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**DAILY EDITORIAL
ANALYSIS**

TOPIC

**GREEN HYDROGEN AND THE
FINANCING CHALLENGE**

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GREEN HYDROGEN AND THE FINANCING CHALLENGE

Context





- **Green hydrogen** has emerged as a crucial pathway to decarbonize its industrial sectors, as India aims for **net-zero emissions by 2070**.
- However, the **economics of green hydrogen production** presents significant challenges, particularly in terms of **financing**.

About the Green Hydrogen

- It is produced using **renewable energy sources** through a process called **electrolysis**, where water is split into hydrogen and oxygen **using electricity generated from renewable sources** such as solar, wind, or hydropower.
- It does not emit greenhouse gases, making it a sustainable and environmentally friendly alternative.
- **India** has set an ambitious target of producing **5 million metric tonnes (MMT)** of green hydrogen annually **by 2030**.

Why Green Hydrogen?

- Traditional hydrogen production methods, such as **grey hydrogen** (produced from fossil fuels) and **blue hydrogen** (produced from fossil fuels with carbon capture), still contribute to greenhouse gas emissions.

Color	GREY HYDROGEN	BLUE HYDROGEN	TURQUOISE HYDROGEN*	GREEN HYDROGEN
Process	SMR or gasification	SMR or gasification with carbon capture (85-95%)	Pyrolysis	Electrolysis
Source	Methane or coal 	Methane or coal 	Methane 	Renewable electricity 

Note: SMR = steam methane reforming.

* Turquoise hydrogen is an emerging decarbonisation option.

- The push for green hydrogen is driven by the need to reduce carbon emissions and combat climate change.
- Green hydrogen offers a zero-emission alternative, aligning with global climate goals.

Concerns Related To Green Hydrogen

- **High Production Costs:** The **levelized cost of electricity (LCOE)** and **electrolyzer costs** are major factors driving up the overall production costs.
 - ♦ In emerging markets like India, the high cost of capital further exacerbates the financial viability of green hydrogen projects.
- **Disparity in Production Costs:** A substantial disparity between **green hydrogen production costs (\$5.30-\$6.70 per kg)** and traditional **grey/blue hydrogen production costs (\$1.9-\$2.4 per kg)**.
 - ♦ It makes it challenging to drive domestic offtake and attract private investment.
 - ♦ It creates a classic market deadlock: green hydrogen costs can only decrease with scaled production, but scaling requires viable economics.
- **Global Investment Barriers:** By May 2024, **only 27.6% of the 1,572** announced large-scale clean hydrogen projects valued at \$370 billion had reached final investment decisions.

- ◆ This disparity between plans and financial commitments indicates that the market's structural barriers extend beyond technological readiness.
- **Technological Readiness:** The adoption rates and risk factors associated with futuristic technologies pose challenges for financing and scaling up production.
 - ◆ Investors and financial institutions are often hesitant to fund projects that have not been tested at scale.

Key Initiatives Related To Green Hydrogen in India

- **National Green Hydrogen Mission:** It aims to make India a leader in green hydrogen production by focusing on reducing the cost of green hydrogen production, creating demand, and establishing a certification framework for green hydrogen and its derivatives.
- **Financial Incentives and Pilot Projects:** The mission includes financial incentives for manufacturing electrolyzers and producing green hydrogen.
 - ◆ Pilot projects are also being funded to explore low carbon steel production, mobility solutions, and shipping applications.
 - ◆ These initiatives are expected to drive innovation and reduce production costs.
- **Green Hydrogen Hubs:** India plans to develop green hydrogen hubs to support large-scale production and utilization.
 - ◆ These hubs will be equipped with the necessary infrastructure and will be strategically located to maximize efficiency and reduce costs.

Mechanism Associated To Overcome High Costs

- **Blended Finance Models: Combining public and private capital** can help lower risks and make investments in green hydrogen more attractive. Government-backed financial instruments or concessional loans can reduce borrowing costs, lowering the **weighted average cost of capital (WACC)**.
 - ◆ Collaborations between the **government and private sectors** can help mitigate risks and ensure the financing of green hydrogen projects. Governments can provide financial support through incentives, subsidies, or tax breaks to attract private investors.
- **Green Bonds and Climate Financing:** Issuing green bonds to raise capital for renewable energy projects can provide long-term funding at lower costs. These bonds can appeal to investors with an interest in sustainable investments.
- **Carbon Credits and Offtake Agreements:** Green hydrogen projects could leverage carbon credits or long-term offtake agreements to secure steady revenue streams, which would increase investor confidence and help finance production scale-up.
- **Strategic Industrial Clusters:** Creating localized industrial clusters linked to renewable energy sources can create self-sustaining hydrogen corridors in India, attracting investment and fostering integrated ecosystems.

Conclusion and Way Forward

- The **U.K.'s Low Carbon Hydrogen Standard Certification** provides a model for building market confidence. Similarly, strategic hydrogen hubs in the **U.S., Japan, and Australia** reflect a shift from traditional industrial development approaches.
 - ◆ **India** needs to adopt similar approaches to overcome structural barriers and promote the growth of its green hydrogen sector.
- By leveraging innovative and effective financing mechanisms and policy frameworks, India can overcome the financing challenges and establish itself as a leader in the green hydrogen sector.

Source: TH

Mains Practice Question

Discuss the key financial challenges associated with green hydrogen projects and analyze the potential financing mechanisms that could accelerate their deployment.