All about Green Hydrogen

What is the issue?

As the green energy movement grows, Indian companies are on a mission to adopt green hydrogen, the cleanest form of energy in the world.

What is green hydrogen?

- Green hydrogen is produced with the help of electrolysis through electricity generated from renewable sources of energy such as solar and wind.
- An electric current then splits the water into hydrogen and oxygen.
- This ensures no greenhouse gas emissions as the only by product of this process is oxygen, making it a great replacement for carbon emitting fuels.

What is green energy so significant?

> *India's current grey hydrogen production is six million tonnes per annum, which is around 8.5% of global annual production.*

- As of now, 75% of India's energy demand is met by coal and oil, including imports which is expected to increase.
- The green hydrogen, being a sunrise sector, must be tapped to tackle the dependence on fossil fuel and take greater advantage of India's solar capacity.
- Green hydrogen is a crucial weapon in India's arsenal to fight climate change as it improves the long-term energy storage capabilities of renewable energy.
- It is also the most promising solution to decarbonise sectors like cement, steel, and refineries.
- Hydrogen can provide the lowest-cost decarbonization solution for over a fifth of final energy demand by mid-century contributing a cumulated reduction of 80Gt of CO_2 and is thus an essential solution to reach the 1.5°C climate scenario.
- Since hydrogen is the cleanest fuel, it can help India in achieving the

target of net-zero carbon emissions by 2070.

What steps have been taken to boost green hydrogen in India?

- Ministry of New and Renewable Energy (MNRE) has been supporting a broad based R&D programme on Hydrogen Energy and Fuel.
- With respect to transportation, major work has been supported to Banaras Hindu University, IIT Delhi, and Mahindra & Mahindra resulting in the development of internal combustion engines and vehicles that run on hydrogen fuel.
- Two hydrogen refuelling stations have been established (one each at Indian Oil R&D Centre, Faridabad and National Institute of Solar Energy, Gurugram).
- India has already taken the first step with the Indian Oil Corporation floating a global tender to set up two green hydrogen generations units at the Mathura and Panipat refineries.
- **National Hydrogen Energy Mission** which was proposed in the Budget Speech 2021-22 aims to develop India into a global hub for manufacturing of hydrogen and fuel cells technologies across the value chain.
- A production linked incentive (PLI) scheme was announced in the budget 2021-22.
- National Hydrogen Energy Mission document was drafted by MNRE to scale up Green Hydrogen production and utilization across multiple sectors, including transportation

What are the challenges?

- The major challenge in the electrolysis of water using renewable energy is the cost, particularly, the cost of the electrolyser (the device that splits water).
- Only a handful of Indian companies manufacture electrolysers.
- According to The Energy and Resources Institute (TERI), the cost of green hydrogen production is $5-$6 per kg.
- Another challenge is the efficiency of the electrolysers i.e. how much electricity it consumes to produce a kg of hydrogen.
- Today, it is 55 kWhr per kg of hydrogen.
- Absence of dedicated government policy and lack of public awareness have been significant barriers in India’s hydrogen economy.

How can the green hydrogen production be ramped?

- Green hydrogen prices to come down to at least $2 per kg but this

reduction in prices requires manufacturing electrolysers on a much larger scale in India.

- Government funding and long-term policies that attract private investments within the standards and a progressive compliance framework are essential to boost green hydrogen.
- A few key sectors with low transition costs, such as refineries, fertilizers and natural gas, should be mandated to use hydrogen (green purchase obligation or GPO) to bring down costs as part of near-term goals.
- Shipping, aviation, energy storage and solutions towards power intermittency should be mandated to use green hydrogen in the long run.
- With its abundant and cheap solar energy, India has the upper hand to tap into these investments and lead global efforts in transitioning to green hydrogen.

References

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