

India & the promise of a green hydrogen future

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The global race to cut emissions from hard-to-abate sectors such as steel, fertilisers, shipping, aviation and long-haul transport is underway, with green hydrogen emerging as the decisive fuel. While Europe, Japan, Korea and the Middle East are investing billions into renewable hydrogen, India has the right mix of resources, policy and demand to emerge as the world's pre-eminent hub for this new energy vector.

India's advantage rests on five decisive strengths. First, India offers globally unmatched rates for round-the-clock renewable energy, with prices ranging from ₹4.60 to ₹5 per kWh, making green hydrogen production extremely cost-competitive. Second, government policy has been both consistent and ambitious: the National Green Hydrogen Mission sets clear targets and provides the regulatory confidence that investors and companies seek. Third, India's industrial base is already strong, ranging from engineering capabilities to pipelines, refineries and ports, providing a ready ecosystem for scaling green hydrogen. Fourth, India's large domestic demand for fertilisers, refining, steel and chemicals ensures that hydrogen uptake will be driven not just by exports but also by domestic consumption. And fifth, the global export opportunity is immense. Markets like Europe and Japan are actively seeking clean hydrogen imports and India is uniquely placed to serve them.

The momentum behind India's green hydrogen push is already becoming visible. The Solar Energy Corporation of India (SECI) has awarded contracts for 450,000 tonnes per annum of green hydrogen production with leading firms like Reliance, Greenko, ACME, L&T and others in the fray. SECI has also finalised a 724,000 tonne green ammonia tender aggregating demand from 13 fertiliser plants nationwide. This tender achieved a record-low price of ₹55.75 per kilogram, among the most competitive globally. Complementing these results, the Indian Oil Corporation has awarded a landmark project at its Panipat refinery in Haryana: a 10,000 tonnes per annum green hydrogen facility to be executed by L&T Energy Green Tech, with a tax-inclusive price of USD 4.5 per kilogram over 25 years. Meanwhile, Bharat Petroleum has partnered with Singapore's Sembcorp to develop green hydrogen and green ammonia projects in India. While it is true that some tenders have faced delays and retendering which is inevitable in an emerging industry, the trajectory is clear: India is moving from ambition to action.

What makes India's green hydrogen journey especially exciting is not merely producing hydrogen but the potential to create green value-added products. Green fertilisers can reduce India's import dependence, ease the subsidy burden and secure long-term food security. Green steel offers a path to global competitiveness, particularly as Europe prepares to impose carbon border taxes that will penalise high-emission exports. Green

ammonia holds promise as a fuel for shipping and as a practical carrier for exporting hydrogen itself. By scaling these value-added products, India will not just be a supplier of raw hydrogen but an industrial powerhouse in the green economy.

Yet, to seize this opportunity, India must act decisively across five priorities. First, securing government-to-government agreements with key importing regions will be crucial. Long-term offtake contracts of 10–15 years will provide investors with the certainty needed to scale production. Second, India must accelerate domestic electrolyser manufacturing by the end of this decade to reduce import dependence and lower costs. Third, marketing the “India Green Hydrogen” brand globally will be vital. With certification systems aligned to international standards, India can showcase its cost advantage to buyers worldwide. Fourth, heavy investment in skilling is critical: tens of thousands of trained technicians will be required in just the next five years and partnerships with universities and industrial training institutes must deliver that pipeline of talent. Fifth, India must create the world’s most efficient regulatory environment for hydrogen, with single-window clearance systems, transparent permitting and predictable rules that can reduce transaction costs and delays.

While the risks associated with scaling India’s green hydrogen industry are significant, they are far from insurmountable. High capital costs can be addressed through concessional finance, sovereign green bonds and blended finance models. Certification disputes must be pre-empted by adopting international standards and securing bilateral recognition agreements with major markets. Skill shortages can be mitigated through a national skilling mission tailored to hydrogen and allied industries. The challenge of tender cancellations and delays can be improved by better bid design and more realistic project timelines.

India’s hydrogen story is not just about energy; it is about reimagining its economic and industrial future. By producing the cheapest green hydrogen in the world, building value-added products like green steel, ammonia and fertilisers and establishing itself as the trusted supplier for world, India can leapfrog into global leadership in the clean economy. The green hydrogen race is underway and while many countries are running hard, India is uniquely positioned to finish in front.

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