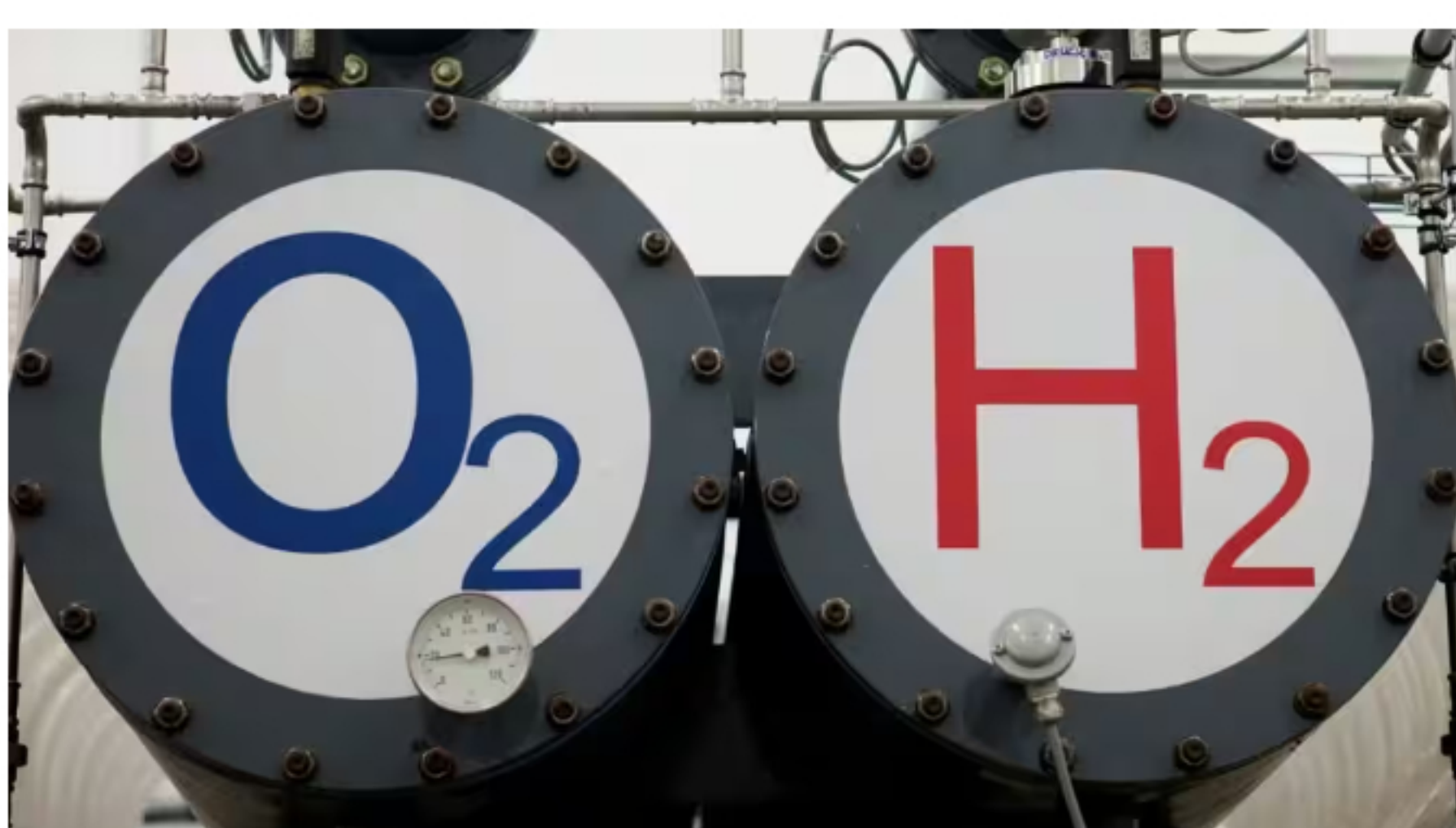


How can India accelerate the adoption of green hydrogen?

Green hydrogen, also known as renewable hydrogen, is produced through electrolysis, where water is split into hydrogen and oxygen using electricity generated from renewable sources such as solar photovoltaic (PV) and wind turbines.

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Hydrogen stands as a linchpin in achieving global net-zero emissions by 2050. (Image/Reuters)

By **Tanmoy Duari**

India stands at a critical juncture in its energy transition, with green hydrogen emerging as a transformative solution to mitigate environmental impact and foster sustainable development. Green hydrogen, produced through electrolysis using renewable energy sources like solar and wind power, has garnered global attention as a clean and versatile energy carrier. India's abundant renewable resources and ambitious renewable energy targets position it as a key player in the global green hydrogen market. This article delves into the intricacies of green hydrogen adoption in India, exploring key drivers, challenges, and strategies for accelerating its deployment.

Green hydrogen, also known as renewable hydrogen, is produced through electrolysis, where water is split into hydrogen and oxygen using electricity generated from renewable sources such as solar photovoltaic (PV) and wind turbines. Unlike grey hydrogen produced from natural gas, green hydrogen emits no greenhouse gases during production, making it a zero-emission fuel with immense potential for decarbonizing various sectors including transportation, industry, and power generation.

Drivers of Green Hydrogen Adoption in India

Renewable Energy Potential: India boasts significant solar and wind energy potential, making it conducive for large-scale green hydrogen production. The declining costs of renewable energy technologies further enhance the economic viability of green hydrogen production.

Climate Commitments: India's commitment to reducing carbon emissions under the Paris Agreement and its ambitious renewable energy targets necessitate the adoption of clean energy solutions like green hydrogen to achieve climate goals.

Energy Security: Green hydrogen offers a pathway to enhance energy security by reducing dependency on fossil fuel imports and diversifying the energy mix with indigenous renewable resources.

Technological Advancements: Rapid advancements in electrolyser technology, coupled with economies of scale, are driving down the costs of green hydrogen production, making it increasingly competitive against conventional fuels.

Challenges to Adoption of Green Hydrogen:

Despite the promising prospects, several challenges hinder the widespread adoption of green hydrogen in India.

Cost Competitiveness: While costs are decreasing, green hydrogen production remains more expensive than grey hydrogen due to high electricity costs and electrolyser prices. Continued research and development (R&D) efforts are needed to achieve cost parity with fossil-based hydrogen.

Infrastructure Development: Building the necessary infrastructure for green hydrogen production, storage, and distribution requires substantial investments and regulatory support. Developing hydrogen refueling stations for fuel cell vehicles is also essential to promote hydrogen mobility.

Policy and Regulatory Framework: Clear and stable policies, including incentives such as subsidies, tax benefits, and market mechanisms like carbon pricing, are crucial to incentivise investments in green hydrogen projects and create a favourable market environment.

Scale-Up Challenges: Scaling up green hydrogen production to meet demand across sectors necessitates collaboration among government, industry, and research institutions to address technical, logistical, and supply chain challenges.

Strategies to Accelerate Green Hydrogen Adoption:

The government should formulate a comprehensive national hydrogen policy that provides long-term visibility, regulatory certainty, and financial incentives to attract investments in green hydrogen projects.

Increased funding for R&D initiatives aimed at improving electrolyser efficiency, reducing costs, and developing hydrogen storage and transport technologies will accelerate the deployment of green hydrogen.

Collaborative efforts between government agencies, private sector players, and research institutions can drive innovation, promote knowledge sharing, and facilitate pilot projects to demonstrate the viability of green hydrogen applications.

Training programs and skill development initiatives should be implemented to build a skilled workforce capable of designing, operating, and maintaining green hydrogen infrastructure and technologies.

Engaging in international partnerships, technology transfer agreements, and knowledge-sharing platforms will leverage global expertise and resources to expedite India's green hydrogen transition.

India's pursuit of green hydrogen signifies a strategic shift towards sustainable and inclusive energy systems aligned with global climate objectives. Overcoming challenges and leveraging key drivers through concerted policy interventions, technological innovation, and collaborative partnerships will unlock the full potential of green hydrogen, paving the way for a cleaner, greener, and more resilient energy future.