International Cooperation on Green Hydrogen

For Prelims: International Conference on Green Hydrogen 2024 (ICGH-2024), G20 Nations, Paris Commitments, Green Hydrogen, International Energy Agency (IEA), Grey Hydrogen, Electrolysis, Fuel Cells, Rare Materials, Hydrogen Council, Horizon Europe, Global Hydrogen Coalition.

For Mains: International cooperation for scaling up production of green hydrogen.

Source: LM

Why in News?

Recently, the Prime Minister (PM) virtually addressed the second **International Conference on Green Hydrogen 2024 (ICGH-2024)** being held at **Bharat Mandapam, New Delhi**.

- The PM emphasised the need for **international cooperation** to scale up **green hydrogen production**, **reduce costs**, and promote **research and development**.

What are Key Highlights of ICGH-2024?

- **Counting India's Achievements:** India is among the first **G20 nations** to fulfil its **Paris commitments** on green energy. India's commitments were fulfilled **9 years ahead** of the target of 2030.
  - India pledged to increase **non-fossil energy** capacity to **500 GW (gigawatts)** and **reduce** the total projected carbon emissions by **1 billion tonnes** by 2030.
  - **Installed non-fossil fuel capacity** in India increased by nearly **300%** over the past decade.
- **Emerging Importance of Green Hydrogen:** Green Hydrogen is identified as a key component in the global energy landscape, with potential to **decarbonise difficult-to-electrify sectors** such as refineries, fertilisers, steel, and heavy-duty transportation.
  - It can also serve as a **storage solution for surplus renewable energy.**
- **Investment in Research:** The conference called for investments in **cutting-edge research and development**, partnerships between industry and academia and encouragement for **start-ups and entrepreneurs** of the Green Hydrogen.
  - PM urged the **domain experts** and the scientific community to lead the way in **Green Hydrogen adoption.**
- **G20 Summit Insights:** PM underlined **the New Delhi G-20 Leaders' declaration** that adopted five high-level **voluntary principles on Hydrogen** that are helping in the creation of a **unified roadmap.**
- **Critical Questions:** PM asked about ways to improve electrolyser efficiency, use seawater and **municipal wastewater** for production, and explore **Green Hydrogen's role** in public transport, shipping, and waterways.

Note

- India has announced an exclusive partnership with the **European Hydrogen Week**, set to take place in November 2024.
- It highlights India's intent to address the **green regulations** of the **European Union.**
- Also, **Indian Railways** plans field trials of the first **hydrogen fuelled train** in January 2025.
    - **A 1200 KW DEMU (Diesel Electric Multiple Unit)** will be converted into a **hydrogen fuel cell-based DPRS** (Distributed Power Rolling Stock) for the trials.

Why International Cooperation is Needed in Promotion of Green Hydrogen?

- **High Production Costs:** According to the **International Energy Agency (IEA)**, the cost of producing **green hydrogen** can range from **USD 3 to USD 8 per kilogram,** significantly higher than **grey hydrogen** produced from fossil fuels.
- **Technology and Infrastructure Investment:** The cost of **alkaline electrolysers** has decreased by **40% between 2014 and 2019**, but further **cost reductions** are **needed** to make green hydrogen **competitive.**
- **Electrolysis Costs:** Green hydrogen is produced through **electrolysis**, which requires substantial amounts of electricity. As of 2023, the **production cost of green hydrogen remains high** compared to conventional hydrogen.
- **Efficiency of Electrolyzers:** According to India's **Ministry of New and Renewable Energy**, current electrolyzers are **not yet efficient enough** for widespread adoption. Research and development are required to improve efficiency and reduce costs.
- **Resource Availability:** According to the **European Commission**, the availability of **rare materials** for electrolyser and **fuel cells** presents another challenge.
    - The need for metals like **platinum and iridium** can constrain the scalability of green hydrogen technologies.
- **Scaling Up Production:** Scaling up production to meet global demands poses a significant challenge.
    - The **EU's Hydrogen Roadmap** indicates that achieving the necessary scale for green hydrogen production requires coordinated efforts across industries and governments.

How can International Cooperation Help in Promotion of Green Hydrogen?

- **Scaling Up Production:** An estimate from a recent **Hydrogen Council report** suggests that Asia will require **USD 90 billion** investment in hydrogen projects by 2030.
    - According to the **IEA**, **joint ventures** and cross-border **collaborations** can significantly accelerate the scaling of green hydrogen production technologies by leveraging diverse t**echnological capabilities** and **manufacturing resources**.
- **Economies of Scale**: The **European Commission** highlights that joint international initiatives can drive down costs through shared investments and bulk purchasing of materials.
    - For example, a group of 30 pioneering European energy companies officially launched **"HyDeal Ambition"** with the aim of delivering **100% green hydrogen** across Europe at a low cost of **Euro 1.5/kg.**
- **Shared Infrastructure**: Shared infrastructure for green hydrogen production, storage, and distribution can lower investment costs and make the technology more economically viable.
    - Collaborative infrastructure projects, like the **Asia-Pacific Hydrogen Association's** regional networks, illustrate how shared facilities can decrease costs.
- **Innovation Through Partnerships**: Global partnerships drive innovation by bringing together diverse research perspectives and funding sources.
    - E.g., the **Global Hydrogen Coalition** is a prominent example of a platform that brings together **governments, industry leaders, and research institutions** to drive innovation in hydrogen technologies.
- **Unified Policies and Regulations**: International collaboration helps in developing **cohesive policies and regulations** that support green hydrogen development.
    - The 2023 G20 Summit, under India's presidency, adopted **voluntary principles for green**

hydrogen which would help in creating a **common roadmap**.

- **Investment and Funding**: Joint **funding initiatives and investment** from international sources can accelerate research and deployment.
    - E.g., Several research and innovation projects on hydrogen are ongoing within **Horizon Europe**, the EU's Framework Programme for Research and Innovation.
        - These projects are managed through the **Clean Hydrogen Partnership (2021-2027),** a joint public-private partnership supported by the European Commission.

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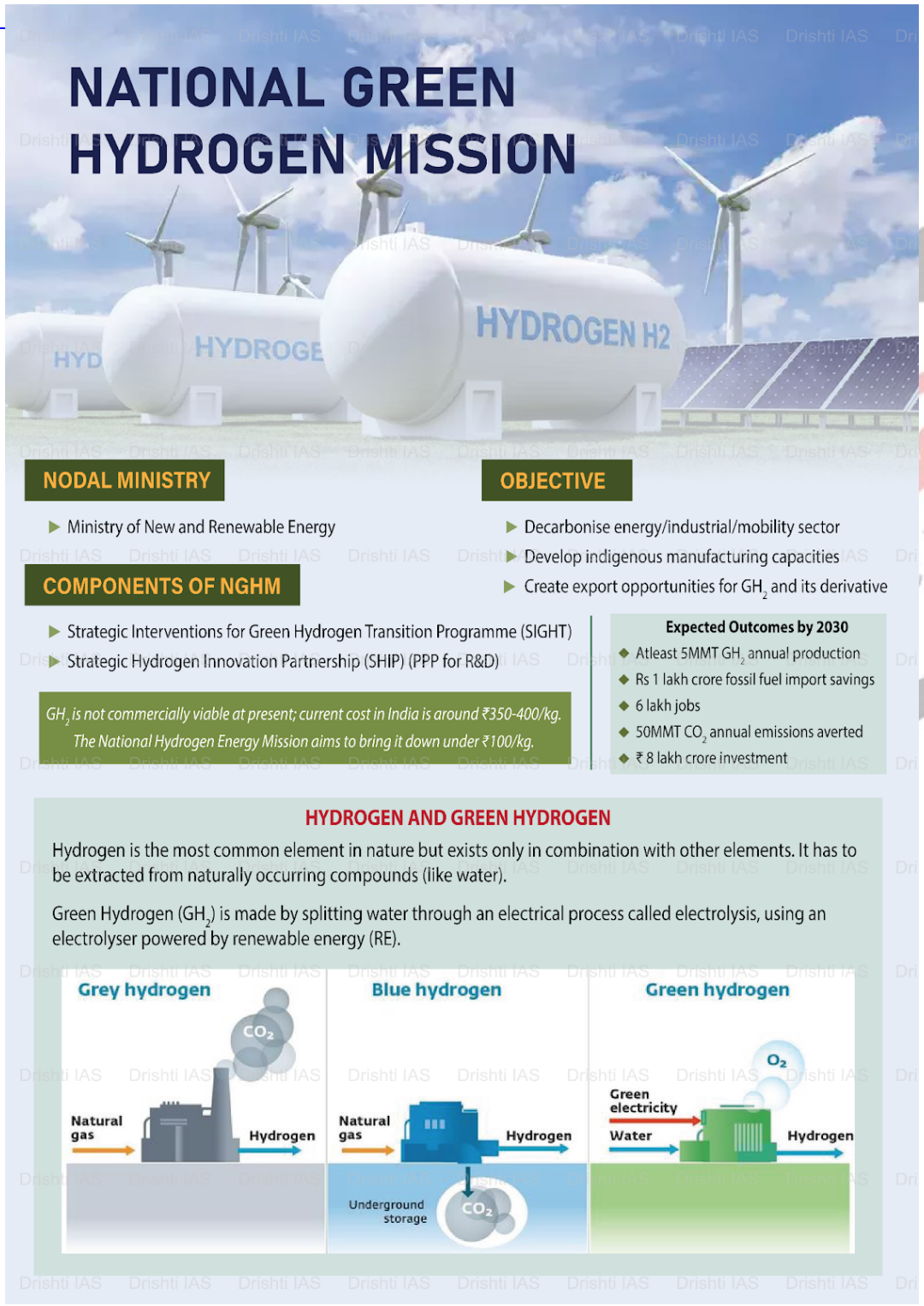

Conclusion

International cooperation is **essential** for advancing green hydrogen. By s**haring technology, harmonising policies, and pooling investments**, nations can overcome production and infrastructure challenges. Collaborative efforts ensure efficient **global supply chains**, reduce costs, and foster public acceptance. **Unified global action** accelerates the transition to a sustainable energy future and maximises green hydrogen's potential.

Drishti Mains Question:

Q. How can international cooperation contribute to the promotion and development of green hydrogen as a sustainable energy source?

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q. Consider the following heavy industries: (2023)

1. Fertilizer plants
2. Oil refineries
3. Steel plants

Green hydrogen is expected to play a significant role in decarbonizing how many of the above industries?

(a) Only one

(b) Only two

(c) All three

(d) None

Ans: (c)

Q.With reference to green hydrogen, consider the following statements : (2023)

1. It can be used directly as a fuel for internal combustion.
2. It can be blended with natural gas and used as fuel for heat or power generation.
3. It can be used in the hydrogen fuel cell to run vehicles.

How many of the above statements are correct?

(a) Only one

(b) Only two

(c) All three

(d) None

Ans: (c)

Q.Hydrogen fuel cell vehicles produce one of the following as “exhaust” (2010)

(a) NH_3

(b) CH_4

(c) H_2O

(d) H_2O_2

Ans: (c)