

Green Hydrogen: Empowering India's Decarbonization with Diverse Applications

Green hydrogen, derived from renewable sources like solar energy, not only holds immense promise for India's decarbonization goals but also offers



versatile applications across industries traditionally reliant on fossil fuels. Its role extends beyond electricity generation to powering processes like steel, aluminum, cement production, and even transportation, making it a game-changer in the sustainable energy landscape.

Industries such as steel, aluminum, and cement production often require high-temperature processes that are not efficiently powered by electricity alone. Green hydrogen steps in as a clean, high-energy fuel alternative, ca-

pable of meeting the intense heat demands of these industrial processes while drastically reducing carbon emissions. By integrating hydrogen into these sectors, India can significantly lower its carbon footprint and contribute to

global climate goals.

Moreover, the transportation sector, a major contributor to pollution, stands to benefit from hydrogen as well. Hydrogen-powered vehicles offer zero-emission mobility, addressing air quality concerns in cities and reducing reliance on fossil fuels. As India works towards electrifying its transport sector, hydrogen-powered vehicles complement electric vehicles by providing longer driving ranges and faster refueling times, making them suitable for heavy-duty vehicles and

long-haul transport.

On the generation side, the production of hydrogen and renewable energy can be optimized together, and their synergy is particularly valuable in addressing intermittency challenges. For instance, solar power can be harnessed during peak hours to produce green hydrogen through a process called "Electrolysis", which can then be stored and utilized as needed, ensuring a reliable and continuous energy supply. In electrolysis, electricity is used to split water molecules into hydrogen and oxygen gases, with the electricity sourced from renewable energy such as solar power ensuring the process remains environmentally friendly.

Advancements in electrolyzer technology are driving down costs and improving efficiency, making green hydrogen production increasingly competitive with traditional fossil fuel-based methods. This scalability and cost-effectiveness positions electrolysis as a key enabler for industries seeking clean energy solutions, especially in sectors with high-energy demand and difficult-to-electrify processes such as steel, aluminum, and chemical production.

"Modern utility-scale solar power plants with integrated energy storage may incorporate on-site green hydrogen production facilities using

Bio – Gautham Ramesh

Gautham Ramesh currently serves as a Principal at Avantus Energy, one of the largest independent developers of solar and energy storage projects in the US. With expertise in power plant controls and architecture, he holds over 15 granted patents (both US and international). Gautham is a recipient of the Cleanie Award, recognizing



his significant contributions to optimizing power plant assets through the development of control algorithms and design tools at Avantus Energy. He earned a master's degree in Energy Systems Engineering from Northeastern University and a bachelor's degree in Electrical and Electronics Engineering from Anna University.

a prominent solar project developer in the USA. Ramesh is also an advanced power plant technology pioneer, holding over 15 patents related to power plant controls and architectures.

Incentivizing the adoption of hydrogen technologies across these sectors aligns with India's sustainable development goals of achieving energy independence by 2047 and reaching net-zero emissions by 2070. This initiative not only creates new employment opportunities but also fosters technological innovation. By leveraging hydrogen's diverse applications, India can position itself as a global leader in the clean energy transition while reaping significant economic and environmental benefits for years to come.

electrolysis in the near future. This trend is already gaining momentum in the US, supported by incentives such as the Production Tax Credits for green hydrogen under the Inflation Reduction Act of 2022. Implementing a comparable incentive structure in India could significantly boost the adoption of green hydrogen technologies, facilitating our transition towards a decarbonized future," stated Gautham Ramesh, a principal at