India's US$2 Billion Green Hydrogen Scheme Highlights Renewables Investment Focus

34 companies bid for green hydrogen subsidies

Fourteen companies, including Acme Cleantech, Avaada GreenH2, Bharat Petroleum Corp, CESC, Greenko ZeroC, JSW Energy, Reliance Industries, Sembcorp Green Hydrogen, and Torrent Power, have submitted bids for incentives under India's Green Hydrogen Mission.

Additionally, 20 companies, such as Adani Group, Acme Cleantech Solutions, Advait Infratech, Bharat Heavy Electricals, Jindal India, Larsen & Toubro, Ohmium Operations, Reliance Industries, and Waaree Energies, have entered bids for incentives related to electrolyser manufacturing, as announced by the Solar Energy Corporation of India (SECI).

SECI operates as a Central Public Sector Undertaking (CPSU) under the administrative jurisdiction of the Ministry of New and Renewable Energy (MNRE). Established on September 20, 2011, its primary objective is to facilitate the execution of the National Solar Mission (NSM) and its specified targets. SECI is the sole CPSU dedicated to the renewable energy sector.

The 34 bids come in response to India's call for proposals to participate in its US$2.4-billion program (INR 174.90 billion), designed to boost green hydrogen production and electrolyser manufacturing. The program was announced in summer of this year. India is offering incentives worth at least 10 percent of the costs to produce green hydrogen fuel under the US$2.4 billion scheme.

So far, the government has received bids for the production of 0.55 million metric tons of green hydrogen, surpassing the initially invited 0.45 million tons. Similarly, bids for the manufacturing capacity of 3.4 gigawatts (GW) of electrolysers were received, exceeding the initial invitation for 1.5 GW.

The subsidies cover the first three years of production output, offering up to INR 50 (US$0.6) a kilogram for the first year, INR 40 (US$0.48) in the second year, and INR 30 (US$0.36) a kilogram in the third year, according to bid documents seen by *Bloomberg*.

Government incentive program for green hydrogen industry

In the initial stage, two distinct financial incentive mechanisms are proposed with an outlay of INR 174.90 billion up to 2029-30:

- Incentive for manufacturing of electrolysers
- Incentive for production of green hydrogen

The government will allocate around INR 130 billion (approx. US$1.56 billion) to produce green hydrogen, with the remaining funds dedicated to the manufacturing of electrolysers used in the process of splitting hydrogen and energy molecules through electrical means.

Currently, the manufacturing cost of green hydrogen in India stands at approximately INR 300 (US$3.60) per kilogram.

The government intends to invite the bids in three tranches for green hydrogen supply and in two tranches for electrolysers. Each tranche will cover a capacity of 1,500 megawatts, with an incentive set at INR 4,400 (approx. US$52.83) per kilowatt.

In terms of production capacity, the government will support 3.6 million tonnes of hydrogen production over the next three years and approximately 3,000 megawatts of annual electrolyser capacity for a span of five years under this program.

Depending upon the markets and technology development, specific incentive schemes and programmes will continue to evolve as the Mission progresses, according to the MNRE.

Green hydrogen standards in India

Green hydrogen, as per the Indian government's definition, is hydrogen produced utilizing renewable energy. This encompasses various methods such as electrolysis or the conversion of biomass. The definition extends to electricity generated from renewable sources, which can be stored in an energy storage system (ESS) or integrated into the grid in compliance with relevant regulations.

- Standards for green hydrogen produced via electrolysis dictate that non-biogenic greenhouse gas emissions (GHG) resulting from water treatment, electrolysis, gas purification, and the processes of drying and compressing hydrogen must not exceed an average of 2 kilograms of carbon dioxide

equivalent per kilogram of hydrogen (kg CO2 eq/kg Hydrogen) over the last 12-month period.

- Standards for green hydrogen produced through the conversion of biomass specify that non-biogenic greenhouse gas emissions (GHG) originating from biomass processing, heat/steam generation, biomass-to-hydrogen conversion, gas purification, and the processes of drying and compressing hydrogen must not exceed an average of 2 kilograms of carbon dioxide equivalent per kilogram of hydrogen (kg CO2 eq/kg Hydrogen) over the preceding 12 months.

A detailed methodology for measurement, reporting, monitoring, on-site verification, and certification of green hydrogen and its derivatives shall be specified by the MNRE. The Bureau of Energy Efficiency (BEE) at the Ministry of Power shall be the Nodal Authority for accreditation of agencies for the monitoring, verification, and certification for green hydrogen production projects.

Background: Key goals of India's National Green Hydrogen Mission

The National Green Hydrogen Mission aims to revolutionize India's energy landscape. With an initial outlay of INR 197.44 billion, the mission focuses on various components, including the Strategic Interventions for Green Hydrogen Transition (SIGHT) program, pilot projects, research and development (R&D), and other mission-related activities.

By 2030, the mission envisions achieving a green hydrogen production capacity of at least 5 million metric tonnes per year, accompanied by a renewable energy capacity addition of about 125 gigawatts. The expected outcomes include over INR 8 trillion in total investments, the creation of more than 600,000 jobs, a cumulative reduction in fossil fuel imports exceeding INR 1 trillion, and the reduction of nearly 50 million metric tonnes of annual greenhouse gas emissions.

The Mission's benefits extend to the creation of export opportunities for green hydrogen and its derivatives, decarbonization of industrial, mobility, and energy sectors, reduced dependence on imported fossil fuels, development of indigenous manufacturing capabilities, employment generation, and advancements in cutting-edge technologies.

The SIGHT program will provide financial incentives for domestic manufacturing of electrolysers and green hydrogen production. The Green Hydrogen Mission also supports pilot projects in emerging end-use sectors and production pathways, while identifying and developing regions as Green Hydrogen Hubs.

To ensure the success of the mission, an enabling policy framework, robust standards and regulations, and a public-private partnership framework for research and development (Strategic Hydrogen Innovation Partnership – SHIP) will be established. The Ministry of New & Renewable Energy will coordinate and implement the mission, with all concerned ministries, departments, agencies, and institutions of the central and state governments taking focused and coordinated steps toward achieving the mission's objectives. The coordinated efforts will contribute to India's sustainable energy future and position the country as a leader in the green hydrogen sector.

Export of green hydrogen

While boosting production capacity in India, the government has also commenced discussions regarding the potential export of green hydrogen to France, Italy, and Germany. Proposals are being sent through the Ministry of External Affairs per a ***Business Line*** **report** in October. In addition, India is also aiming to export green hydrogen to other European Union nations, including the Netherlands, Austria, and Sweden, under Article 6.2 of the Paris Agreement. Further, a National Green Hydrogen Mission report states that bilateral negotiations are "underway" for signing agreements with Japan, South Korea, and Singapore.

FDI in the renewable energy sector

Under the existing foreign direct investment (FDI) policy of the Government of India, the renewable energy sector allows up to 100 percent FDI under the automatic route.

List of programs to ease doing business and incentive schemes

To attract investments, including FDI, the government has implemented various measures, including:

- Establishment of a Project Development Cell to attract and facilitate investments.
- Declaration of a trajectory for Renewable Purchase Obligation (RPO) until 2029-30.
- Creation of Ultra Mega Renewable Energy Parks for large-scale installation of RE projects with provided land and transmission.
- Expansion of transmission infrastructure under the Green Energy Corridor Scheme for efficient evacuation of renewable power.
- Introduction of schemes, such as Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM), Solar Rooftop Phase-II, 1200 MW CPSU Scheme Phase II, etc.
- Launch of the National Green Hydrogen Mission to establish India as a global hub for the production, utilization, and export of Green Hydrogen and its derivatives.
- Notification of Promoting Renewable Energy through Green Energy Open Access Rules 2022.
- Introduction of the Green Term Ahead Market (GTAM) to facilitate the sale of Renewable Energy Power through exchanges.
- Release of Standard Bidding Guidelines for tariff-based competitive bidding in the procurement of Power from Grid Connected Solar PV and Wind Projects.
- Waiver of Inter State Transmission System (ISTS) charges for inter-state sale of solar and wind power for projects commissioned by June 30, 2025.
- Notification of standards for the deployment of solar photovoltaic systems/devices.
- Issuance of orders ensuring power dispatch against Letter of Credit (LC) or advance payment, ensuring timely payment by distribution licensees to

- Issuance of orders ensuring power dispatch against Letter of Credit (LC) or advance payment, ensuring timely payment by distribution licensees to RE generators.

According to information from the Department for Promotion of Industry and Internal Trade (DPIIT), India's renewable energy sector has received a total FDI equity investment of US$6.13 billion in the last three financial years and the current financial year (till September 30, 2023).