

Stages of policy support for robust green hydrogen ecosystem development in India

Part -5 (Scaling policy, support infrastructure and trade opportunities for hydrogen in India with technology and policy comprehensive roadmap)

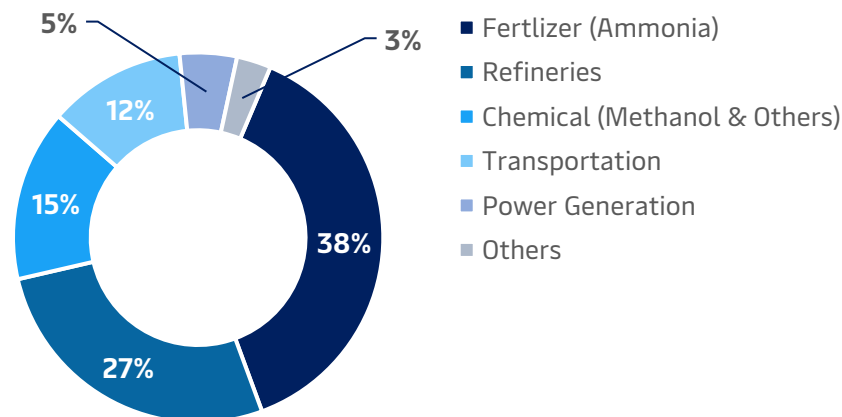
Risks & challenges for hydrogen market development in India

India – Investment Environment

There is tremendous potential for low-cost, low-carbon production of H₂ in India and the Government along with industry identifies the same.

There is tremendous potential for low-cost, low-carbon production of hydrogen in India, which can enable broad adoption of hydrogen across sectors. Currently in India, hydrogen mainly serve as feedstock in ammonia and methanol production and in refineries. In transportation it is catching up but is in very nascent stages in the country. It is anticipated that good numbers of FCEVs and buses shall come into play in the big cities for public transport in the country. Also, under the mining segment also it is anticipated to evolve as an alternative source.

India Hydrogen Market Share (2021) – Consumption by key sectors in India



Source : eninrac research & analysis & Channel Checks

6 Million Tonnes

Of H₂ is currently consumed in Indian market

US\$ 11 Billion

Is total worth of current H₂ market in India

Close to 80%

Is captured by fertilizer (ammonia), refineries & chemical segment in India

Only 20%

Is captured by transportation, power generation & other segment in India

The stages of green hydrogen policy support

Regulatory structure - from ambiguity to clarity

As the penetration of green hydrogen technologies increases and costs come down, policies will have to evolve accordingly. The briefs following this report use the concept of policy stages to reflect the evolution of policy needs with the increased deployment of green hydrogen. Here are the three basic steps and the overall milestones for each:

Step 1: Technology Readiness - At this stage, hydrogen is a niche technology with little use except in demonstration projects; it is mostly produced on-site with limited infrastructure development. The largest barrier to greater use is cost. The main role of policy makers is to encourage and accelerate further deployment of electrolyzers. This can be done in part through long-term signals, such as a commitment to net zero emissions, which offer certainty to the private sector and improve the business case for hydrogen especially green hydrogen for India.

As important, however, are shorter-term policies that help to close the investment and operational cost gaps. These include research and development (R&D) funding, risk mitigation policies and co-funding of large prototypes and demonstration projects to decrease the cost of capital. In addition, end uses still at the demonstration stage may need dedicated mission-driven innovation programmes with clear timelines and collaboration with the private sector to accelerate their commercialisation. Supportive governance systems and guidelines should also be put in place at this stage, ensuring that the growth of green hydrogen is sustainable.

Step 2: Market Penetration - At this stage, some applications are operational and able to prove what green hydrogen can do and at what cost. Scaling up these technologies and developing experience through learning-by-doing reduces costs and helps close the profitability gap. This stage also begins to see benefits from synergies between applications, increasing hydrogen demand and realising economies of scale for production and infrastructure. These synergies can take place in industrial clusters, hydrogen valleys (e.g. cities) or hubs (e.g. ports).

Industrial users can drive the development of dedicated “green hydrogen corridors” that connect regions generating low-cost renewable energy with demand centres. Most of this infrastructure is not developed from scratch, but is repurposed from existing natural gas networks and power grids.

Drivers of the New Wave of Green Hydrogen

Step 3: Market Growth - At this stage, hydrogen becomes a well-known and widely used energy carrier and is close to reaching its full potential. It has become competitive both on the supply side and in its end uses. Direct incentives are no longer needed for most applications and private capital has replaced public support in driving hydrogen growth. There is full flexibility in converting hydrogen to other energy carriers, making it possible to use the most convenient alternative depending on the specific conditions in each region. The power system has been decarbonised and only green hydrogen is being deployed. Most natural gas infrastructure has been repurposed to transport pure hydrogen.

Currently, green hydrogen is at the first stage for most sectors. Some regions may be more advanced in specific sectors or uses, while still being immature in others. For instance, California is ahead in FCEV deployment, but has no large-scale electrolysis industry, while Germany has focused on converting natural gas infrastructure to hydrogen. On other hand, India's hydrogen market is currently in the nascent stages of development. This is because, at current production costs, green hydrogen is twice as expensive as grey and brown/black hydrogen – the dominant forms of hydrogen. In addition, there are no demand-side mandates to support its uptake.

Policy Support for Transforming India into a Global Hub for Green Hydrogen Production

The Government of India has a vision to transform India into a global hub for green hydrogen production and export to achieve self-reliance in energy and unlock green growth and jobs in the years to come. Prime Minister, Mr. Narendra Modi, while speaking at the 3rd RE-Invest Conference in November 2020, had announced plans to launch a comprehensive National Hydrogen Energy Mission.

National Hydrogen Energy Mission: The proposed National Hydrogen Energy Mission would aim to lay down Government of India's vision, intent and direction for hydrogen energy and suggest strategy and approaches for realizing the vision.

- a. The Mission would put forward specific strategy for the short term (4 years), and broad strokes principles for long term (10 years and beyond). The Mission document would cover all essential aspects of value chain and consolidate approaches under a single framework and governance structure.
- b. The aim is to develop India into a global hub for manufacturing of hydrogen and fuel cells technologies across the value chain. Toward this end, a framework to support manufacturing via suitable incentives and facilitation aligned with 'Make in India' and 'Atmanirbhar Bharat' will be developed. It will provide necessary flexibility to capture benefit from advances taking place in technology landscape.
- c. The Government of India will facilitate demand creation in identified segments. Possible areas include suitable mandates for use of green hydrogen in industry such as fertilizer, steel, petrochemicals etc.
- d. Major activities envisaged under the Mission include creating volumes and infrastructure; demonstrations in niche applications (including for transport, industry); goal-oriented Research & Development; facilitative policy support; and putting in place a robust framework for standards and regulations for hydrogen technologies.

Policy Development - India

- **Inter-Ministerial Consultations Underway for India's Hydrogen Policy:** Mr. Rajnath Ram, Energy Advisor, NITI Aayog has stated in an interview that the government is progressing towards launching a National Hydrogen Policy. While stakeholder consultations have happened, inter-ministerial consultations are underway to launch the hydrogen policy. He further pointed that India should aim to export green hydrogen in near future.
- **Govt Planning to Blend 15% Green Hydrogen with Piped Natural Gas:** The government is planning to blend 15% green hydrogen with piped natural gas (PNG) for domestic, commercial, and industrial consumption. The move is in line with India's ambitious targets for reducing greenhouse gas emissions and becoming carbon neutral by 2070. Earlier this year, Power Minister Mr. R K Singh had announced that the government will bring green hydrogen under renewable purchase obligation (RPO), which essentially means that bulk buyers such as Discoms and captive users have to buy a certain proportion of renewable energy (RE) out of their total power requirement. A similar mechanism will be created for hydrogen, and it will be called hydrogen purchase obligation (HPO).
- **India to Soon Launch Scheme to Boost R&D of Electrolysers:** To achieve India's ambitious renewable energy target of 500GW by 2030, Ministry of New & Renewable Energy announced that a scheme for boosting research and development of electrolysers will be rolled out soon. It underscored that India must work towards production of hydrogen energy so that apart from domestic consumption it may also be able to export it.

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