Issues with Green Hydrogen

Why in news?

Recently, Government has announced an Rs 17,490 crore Green Hydrogen Package.

What is Green Hydrogen?

- Hydrogen is an abundant, cheap and clean-burning which is described as the *fuel of the future.*
- It is produced using ***electrolysis of water*** with electricity generated by *renewable energy.*
- The carbon intensity ultimately depends on the carbon neutrality of the source of electricity (i.e., the more renewable energy there is in the electricity fuel mix, the "greener" the hydrogen produced).

What is the need for Green hydrogen?

- **Energy dense -** It stores the energy in dense chemical form which is suitable for energy intensive applications like aircraft or automobile fuel.
- **Energy carrier** - It acts as an energy carrier which is crucial to achieve deep decarbonisation of hard to abate sectors.
- **Decarbonising Transport-** It power fuel cells in vehicles, trucks, and ships.
- **Dealing with Climate Change -** It can replace coke in steel-making, facilitating the production of green steel. These applications doesn't emit carbon dioxide.
- Green hydrogen will aid contribute to India's Panchamrit to deal with the challenge of climate change.

Panchamrit

- By ***2030***, India will
  - Reach its non-fossil energy capacity to *500 GW*
  - Meet *50%* of its energy requirements from renewable energy
  - Reduce the total projected carbon emissions by *1 billion tonnes*
  - Reduce the carbon intensity of its economy by *less than 45%.*
- By the year ***2070***, India will achieve the target of *Net Zero.*

What are the challenges associated with green hydrogen production?

- **High cost-** High overall costs of the system including capital, operational, maintenance, and running costs.
- Green steel cost exceeds 40-60% of regular steel.

- **Low production efficiency-** One-third of energy is lost in production.
- Electrolysers are expensive as they are yet to be standardised and mass-produced.
- **Pressure on drinking water supply-** Primary raw material is clean water which puts pressure on the municipal water supply.
- Low user acceptance and social awareness.
- **Highly volatile-** Loss of 70 % of hydrogen during production to end use.
- Hydrogen is very light and hence leaks at each stage, from production to end-use.
- **Low supply chain efficiency-** The low density of hydrogen necessitates compression, which increases costs.
- Transportation requires specialised infrastructure due to hydrogen's flammability and corrosiveness.
- Energy losses can occur at various stages throughout the supply chain.
- **High safety concern-** Storage tanks must be designed to handle high pressure and low temperatures.
- Hydrogen is *highly flammable and corrosive* and needs special containers or pipelines to withstand high pressure and wear and tear.

National Green Hydrogen Mission was launched in 2023 to make India a hub for production and export of Green Hydrogen.

What are the options that lies ahead for India?

- **Investment**- Capital must be invested in Research and Development like stabilising grid power rather than incentives.
- **Reduce import bill-** Hefty bills due to over reliance on export of oil must be reduced.
- **Cost optimisation-** Cost can be optimised by combining use of grid power, grey and blue hydrogen.
- **Decreasing cost-** Government can explore different financing options to make it viable like public-private partnership.
- **Policy push-** Policy push on both demand and supply side, addressing high cost in demand side and infrastructure bottlenecks
- **Regulations** - Proper standards and regulations are required for quicker adoption of green hydrogen economy.

References

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2. Niti Aayog| Report on Green Hydrogen Potential
3. PIB | National Green Hydrogen Mission

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