



Emerging Global Low-Carbon Ammonia Market: Opportunities and Barriers for Financing

**SPECIAL INTEREST
GROUP –
FINANCING THE
ENERGY TRANSITION**

Chaired by



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Background and Context

Hydrogen or Ammonia are being touted as emerging globally traded zero-carbon fuel supply sources that could help to decarbonize transport and power production. While hydrogen is used extensively as a feedstock for refining and other industries, its low energy density does not make it economically viable for long-range transport. Alternatively, ammonia can serve as a vector for global hydrogen trade, as it is already a globally traded commodity and can be readily produced from hydrogen and converted back to hydrogen at the point of import. There are two main pathways for producing low-carbon ammonia, either through electrolysis using renewable power, or natural gas combined with carbon capture and storage (CCUS). In both instances, the hydrogen that is produced is sent for further processing into ammonia.

Global ammonia supply was 191 MT in 2022, of which around 10% was traded on the global market. Traditional demand sources for ammonia are the industrial and fertilizer sectors, although there is strong interest in low-carbon ammonia as a fuel for co-firing in coal power plants and for use in heavy-duty transport. Ammonia production and trade are set to expand over the coming years. Wood Mackenzie forecasts supply growing to 325 MT by 2035 and

563 MT by 2050, with almost all of the growth coming from low-carbon ammonia. They forecast that low-carbon ammonia sources will account for 27% of global ammonia production by 2033, with the electrolysis pathway accounting for 20% of total production, and natural gas with CCUS accounting for 7%.

Global trade is also set to expand rapidly, increasing more than 5 times from current levels to reach 113 MT in 2050. Ammonia producing and importing countries are vying to participate in this emerging global market and are putting in place a wide range of policy support measures to encourage a build-out of this industry. The successful emergence of a global low-carbon ammonia supply chain will require the concurrent development of multiple facilities on the exporting and importing side, including ammonia production, carbon capture, utilization and storage (CCUS), ammonia transport, export and import terminals, marine tankers and port infrastructure. Commercial finance will play a pivotal role in supporting a build-out of this industry, but significant government support will also be required in order to address specific barriers and risks. Project proponents will need to coordinate and optimize the various sources of government funding together with commercial sources.



Key Barriers and Risks to Finance

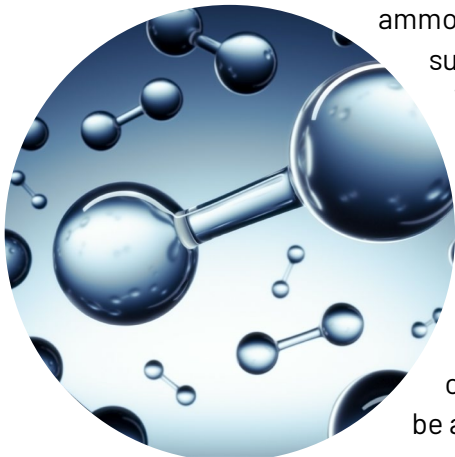
A sub-group of members from the SIG on Financing the Energy Transition met to discuss the opportunities and challenges for financing in this market. They identified the following barriers and key risks that will need to be addressed in order to establish bankable projects.

REVENUE RISK

There is currently no traded market for low-carbon ammonia and no relevant price benchmarks that can be relied upon for contracts. Project proponents will have to secure long-term offtake contracts under fixed price terms in order to attract bank financing. Some importing countries in Asia (Japan, South Korea) have announced plans to auction long-term supply contracts with fixed pricing over extended periods (15+ years). This would address revenue risk for projects and go a long way in bolstering their business case.

INSURANCE

While there is currently an insurable market for ammonia transport, the anticipated growth in ammonia transport surpasses current insurance market capacity. This may result in uncovered exposure for project sponsors, and it is not clear whether shippers or customers would be able to absorb the



added costs for insurance. Demonstrating adequate insurance coverage levels is essential for securing financing.

TECHNOLOGY AND INTERFACE RISK

While ammonia production and transport is commercially proven, the production of low-carbon ammonia requires the integration of various processes and technologies, some of which are relatively new (i.e. large-scale electrolysis). It is important to manage interface risk between the various components and technologies to ensure stable operations. The intermittency of renewable power sources will also need to be balanced with the operation of other components that require stable operation (i.e. electrolysis and ammonia production). The varying levels of technology maturity and risk would require customized approaches to financing each component. For example, producers may seek support through contracts for difference to address price risk, while transportation and export projects would look for capital support.

COMPLETION RISK

Given the complexity of a low-carbon ammonia supply chain, which involves the construction of multiple interconnected facilities (i.e. hydrogen production, ammonia production, export terminals), there may be a risk of delays, cost overruns or design failures with one project impacting the completion and operation of other projects. Lenders will typically look for completion risks to be borne by the EPC contractors, preferably fewer EPCs with well-defined interfaces. A parent sponsor with a strong balance sheet may also be willing to provide completion guarantees or may prefer to postpone financing following completion once the project has been de-risked.

SUPPLY CHAIN RISK

Some components used in the production of low-carbon ammonia may present supply chain risks (i.e. electrolyzer components), which may affect cost and schedule. Project sponsors will also want to ensure reliable access to low-cost renewable power through power purchase agreements, or access to natural gas through supply contracts. The electrolysis process consumes significant amounts of water, so decisions around project siting will need to take this into account. For projects relying on carbon capture, they would need to secure offtake of carbon for utilization, or access to a local carbon storage hub.



TANKERS AND PORT INFRASTRUCTURE

- The global fleet of ammonia tankers will have to increase substantially to handle the anticipated growth in trade of this commodity. Project sponsors will likely choose to charter vessels on the open market rather than build and own vessels, however there may be inadequate shipping capacity as the industry ramps-up.
- There is interest in using ammonia as a fuel for vessels, however this is a new technology and will require time to be proven and certified for safety standards.
- Port infrastructure (i.e. loading, unloading, storage capacity) will also need to keep pace with the growth in ammonia production and marine transport.

GEOPOLITICAL RISK

Depending on the location of proposed low-carbon ammonia projects, there could be local currency or geopolitical risks to consider. These

can be mitigated to some extent by financial hedging instruments. Project proponents can also look to obtain insurance and other types of support from Export Credit Agencies (ECAs).

Next Steps – Call to Action

The sub-group on H2 and Ammonia calls on IPFA members to contribute relevant policy, market and project insights based on experience in their home countries. The emergence of global trade in low-carbon ammonia will require coordinated efforts between producing and importing countries, with one of the most critical aspects being the price mechanisms that will underpin future contracts. It would also help to gain a better understanding of long-term supply contracts being issued by several importing countries and how this will support demand going forward. It would help to gain additional insight into blended finance structures and how they may be applied to this emerging industry. The development and financing of these projects will be challenging and a work in progress hence the call to Members of the IPFA to share their thoughts and experience with our Sub-Group.

Annex – Canada Case Study

Canada is positioning itself as a future exporter of low-carbon ammonia, drawing upon its abundant low-cost energy resources. The Hydrogen Strategy for Canada seeks to position Canada as a global hydrogen leader, including for exports of hydrogen derivatives such as ammonia. Canada has an abundance of low-cost



and large-scale natural gas reserves in Alberta and British Columbia which can be converted to low-carbon ammonia. On Canada’s East Coast, a strong wind resource and access to deepwater ports provides the impetus for developing green ammonia export projects. The Government of Canada is supporting these developments through the following measures:

Investment Tax Credits

- The Clean Economy Investment Tax Credits (ITCs) which were passed into law in June 2024 represent CAD 93 billion in federal incentives by fiscal year 2034-35. The ITCs will provide between 15% and 60% in refundable tax credits to projects, and includes ITCs for : Clean Technology, Carbon Capture, Utilization and Storage (CCUS), Clean Technology Manufacturing, and Clean Hydrogen.
- The **Clean Hydrogen ITC** will provide between 15% to 40% in refundable tax credits for hydrogen projects, with the projects producing the cleanest hydrogen receiving the highest levels of support. Equipment to convert hydrogen to ammonia may also be eligible.

Program Funding

- **Clean Fuels Fund (CFF)** is a \$1.5 billion fund announced in 2021 that has the objective to increase domestic production of clean fuels, including hydrogen and synthetic fuels. As of October 2023, the government had selected about 10 hydrogen production projects that will receive support totalling over \$300 million.
- **Strategic Innovation Fund – Net Zero-Accelerator (SIF-NZA)** is a program that will provide up to \$8 billion in funding to support large-scale investments in key industrial sectors that contribute to reducing greenhouse gas emissions and

helping the country achieve its net-zero target. The program announced funding for 2 hydrogen projects, the Air Products Net Zero Hydrogen Energy complex in Edmonton, Alberta (\$300 million in support) and the AVL Fuel Cell Canada’s global hydrogen fuel cell R&D facility in Burnaby, British Columbia (\$15 million).

Export Trade Finance

- **Export Development Canada (EDC)** has a mandate to support and develop Canada’s export trade and Canadian capacity to engage in trade and to respond to international business opportunities.
- EDC has committed to becoming a net zero institution by 2050 and is a lender to two low-carbon ammonia export projects on Canada’s East Coast, as detailed further below.

Concessional Loans

- **Canada Infrastructure Bank (CIB)** has a mandate to invest, and seek to attract private and institutional investment, in revenue-generating infrastructure projects that are in the public interest.
- CIB’s mandate also includes accelerating Canada’s transition to a low-carbon economy by providing financing to clean power and green infrastructure projects, with \$10B having been allocated to each of these sectors.
- CIB is in active discussions with proponents of low-carbon ammonia projects in regards to providing concessional financing support. This includes production facilities, transportation, and export terminals.

Carbon Contracts for Difference

- **Canada Growth Fund (CGF)** has a mandate to help transform and grow

Canada’s economy on the path to net-zero, to meet national economic and climate policy goals such as reducing GHG emissions, while creating good careers and opportunities for Canadians for generations to come.

- CGF has been given funding of \$15B to accelerate deployment of key technologies (i.e. low-carbon hydrogen, CCUS), assist with scaling-up companies that will drive clean growth and productivity, and strengthening critical supply chains.
- CGF is the only federal entity with authority to enter into contracts for difference (CFDs) with proponents. This is a type of financial contract that helps to mitigate demand and price risk for a commodity (e.g., carbon emissions, hydrogen, etc.).

Projects under Development

In total, there are 12 ammonia production facilities in Western Canada that are at the pre-FEED stage, including 8 projects relying on the natural gas and CCUS pathway, and 4 projects relying on renewable power and electrolysis. These projects represent 12 MT in new production capacity with total capital cost of CAD 28.49 billion. There is also a project proposal for the bulk movement of ammonia from production facilities in Alberta and British Columbia to the West Coast where it can be loaded onto marine tankers and shipped to Asia. The following are some examples of some projects that are in advanced stages of development:

EverWind Fuels (Point Tupper, Nova Scotia)

- EverWind is planning to produce 1 MT per year of low-carbon ammonia (converted

from hydrogen) for export by 2026, to be powered by new onshore wind and solar resources.

- **Current status:** Conditional approval has been granted; Phase 1 FEED complete
- **Funding:** A US\$125 million debt facility loan has been received from Export Development Canada.

World Energy GH2 Project Nujio’Qonik (Stephenville, Newfoundland)

- World Energy GH2 is planning to build Canada’s first commercial green hydrogen and ammonia production site, drawing on 4 GW of offshore wind power to produce 1.6 MT of low-carbon ammonia per year.
- **Current Status:** Selected for exclusive rights to Crown land; provincial environmental assessment approved
- **Funding:** The project has received a US\$95 million debt facility loan from Export Development Canada.

Pembina Pipeline: Low Carbon Complex (Fort Saskatchewan, Alberta)

- Pembina Pipeline plans to develop a low-carbon ammonia production facility situated beside its Redwater Complex in the Alberta Industrial Heartland near Fort Saskatchewan, Alberta. The project aims to use natural gas with CCUS to produce 85 kilotonnes per annum of low-carbon hydrogen that will be converted to low-carbon ammonia and transported to Japan and Asian markets.
- **Current status:** MOU signed with Marubeni Corporation (who is the off-taker) in May 2023. Pre-development work is underway with a final investment decision expected in the second half of 2025.

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