Green ammonia trade exposes regulatory issues

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Stephen B. Harrison, sbh4 Consulting, explores the development of AM Green's green ammonia complex in India, and the variety of challenges and opportunities that lie ahead.

India's southeast coast is rapidly emerging as a focal point in the global clean molecule economy, and few projects exemplify this momentum better than AM Green's flagship green ammonia complex in Kakinada, Andhra Pradesh, India.

Following its final investment decision (FID) in August 2024, the project has entered its execution phase, positioning it as India's first commercial scale green ammonia and green hydrogen production facility.

At the heart of the development is a bold transformation. AM Green acquired and is repurposing the former Nagarjuna Fertilizers grey ammonia and urea complex, a 495-acre industrial site strategically located on the Kakinada deep-water port.

The port-side location enables access to export markets in Europe. The AM Green project has tested domestic Indian policies related to green ammonia. It has also ridden the roller-coaster implications of the EU carbon border adjustment mechanism CBAM and proved as a test-case for overseas certification of EU renewable fuels of non-biological origin (RFNBO).

Previously, the project in Kakinada has successfully jumped technical, commercial, project finance and international regulatory hurdles. There is every chance it will become one of the largest green ammonia trading platforms worldwide this decade.

Policy alignment

India has successfully concluded several auctions to establish local production of green hydrogen and ammonia. These auctions are part of the National Green Hydrogen Mission, which aims to produce 5 million tpy of green hydrogen by 2030.

The primary vehicle for these auctions is the Strategic Interventions for Green Hydrogen Transition (SIGHT) Scheme, implemented by the Solar Energy Corporation of India (SECI).

In 2025, SECI launched auctions to procure a cumulative 0.724 million tpy of green ammonia for 13 fertilizer plants across India. The contracts are generally structured for 10 years, providing long-term offtake assurance that de-risks the multi-billion-dollar investments required for these plants.

Separate auctions have been held to incentivise green hydrogen. Producers are awarded subsidies for the first three years of production. Winners of these auctions, held in 2025, included Reliance Green Hydrogen, L&T Energy, Sembcorp Green Infra, and AM Green.

While the auctions are centrally managed by SECI, individual Indian states also provide critical infrastructure and additional incentives. For example, temporary exemption from electricity duties, relief from interstate transmission (ISTS) charges and capital subsidies.

Notably in Andhra Pradesh, where the AM Green ammonia export project is located, the state has enacted dedicated green hydrogen and green ammonia policies which streamline land allocation to attract larger schemes.

Policy execution risks

Whilst the auctions have been completed, accessing the subsidies is proving to be frustrating.

According to Jitendra Choubey, a writer for the New India Express in New Delhi, "The delay in finalising agreements jeopardises India's plans to become a global leader in green ammonia production. However, the government said it has enough time till the target.

"Green ammonia agreements with local manufacturers would assure them that the government will purchase their ammonia for the fertilizer industry. Developers who are supposed to set up plants are concerned about the delay."

Choubey goes on to cite a source at one of the 13 developers that won one of the green ammonia auctions saying that, "the government fixed the price and provided a letter of assurance around eight months ago, but there is still no indication of when the agreements will be signed and when we can start our business. Prices fixed by the government may become unfeasible if the delay continues. Some developers may choose to withdraw from the contract."

In defence of the timeline, Ministry of New and Renewable Energy Secretary Santosh Sarangi is reported by Choubey to have said: "there is enough time as supplies are to be made from 2028 - 2029. The fertilizer department has asked the plants to get their board approvals for signing of purchase and supply agreements. It will be done in due course."

Choubey concluded that the "export case is a strong one, while manufacturing for domestic use is challenging."

Avoiding stranded assets

Grey ammonia production is globally responsible for a similar amount of carbon dioxide emissions as the aviation sector. The transition from grey to green will have a material impact on climate change mitigation.

The existing grey ammonia plant, which was slated for shutdown due to uncertainty around long-term natural gas supply, is being fully converted to run on renewable electricity and electrolytic hydrogen – preserving an estimated 500 direct jobs and breathing new life into a once-stranded asset.

Madhura Joshi, Programme Lead – Asia Hub, Global Clean Power Diplomacy at E3G, based in India, said: "India imports thousands of tonnes of grey ammonia each year to support local agriculture and feed the nation."

Estimates suggest that nearly 86% of India's total ammonia use is reliant on imports of ammonia, natural gas, or ammonia embedded in fertilizer end-products.

"The production of green ammonia locally," Joshi continued, "will be a tremendous win for balancing international trade and ensuring food security. Development of the first wave of projects at commercial scale is essential to drive this sector forward."

The Kakinada facility is being built in phases to reach truly world scale capacity. Phase 1 will deliver 0.5 million tpy of green ammonia by late 2027, progressing toward 1 million tpy in later phases.

Electrolytic green hydrogen

AM Green is pursuing a 5 million tpy green ammonia production target by 2030. This requires approximately 1 million tpy of green hydrogen, which is 20% of India's green hydrogen production target under the National Green Hydrogen Mission.

This places the Kakinada project among the largest green ammonia developments globally, and one that will become increasingly influential in shaping international clean molecule trade.

Hydrogen will be produced on 1.28 GW of pressurised alkaline electrolysers supplied by John Cockerill. These electrolysers are configured in 5 MW stacks, each producing roughly 100 Nm^3/hr. In total, this equates to approximately 545 tpd of electrolytic hydrogen. A total of 128 stacks will be installed in the first 640 MW phase, with mechanical completion targeted for September - October 2027 and the first 20 MW block commissioned as early as 1Q27.[1]

The hydrogen is then combined with nitrogen produced by two on-site cryogenic air separation units, which will also be fed with renewable electricity to produce green nitrogen gas Ammonia

is produced in two synthesis trains, which will be refurbished and modernised by Casale and Rely (a Technip Energies and John Cockerill joint venture).

Hybrid renewable power sourcing strategy

A key advantage underpinning the project's competitiveness lies in India's integrated power system. The 'One Nation, One Grid, One Frequency' policy allows renewable electricity from resource-rich regions, including solar, wind and pumped hydro generation, to be transmitted to electrolytic hydrogen production sites with firm round-the-clock (RTC) supply.

AM Green has secured 1.3 GW of RTC carbon-free power, enabled by 4.5 GW of hybrid wind and solar assets and 950 MW of pumped storage capacity.

According to Joshi, "In support of renewable power generation, India has successfully scaled up local PV solar module manufacturing, reaching around 144 GW per year. This capacity is now sufficient to meet domestic demand and allows significant room for exports."

Additional renewable power will be used to generate the green ammonia. Construction of new clean electricity generation capacity from wind and solar generation will displace fossil fuels. The Kakinada project will integrate the non-programmable renewables with pumped hydro to secure the power supply.

Greenko Group is developing a 1.68 GW pumped hydro storage plant at Pinnapuram in the Kurnool district of Andhra Pradesh. This hybrid renewable power generation approach avoids wasteful power curtailment, meaning more of the electrons that are produced can actually be used.

Pre-certification as an RFNBO

Additional renewable electricity supply is central to achieving the strict EU RFNBO criteria, for which the project has already obtained pre-certification from Hinicio under the CertifHy scheme.

With EU renewable fuels certification, the Kakinada facility is ideally placed for energy exports to support international climate targets. Approximately 75% of the ammonia output will be exported, with the balance serving India's domestic fertilizer sector, which is heavily reliant on ammonia imports for food security needs.

AM Green has secured a robust international offtake pipeline, including a binding agreement with Uniper (up to 500 000 tpy starting in 2028) and term sheets with Yara and Keppel.

Additionally, the green ammonia value chain is emerging and must be proven at scale with the first wave of projects. In the coming decades, replication will have a significant positive climate impact.

This intersection of industrial repurposing, export-led growth, and renewable energy scaling marks Kakinada as a blueprint for decarbonisation of heavy industry and the energy sector.

Riding the CBAM roller-coaster

On 27 January 2026, the EU and India closed a comprehensive Free Trade Agreement, dubbed the 'mother of all deals'. It will eliminate duties on about 99.5% of Indian exports and around 96.5% of EU goods and services. The agreement connects roughly two billion people and reduces trade barriers, which will deepen and secure intercontinental economic ties.

Despite this agreement, the EU will still apply the CBAM to ammonia imports. However, this tariff is based on the CO_2 intensity of the ammonia arriving in the EU. For green ammonia, the CO_2 intensity is zero, meaning it is effectively exempted from this import duty.

This means that the CBAM has provided a competitive advantage to green ammonia over grey.

Stefan Sipka, Senior Policy Analyst and Head of Sustainable Prosperity for Europe Programme at the European Policy Centre, based in Brussels, said: "The introduction of the CBAM rules in the EU is designed to encourage decarbonisation in countries that trade with EU nations so that there is a wide international accountability for mitigating the effects of climate change."

"Additionally," he added, "it helps to level the playing field in terms of the additional cost of making green molecules."

Policy stability

There have been reactions from farming communities in some EU nations related to the import of ammonia, which is used to make fertilizers. They are concerned that if the costs of commodities increase due to CBAM rules, their costs of food production will rise, threatening their competitiveness and livelihoods. Additionally, the MERCOSUR trade agreement has received attention for similar reasons.

“Consultation with multiple EU nations and stakeholder groups is essential during policy development,” said Sipka. “Furthermore, measured reactions to valid concerns that are raised when the impact of policies becomes clearly understood should also be considered in good faith.

“Long-term investment decisions and multi-year trade contracts rely on policy certainty. However, the world is dynamic, and some degree of policy evolution is also to be expected while staying true to the overall climate ambition.”

However, the European Commission has proposed a temporary duty-relief on certain fertilizers to ease the cost strains on farmers. It has said that CBAM will remain in place.

Replicability

From an investor and developer perspective, AM Green’s execution philosophy provides valuable lessons: brownfield conversion reduces CAPEX, grid-supplied firm renewable power minimises operating costs, and strategic offtake agreements secure long-term revenue visibility and bankability.

Joshi said, “The lessons from early projects, such as AM Green’s scheme in Kakinada, will de-risk replication, introduce tangible economies of scale and lead to greater bankability of future projects. Development of these execution and technical capabilities offers the tremendous benefits of improved supply security; increased savings by reducing imports; and supporting decarbonisation of fertilizer production in the future.”

With construction already underway and phased commissioning beginning in 2027, the Kakinada project represents one of the most advanced examples of large-scale, certification-aligned green ammonia manufacturing anywhere in the world.

Net-positive

“Overall, I am convinced that green ammonia production in India for export is a win-win-win for building capability to support India’s social, industrial and economic development, international trade, and the climate,” Joshi continued. “AM Green’s export-oriented project is undoubtedly net-positive for India.”

As global industries seek low-carbon feedstocks and fuels, AM Green’s Kakinada complex is poised to influence international policies, supply chain economics and decarbonisation pathways. It is a beacon demonstrating how Indian innovation can meet stringent international climate standards, while catalysing industrial rejuvenation.

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