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How India's push for green hydrogen could help clean up the whole world

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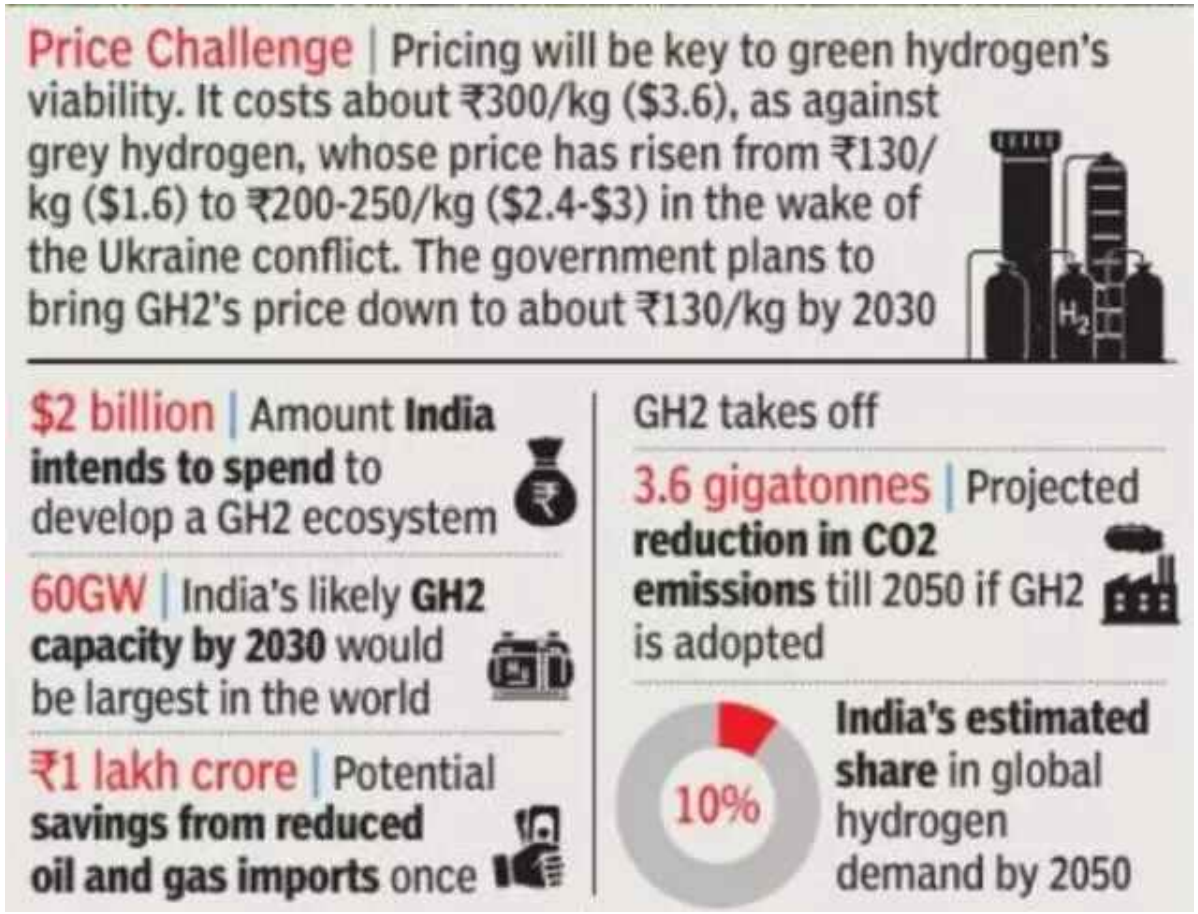
Hydrogen is the cleanest fuel, but almost all of it is locked up with other elements in the form of water, hydrocarbons, etc. The current commercial processes of extracting hydrogen pollute the atmosphere, but 'green hydrogen' is set to change that. And with the recently approved National Green Hydrogen Mission, India aims to achieve leadership in this field by 2030. Sanjay Dutta explains

What is green hydrogen?
Hydrogen produced by electrolysing water, using electricity from solar or wind power projects, is designated 'green' hydrogen – or increasingly, just GH2.

Why is GH2 seen as the 'fuel of the future'?It is considered the cleanest fuel because its production or consumption does not leave any carbon trail. But it requires large amounts of energy to produce.



What do hydrogen's colour codes signify?

The colour codes indicate the source. Grey hydrogen extracted from natural gas is the most common type in use at present. Brown hydrogen is produced through gasification of coal. This process emits greenhouse gases as a byproduct. Blue hydrogen is tapped from greenhouse gases locked up in carbon capture and storage facilities.

What are the applications of hydrogen?

At present hydrogen use is limited to large industries, such as oil refineries, steel, fertilisers and bulk chemicals. A major application will be for blending with CNG and PNG, to clean up their emissions.

When was the GH2 mission launched?

PM Narendra Modi first laid out the plan at the third renewable energy investors meet in November 2020. Finance minister Nirmala Sitharaman articulated the roadmap by announcing the mission in her Budget speech on February 1, 2021. The power ministry on February 17, 2022 notified GH2 and green ammonia policy enablers. Finally, the Cabinet approved an incentive package to seed the market on January 4 this year.

What is the Hydrogen Mission's aim?

To strengthen India's pole position in climate action and energy transition as well as reduce dependence on energy imports. GH2 can potentially lead to savings of Rs 1 lakh crore in India's energy import bill and cut out 68% of expensive gas shipments by replacing traditional industrial fuel/feedstock. The government sees India meeting 10% of g lobal GH2 demand by 2030.

How much does hydrogen cost?

Prices of hydrogen vary according to source, market conditions and currency rates. GH2 currently costs Rs 300/kg. The average cost of grey hydrogen extracted from natural gas – the commonly used form of hydrogen – averaged Rs 130/kg but has been Rs 200-250/kg sincethe Ukraine conflict.

How much incentive is India offering to develop a GH2 ecosystem?

A little over $2 billion. Most of this money will go towards supporting 15GW (gigawatts) of domestic electrolyser manufacturing capacity by 2030. By then the government believes India will have a capacity of 60GW, expected to be the largest in the world. The remaining funds will be used for strategic intervention to help projects.

How many other countries are promoting GH2?

Official documents indicate 25 countries are chasing the GH2 dream with support from their governments. Germany is offering the highest support at $10. 3 billion, followed by the US with $9 billion, France $8. 2 billion and the European Union $4. 3 billion.

Which Indian companies are investing in GH2 projects?

State-run IndianOil and GAIL have announced commercial scale GH2 plans. NTPC this week became the first entity to blend

PNG with GH2. GAIL and IOC have pilots for blending CNG with grey hydro gen. Oil India Ltd is running hydrogen buses in Kaziranga National Park, Assam. In the private sector, Reliance Industries Ltd, Adani Group and ACME Group have mega-size plans for manufacturing electrolysers, as well as GH2 and green ammonia units.

What are the drawbacks of hydrogen?

Hydrogen is highly inflammable due to its high energy density and is risky to transport or store. This means either GH2 plants must be set up near consumption sites and green power wheeled from afar, or the gas must be converted into liquid ammonia for transporting. Both options impact the overall project economics.