India

India has set itself an ambitious target of becoming energy independent by 2047 and achieving net zero emissions by 2070.

This objective underlines India's flagship green hydrogen program, titled as the National Green Hydrogen Mission, 2023 (National Green Hydrogen Mission) introduced by the Ministry of New and Renewable Energy, Government of India ("MNRE"), which aims capacity building to produce at least 5 million metric tonne ("MMT") of green hydrogen per annum by 2030, with the potential increase of up to 10 MMT. In India, it is estimated that 5 MMT hydrogen is consumed each year by various industries. Therefore, green hydrogen production has a ready market which can aim to replace fossil fuel based industrial consumption to a carbon neutral system, in the near future.

In the 2021-22 Federal India already boasts of having one of the largest renewable energy footprints in the world, which sets it at a significant advantage in terms of competitive input cost for production of green hydrogen.

With the global electrolysers' market set to add an estimated 200GW of capacity by 2030, and as *India estimates capacity addition of 125GW of renewable energy by 2030*, India's cost of production and cost of capital for green hydrogen will be one of the lowest in the world.

Legal framework overview

While the regulatory regime for green hydrogen is still at a nascent stage, the National Green Hydrogen Mission is the flagship vision document which contemplates the development of green hydrogen ecosystem vis-à-vis the interaction between several ministries of the Government of India and consequent role allocation.

INR 197 billion

Estimated outlay

Key highlights of the National Green Hydrogen Mission include:

- The MNRE will formulate schemes for financial incentives to support production, utilization and development of green hydrogen;
- The Ministry of Power ("MOP") will implement policies and regulations to ensure delivery of renewable power to green hydrogen facilities for reducing the cost of production;
- The Ministry of Petroleum and Natural Gas will facilitate consumption of green hydrogen in refineries and city gas distribution; and
- Development of online portal setting out the relevant legislations and standards, facilitating time bound approvals, for hydrogen production, storage and use.

Legal framework overview (cont)

The MOP has introduced the Green Hydrogen Policy, 2022 (Green Hydrogen Policy), which most significantly provides that renewable energy consumed for production of green hydrogen will count towards the renewable purchase obligations of the obligated entity.

The Energy Conservation (Amendment) Act 2022 is another step in the direction to obligate consumption from non-fossil sources as it places a minimum consumption obligation on designated consumers.

In addition to these, various States in India (such as Odisha and Madhya Pradesh) have already included development of green hydrogen as part of their renewable energy policies in order to build synergies with the enabling infrastructure as well as lay down incentives for the green hydrogen industry.

Further, one of the keys to development of the green hydrogen industry in India will be evolution of the supporting legislations (especially the financial legislations and regulations). To that end, the Securities and Exchange Board of India (Issue and Listing of Non Convertible Securities) Regulations, 2021 has included the concept of 'green debt security' thereby facilitating the access to public markets for development of green infrastructure. While at present, the ambit of green debt security does not per se include green hydrogen projects, in our view, this clarity is due in the near future.

Funding & Support schemes

The Indian Government has an established model for funding of sunrise sectors especially in public infrastructure. One of the key models is the competitive bidding route through viability gap funding (a Central financial assistance mechanism), in the form of capital subsidy, which was practically the main stimulus to the initial boom of the renewable energy sector in India.

The National Green Hydrogen Mission seeks to de-risk private investment from various sources and provides an estimated outlay of INR 197 billion, including an outlay of INR 175 billion for SIGHT programme (see below), INR 4.6 billion for pilot projects, INR 4 billion for research and development and INR 3.8 billion towards other mission components. The MNRE has been entrusted to formulate schemes and guidelines for implementation of these components.

In 2022, the Indian Government issued the Framework for Sovereign Green Bonds (Framework) in order to tap the market borrowings for mobilizing resources for green infrastructure projects. The Framework has been designed as per the International Capital Market Association ("ICMA") Green Bond Principles (2021), with four key components: (i) use of proceeds; (ii) project evaluation and selection; (iii) management of proceeds; and (iv) reporting. The Framework has been designed to support India's goal of having 500 GW non-fossil energy capacity by 2030. The Framework states that all eligible green expenditures will be in the form of investment, subsidies, grant-in-aids, or tax foregone (or a combination of some or all of these) or select operational expenditures, research and development, expenditures in public sector projects that help in reducing the carbon intensity of the economy and enable India to meet its Sustainable Development Goals ("SDGs").

The Strategic Interventions for Green Hydrogen Transition ("SIGHT") has been contemplated under the National Green Hydrogen Mission. Initially, two distinct financial incentive mechanisms are envisaged: (i) support for domestic manufacturing of electrolysers; and (ii) incentives on production of green hydrogen.

As per information available in the public domain, it is understood that the Indian Government intends to include the production of electrolysers and green hydrogen within the Production Linked Incentive Scheme ("PLI Scheme") – a scheme for boosting domestic manufacturing under the Make in India vision.

The Green Hydrogen Policy, in addition, sets out the following incentives:

- Waiver of inter-state electricity transmission charges for producers of green hydrogen for 25 years (for projects commissioned before 2025);
- Priority based electrical connectivity to be provided to the green hydrogen industry;
- Land in renewable energy parks to be provided for manufacturing of green hydrogen; and
- Establishment of manufacturing zones dedicated to green hydrogen production.

Some of these aspects are within the legislative domain of States (and not Union) and so implementation of these policy decisions will depend on corresponding regulatory/policy actions by the various States, which should come forth soon.

The Indian Government has an *established model for funding* of sunrise sectors especially in public infrastructure.

Up-coming evolution

India's green hydrogen industry is placed at the cusp of the green transition boom, with ever developing renewable energy capacity addition and the evolving policy landscape designed to incentivize green hydrogen production. The development of support infrastructure as well as ready offtake market in other industries will operate as key accelerators to India's energy transition goals, consequently establishing India as a leading green hydrogen producer.

India's green hydrogen industry is placed at the *cusp of the green transition boom*, with ever developing renewable energy capacity addition and the evolving policy landscape designed to incentivize green hydrogen production.

The National Green Hydrogen Mission lays down a vision for fossil based industries to transition into net zero emission in the following manner:

- **Steel –** carbon credits and imposition of market barriers on carbon steel; blending proportion of non-carbon steel to be proportionately increased as cost of production of green hydrogen reduces.
- **Transport –** introduction of hydrogen highways to facilitate heavy-duty and long-haul vehicles' transition to green hydrogen as fuel; refueling stations to be developed.
- **Shipping –** at least two ships will be retrofit to run on green hydrogen by 2027.
- **Green Hydrogen Hubs –** in order to reduce transportation and logistical barriers, cluster-based production and utilization model to be developed in initial years.

Some recent examples

01 In 2022, the Maharashtra State Power Generation Co. Ltd. issued bids for development of green hydrogen project of capacity 20 nm3/hr including ground mounted solar power plant of 500 kWac capacity.

02 In April 2022, Indian Oil Corporation Ltd., Larsen & Toubro ("L&T") and ReNew Power announced the signing of a binding term sheet for formation of a joint venture to develop green hydrogen projects in India.

03 On May 12 2022, GAIL (India) Limited awarded a contract to set up one of the largest Proton Exchange Membrane ("PEM") Electrolyser in India. The project is to be installed at GAIL's Vijaipur Complex, in Guna District of Madhya Pradesh, and would be based on renewable power.

04 On July 26 2022, the Oil and Natural Gas Corporation Limited signed a memorandum of understanding with Greenko ZeroC Private Limited to pursue opportunities in green hydrogen and green ammonia.

Some recent examples (cont)

05 In August, 2022, Jindal Stainless (Hisar) Ltd. has partnered with Hygenco India Private Limited to install a green hydrogen plant, thereby being the first stainless steel plant in India to install a green hydrogen plant.

06 In 2022, the ACME Group signed a memorandum of understanding with the Government of Karnataka to invest INR 520 billion for development of green hydrogen and green ammonia plant.

07 As per the information available in the public domain, it is understood that the Ministry of Railways, Government of India is planning to run 35 hydrogen fueled trains under Hydrogen for Heritage.

This chapter was provided by Bird & Bird Plus firm AZB & Partners and authored by Qais Jamal, Pranjal Bhattacharya, Upasana Soni and Shreya Mukherjee.

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