

India's green H₂ ambitions ride on Chinese equipment's coat-tails

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Amritsar, 20 September

India needs to kick-start its clean hydrogen manufacturing plans by giving priority to electrolyser manufacturing rather than relegating it to a footnote in its green hydrogen transition programme.

Allocations for clean hydrogen output are three times greater than the support for domestic electrolyser manufacturing. Since the early days of solar and electric vehicles, China has placed a stronger emphasis on a clean energy equipment production ecosystem to dominate the global supply market.

India's ambitions for green hydrogen are riding the coat-tails of Chinese equipment, with Beijing's global stranglehold on the green hydrogen business now extending to New Delhi.

It's likely that a significant portion of India's 5 million tonnes per annum (mtpa) green hydrogen production target, planned by 2030, will be met through the supply of Chinese electrolysers and other components, according to analysts and industry officials.

PERIC Hydrogen Technologies Co., a leading electrolyser manufacturer in China, announced in early September that it has delivered two electrolysers to a prominent Indian steel company and is supplying four more to another Indian steel company. In July, LONGi, the world's largest supplier of electrolysers, agreed to supply electrolysers to another Indian company. China's top electrolyser manu-

facturers now view India as a major export market because local manufacturers cannot meet the demand, as stated by Jian Wu from China Hydrogen Bulletin.

Hetal Gandhi, director of CRISIL Market Intelligence & Analytics, said, "India's current electrolyser manufacturing capacity falls short of meeting its ambitious green hydrogen production targets. A reliance on imports can help stimulate the green hydrogen market in India while also keeping production costs in check."

However, this poses a risk of total dependence on Chinese equipment for the next few years, as evident in how Chinese cells and modules have powered most of India's solar generation over the past decade.

China's advantage lies in its low manufacturing costs. Procurement data for the January-March quarter showed that the unit price of alkaline electrolysers declined to \$200-220 per kilowatt, which is 80 per cent lower than the costs in Western nations, according to data from China Hydrogen Bulletin.

China's benchmark lending rate is around 3.6-4.3 per cent, much lower than what Indian banks charge, improving the viability of hydrogen ventures.

What's even more crucial is the vast electrolyser capacities readily available in China. China's top four electrolyser producers — LONGi, PERIC, Sungrow, and Cockerill Jingli Hydrogen — are world leaders in electrolyser production capacity. They possess a combined 7.5 gigawatt (Gw) of electrolyser manufacturing capac-



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ity, and more than 20 other companies are adding to that capacity, as reported by the China Hydrogen Bulletin.

Envision Group plans to construct a 2 Gw electrolyser manufacturing plant; Trina Solar Co., the world's third-largest solar equipment supplier, is establishing a 1 Gw electrolyser manufacturing plant. Sungrow, a global photovoltaic inverter company, is adding 3 Gw in capacity.

Gandhi added, "China currently holds a dominant position in the global electrolyser market due to its strategic control over critical raw materials like titanium and nickel, essential for electrolyser production. This advantage enables China to achieve scale and cost-effectiveness to the extent of 50 per cent on a global scale,

THE ROAD MAP

■ India needs to jump-start clean hydrogen manufacturing plans by placing a premium on electrolyser manufacturing

■ Allocations for clean hydrogen output are thrice that of support to domestic electrolyser manufacturing

■ Right from the early days of solar and EVs, China has placed a greater emphasis on a clean energy equipment production ecosystem to dominate the global supply market

making it a significant supplier to various countries, including India."

Low electrolyser procurement costs, coupled with the low cost of green electricity, are pivotal for the early adoption of green hydrogen, which, at current levels, is unsustainable without state subsidies. India's plans to reduce the cost of green hydrogen fivefold to \$1 per kilogram by the end of the decade will require low capital costs. Electrolysers constitute approximately one-third of the overall capital expenditure requirements.

According to BloombergNEF, companies will spend around \$130 billion on electrolysers. Electrolysers are machines that use electricity to split water molecules into hydrogen and oxygen. The current is

supplied by solar or wind generators, making hydrogen production green.

China announced nearly \$8 billion in domestic green hydrogen projects in 2022, with \$7.1 billion announced just in the January-March quarter, with an increasing focus on commercialising newer technologies.

Electrolyser manufacturing relies on two primary technologies: alkaline and proton-exchange membrane (PEM).

Alkaline electrolysers, with their superior efficiency and cost-effectiveness, currently hold a dominant share of over 60 per cent in the global market. They offer greater efficiency (30 per cent) compared to other electrolyser types like PEM.

India is also leaning towards alkaline electrolyser technology as the foundation for many of its major green hydrogen projects. New Delhi has set a 2030 target of at least 5 mtpa of green hydrogen production with an associated renewable energy capacity addition of 125 Gw, which will boost demand for electrolysers.

India's green hydrogen production plans are led by steel and oil companies, some of the largest consumers of the fuel.

JSW Energy plans to build what could be the country's largest green hydrogen plant by 2025 in Karnataka, which will produce 3,800 tonnes of hydrogen per year. A Tata Steel unit has partnered renewable energy companies Avaada Energy and ACME Group to establish green hydrogen and green ammonia projects in Odisha.

Oil and Natural Gas Corporation, Oil India, Bharat Petroleum Corporation,

Hindustan Petroleum Corporation, and Indian Oil Corporation are also in the process of setting up clean hydrogen plants with electrolysers imported from China, according to a refinery executive.

The timelines are tight, but there is no Indian manufacturing capacity in sight, the executive said. In the short to medium term, it is likely that China will continue to play a pivotal role as a supplier of electrolysers to India, and dependence on Chinese manufacturers is driven by their competitive pricing and readily available supply, Gandhi said.

In June, the Ministry of New and Renewable Energy approved the Strategic Interventions for Green Hydrogen Transition (SIGHT) programme, with an initial budget of ₹17,490 crores until 2029-30. However, only ₹4,440 crore was allocated to support domestic electrolyser manufacturing, with ₹13,050 crore earmarked for green hydrogen production.

But India's state-sponsored electrolyser manufacturing scheme may deliver only one-fortieth of what India needs to meet its green hydrogen goals.

The Solar Energy Corporation of India has already initiated the bidding process to establish a manufacturing capacity of 1.5 Gw for electrolyser production, with formal awards anticipated in the last quarter of this year. But this initial round of bidding represents only a fraction of the required 60 Gw capacity needed to meet India's ambitious goal of producing 5 mt of green hydrogen, according to CRISIL Research.