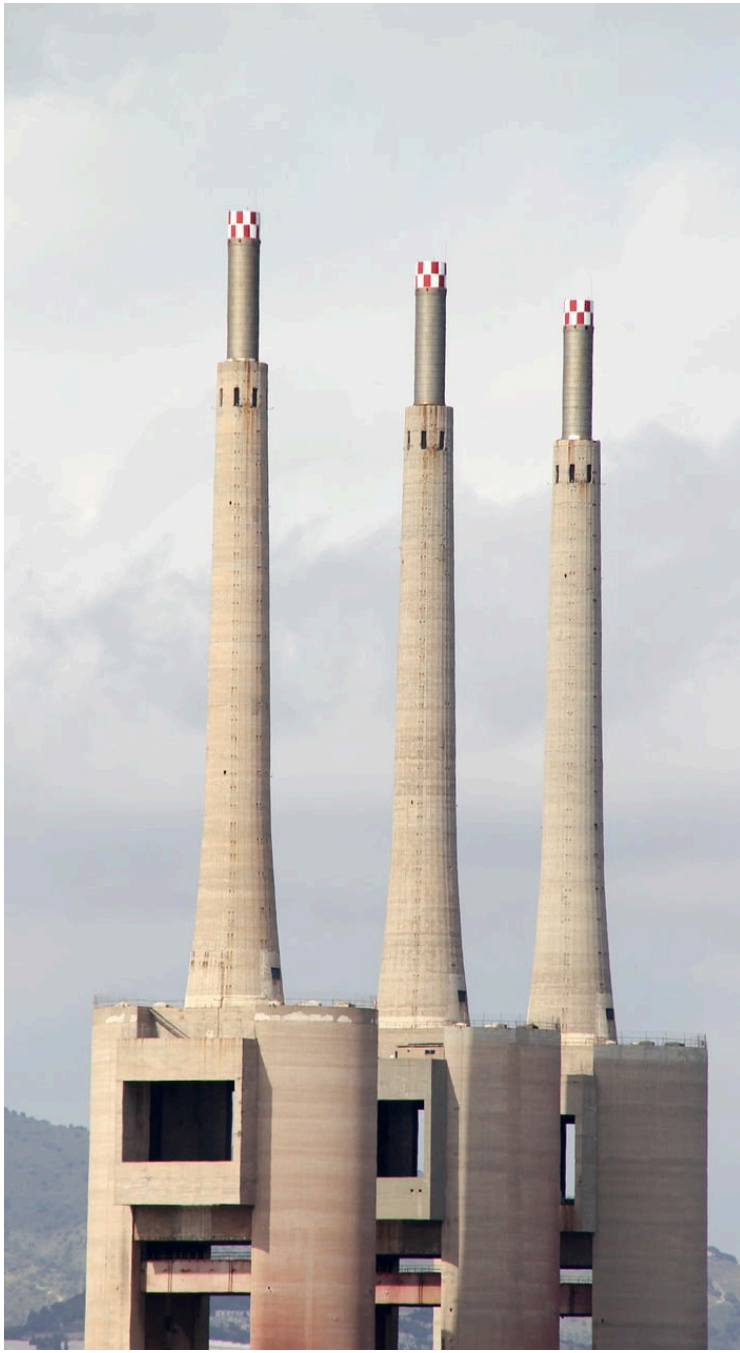
- Driven by low-carbon ammonia supply, the S&P Global Commodity Insights low-carbon ammonia analysis estimates the global ammonia market will triple in size by 2050, from approximately 200 million metric tons (MMT) in 2020, to more than 600 MMT of supply by 2050.
- Bolstered by improved economics resulting from decarbonization policies, low-carbon ammonia is expected to grow from its current nascent state to more than 420 MMT—two-thirds of the total global ammonia market by 2050.
- While ammonia is key to the uptake of hydrogen as a carrier, low-carbon ammonia offers tremendous additional versatility as a feedstock and a fuel.
- Renewables and electrification alone cannot drive decarbonization across all sectors—low-carbon ammonia may be key to "filling the gap" in the energy transition by helping decarbonize hard-to abate sectors. In particular, those sectors include marine transport, industrial processes, and power generation (where low-carbon ammonia is used to transport hydrogen).
- S&P Global Commodity Insights expects global trade of ammonia to increase nearly 10 times over (160 MMT) by 2050, due to its versatility and potential energy uses, referenced above.
- Potential energy uses represent a profound shift for the ammonia industry—from one geared primarily toward fertilizer markets to one driven by energy markets.
- Policy development (the U.S. IRA, REPowerEU, Japan Green Growth Strategy) is already specifically identifying, supporting, and driving low-carbon ammonia development.
- Market mechanisms, such as carbon border-adjustment mechanisms, are already supporting low-carbon ammonia in key markets over conventional production.
- Both governments and industry are driving technological development to support the emerging ammonia value chain. Examples include ammonia blending for power, nitrous oxide scrubbing, two-stroke marine diesel engines and ammonia cracking.

The S&P Global Commodity Insights low-carbon ammonia study estimates the global ammonia market will triple in size by 2050, from approximately 200 MMT in 2020,to more than 600 MMT of supply by 2050. S&P Global Commodity Insights conducted cost modeling for the ammonia value chain and found that the growing impact of emissions penalties, and the introduction of carbon border adjustment mechanisms in Europe will transform the economics of ‘blue" ammonia to be structurally lower cost versus traditional ‘gray’ ammonia.

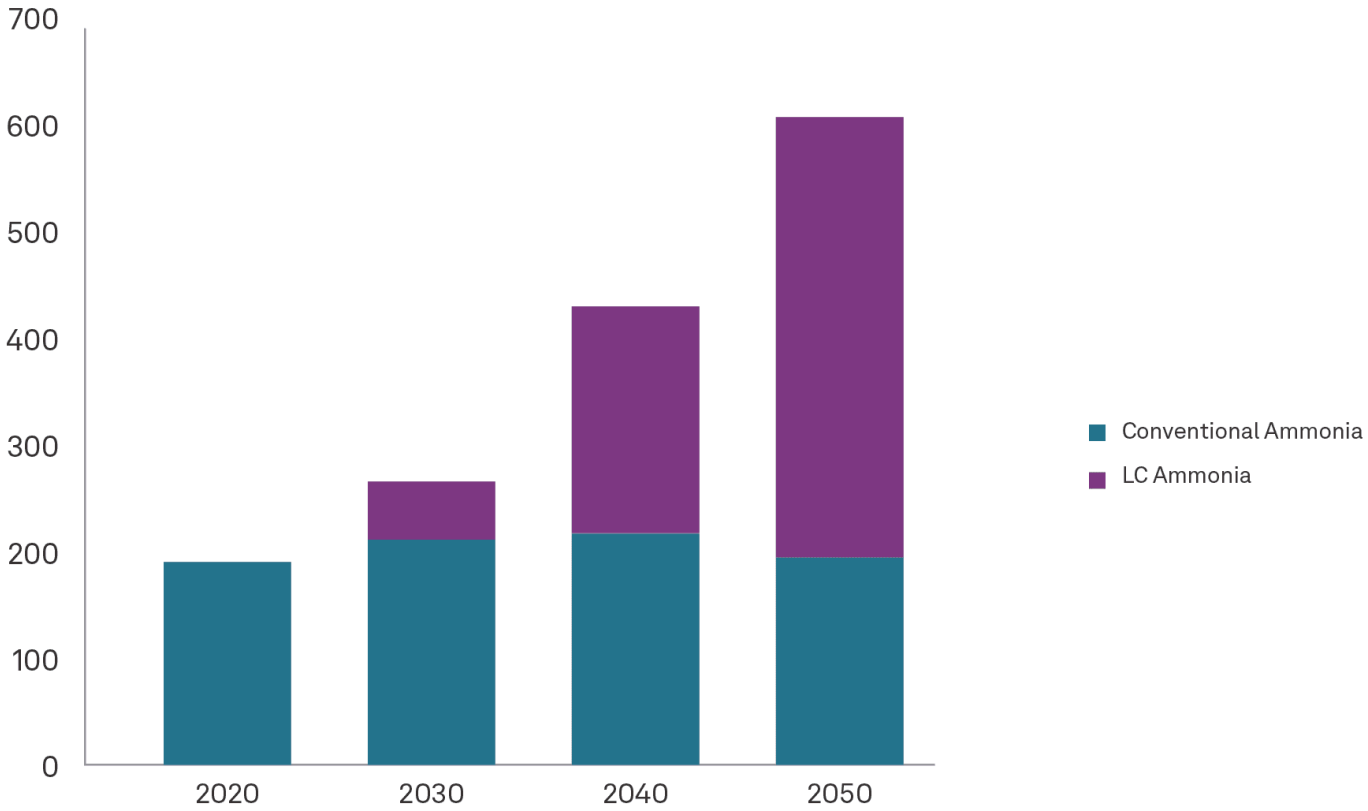
S&P Global Commodity Insights expects ‘blue’ ammonia (hydrocarbon-based production, coupled with carbon capture and storage) to be more economically attractive than conventional production in some key markets before 2030 due to a combination of carbon emissions penalties and production subsidies. However,‘green’ ammonia (produced from renewable electricity) will require further policy support beyond the incentives already announced to make it cost competitive in most markets.

> **Decarbonization policies, including incentives in the U.S. Inflation Reduction Act and the EU’s Carbon Border Adjustment Mechanism, are transforming the economic fundamentals of low-carbon ammonia, said Sean Mulholland, director, Agribusiness Consulting at S&P Global Commodity Insights. The transition from concept to reality is already happening.**



Global ammonia demand to 2050

MMt

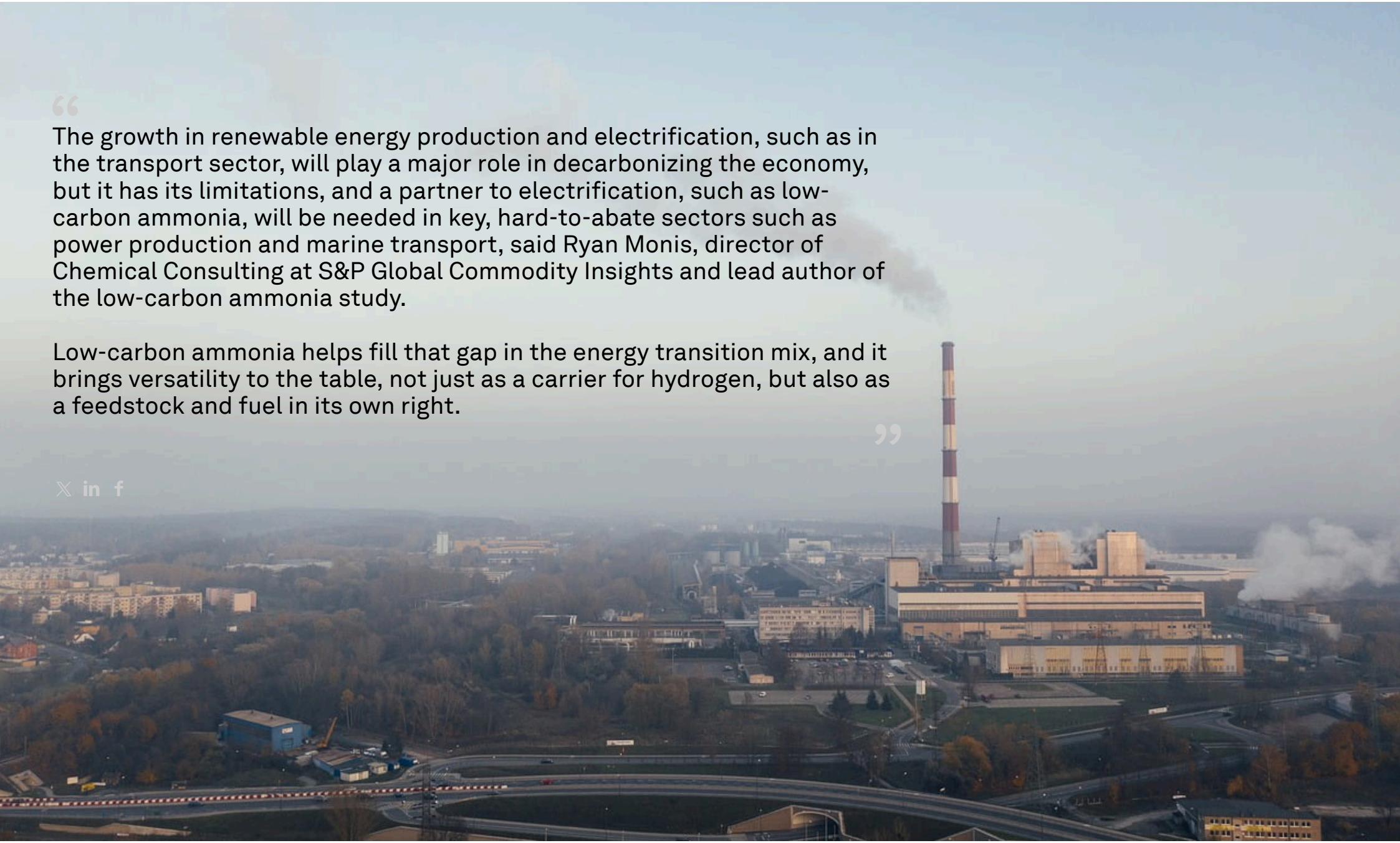


As of June 2023.

Source: S&P Global Commodity Insights

Other points of high potential impact on the development of the market include the development of certification and classification systems to harmonize international trade; greater clarity from some major markets regarding acceptable emissions thresholds for hydrogen and ammonia in their decarbonization plans; and the pace of innovation and efficiency improvements for ammonia's use in power generation, the S&P Global analysis said.

Decarbonization initiatives are all driven by the imperative to cut carbon and other greenhouse gas emissions (GHG) to net-zero by 2050, as detailed in the 2015 United Nations Paris Climate Agreement. Globally, current CO2 emissions of approximately 50 billion metric tons CO2 equivalent will need to be targeted to achieve net zero.



“The growth in renewable energy production and electrification, such as in the transport sector, will play a major role in decarbonizing the economy, but it has its limitations, and a partner to electrification, such as low-carbon ammonia, will be needed in key, hard-to-abate sectors such as power production and marine transport, said Ryan Monis, director of Chemical Consulting at S&P Global Commodity Insights and lead author of the low-carbon ammonia study.

Low-carbon ammonia helps fill that gap in the energy transition mix, and it brings versatility to the table, not just as a carrier for hydrogen, but also as a feedstock and fuel in its own right.”

Monis said low-carbon ammonia is stepping from the shadow of the hydrogen frenzy and proving its potential on several key fronts, both technologically and economically. As a hydrogen carrier, ammonia offers numerous advantages over alternative decarbonization options, including:

- It is cheaper to liquefy than hydrogen
- One cubic meter of ammonia contains 70% more hydrogen than liquid H2
- Ammonia has a pre-existing infrastructure of storage tanks, LPG carriers and a functioning market that ships 17 MMT to 19 MMT annually
- As a bunker fuel, low-carbon ammonia also has a lower carbon intensity compared to other low-carbon alternatives

“While hydrogen is getting tremendous market and media focus for its decarbonization potential, many hydrogen development projects are in the early planning stages, and still face permitting and financing hurdles to advance to the shovel stage, Monis said. Ammonia has an existing market and significant infrastructure that makes it more scalable in the short-term, and those benefits, combined with its versatility as a carrier, feedstock and fuel, make it worthy of advancement as a key enabler for decarbonization.”

The S&P Global report says the rapid growth and development of the global ammonia market will change beyond recognition as partnerships, supply and trade accelerates. Despite major improvements to the economic fundamentals of low-carbon ammonia, Monis said key uncertainties remain that will significantly shape the future of the market.

Some of the biggest hurdles that must be overcome for the market to thrive involves the lack of international agreement on certification and classification systems, which would help segregate and harmonize the trade of low-carbon ammonia, Monis said.

Additionally, some major markets, including Europe, have yet to clarify and define the acceptable emissions thresholds for hydrogen and ammonia as part of their decarbonization plans, which again, would provide needed structure for hydrogen markets to price and trade both fuels, based on carbon intensity.

> Despite some policy and technological uncertainties remaining, it is now clear that the fundamental economics of low-carbon ammonia have been transformed, Monis said.
>
> We expect the number of projects reaching final investment Decisions to accelerate significantly in the coming years, not only in production capacity, but also in the associated infrastructure required to take low-carbon ammonia market from concept to reality.

To find out more about the *S&P Global Commodity Insights Strategic Report: Low-carbon Ammonia: Facilitating the Transition to a Sustainable Future*

CLICK HERE

Appendix & Authors

Related insights or market pricing to support low-carbon ammonia market or production

In addition to the new strategic report, S&P Global Commodity Insights also has introduced a new **Monthly Low-carbon Ammonia Report Service**. Produced by Ferte-con, the fertilizer analysis team at S&P Global Commodity Insights and the leading provider of data and insights for more than 40 years, the new monthly report offers a regular and recurring market analysis that provides business intelligence and short-term forecasts for the low-carbon ammonia market as an individual sector. For more information about the new **Monthly Low-carbon Ammonia Report.**

READ REPORT >

Process Economics Report: Green Ammonia

S&P Global Commodity Insights offers a newly published competitive cost and margin analytics report on ammonia, and chemical process economics reports covering the production of hydrogen, blue and green ammonia, and other assessments of ammonia production technologies currently in use or under consideration. Some recent related reports include:

- **Competitive Cost and Margin Analytics—Ammonia**
- **Blue Ammonia via Casale's A6000CC™ Technology PEP Review**
- **Green Ammonia Technology PEP Review**
- **Natural Gas to Ammonia by Linde Ammonia Concept (LAC™) Process**

Expanded suite of Platts Ammonia Price Assessments to Address Market Growth

S&P Global Commodity Insights has launched a full suite of Platts ammonia price assessments to complement our first-to-market hydrogen prices. We publish Platts daily price assessments for ammonia, low-carbon ("blue") ammonia, premiums for blue ammonia versus conventional ("gray"), and anhydrous ammonia cargo price assessments across a range of geographies and delivery options.

Ammonia Forward Curves

Platts expanded its portfolio of global Platts Forward Curves for ammonia to 24 months, building on its existing three-month Platts Ammonia Forward Curves.

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