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GREEN HYDROGEN

This article covers "Daily Current Affairs" and the topic details "Green Hydrogen". The topic "Green Hydrogen" has relevance in the Science and Technology section of the UPSC CSE exam.

Relevance:
For Prelims:
What is Green hydrogen?
National Mission for Green Hydrogen?
For Mains:
GS 3: Science and Technology
Significance of Green hydrogen?
Challenges in adopting Green hydrogen?

Why in the news?
The government has planned over Rs 17,000 crore in incentives to promote the manufacturing of electrolyzers and green hydrogen in the country, said MNRE Secretary Bhupinder Singh Bhalla.

What is Green hydrogen?
- **Definition:** Green hydrogen refers to hydrogen gas produced through electrolysis, using renewable energy sources such as solar, wind, or hydroelectric power.
- **Renewable Energy:** The production of green hydrogen requires electricity generated from renewable sources, ensuring minimal or no greenhouse gas emissions during the process.
- **Electrolysis Process:** Water molecules (H2O) are split into hydrogen (H2) and oxygen (O2) through electrolysis, which involves passing an electric current through the water.
- **Applications:** Green hydrogen can be used as a fuel in fuel cells for electric vehicles, as well as in industrial processes where it acts as a clean alternative to fossil fuels.
- **Energy Storage:** Green hydrogen can store excess renewable energy and provide a means to balance the intermittent nature of renewable energy sources.
- **Cost Considerations:** Currently, green hydrogen production is more expensive compared to conventional methods that rely on fossil fuels. However, as renewable energy costs decrease and economies of scale are achieved, the cost of green hydrogen is expected to become more competitive.

National Mission for Green Hydrogen?
The National Green Hydrogen Mission is an initiative launched in 2022 by the Government of India as part of its decarbonization strategy. The mission aims to promote the production and use of green hydrogen in the country and leverage it as a key driver for sustainable development.

- **Strategic Hydrogen Innovation Partnership (SHIP):** Promotes Public-Private Partnership framework for Research & Development.
- **Production Target:** Aim to produce 5 million tonnes of green hydrogen by 2030.
- **Goal:** Make India a leading producer and supplier of Green Hydrogen in the world.

Significance of Green hydrogen?

- **Decarbonization:** Green hydrogen plays a crucial role in decarbonizing various sectors, including transportation and industry by replacing fossil fuels
- **Energy Transition:** Green hydrogen offers a means to integrate and store renewable energy. It can help overcome the intermittent nature of wind and solar power by converting excess energy into hydrogen.
- **Energy Storage:** Green hydrogen serves as a versatile energy storage medium. It can store energy for long periods and be converted back into electricity when demand is high.
- **Energy Independence:** By producing hydrogen from renewable sources domestically, countries can reduce their reliance on imported fossil fuels. .
- **Economic Opportunities:** Investments in green hydrogen technologies can drive innovation, create jobs, and stimulate economic growth in sectors such as renewable energy, manufacturing, and infrastructure development.

Challenges in adopting Green hydrogen?

- **Cost:** Currently, the production of green hydrogen is more expensive compared to conventional hydrogen production methods reliant on fossil fuels.
- **Infrastructure:** The infrastructure for green hydrogen production, storage, and distribution is not yet well-developed.
- **Scalability:** Scaling up green hydrogen production requires a substantial increase in renewable energy capacity and the deployment of large-scale electrolysis systems.
- **Efficiency:** The efficiency of electrolysis processes needs improvement. Currently, the conversion of electrical energy into hydrogen is relatively low, resulting in energy losses.

Source:

https://economictimes.indiatimes.com/industry/renewables/govt-plans-rs-17000-cr-incentive-scheme-for-electrolyzers-green-hydrogen-production-mnre-secy-bhupinder-bhalla/articleshow/101340541.cms?from=mdr

Q.1 Which of the following statements regarding the National Green Hydrogen Mission in India is/are correct?

1. The National Green Hydrogen Mission was launched in 2012 as part of India's decarbonization strategy.
2. The mission aims to make India a leading producer and supplier of green hydrogen in the world.
3. It targets a production goal of 10 million tonnes of green hydrogen by 2025.

Select the correct option(s):

(a) 1 and 2 only
(b) 1, 2, and 3 only
(c) 2 and 3 only
(d) 1 and 3 only

Answer: (a)

Q.2 Which of the following statements about green hydrogen is/are correct?

1. Green hydrogen can be used as a clean alternative to fossil fuels in industrial processes.
2. The production of green hydrogen involves the splitting of water molecules using nuclear fission.

Select the correct option(s):

(a) Both 1 and 2
(b) 1 only
(c) 2 only
(d) None of the above

Answer: (b)

Q.3 Discuss the potential of green hydrogen in driving India's energy transition and achieving its climate goals. Analyze the challenges and opportunities associated with the widespread adoption of green hydrogen in the country

Rishabh