



National Hydrogen Energy Mission

Why in News

The [Union Budget for 2021-22](#) has announced a **National Hydrogen Energy Mission (NHM)** that will draw up a road map for using hydrogen as an energy source. The initiative has the potential of transforming transportation.

- **NHM** initiative will capitalise on one of the most abundant elements on earth (Hydrogen) for a cleaner alternative fuel option.

Key Points

▪ About the National Hydrogen Energy Mission:

- Focus on **generation of hydrogen from green power resources**.
- To **link India's growing renewable capacity with the hydrogen economy**.
- India's ambitious goal of 175 GW by 2022 got an impetus in the 2021-22 budget which allocated Rs. 1500 crore for renewable energy development and NHM.
- The usage of hydrogen will not only help India in achieving its emission goals under the [Paris Agreement](#), but will also **reduce import dependency on fossil fuels**.

▪ Hydrogen:

- Hydrogen is the **lightest** and **first element** on the **periodic table**. Since the **weight of hydrogen is less than air**, it rises in the atmosphere and is therefore **rarely found in its pure form, H₂**.
- At standard temperature and pressure, hydrogen is a nontoxic, nonmetallic, odorless, tasteless, colorless, and **highly combustible diatomic gas**.
- Hydrogen fuel is a zero-emission fuel burned with oxygen. It can be **used in fuel cells or internal combustion engines**. It is also used as a **fuel for spacecraft propulsion**.
- **Type of Hydrogen:**
 - **Grey Hydrogen:**
 - Constitutes India's bulk Production.
 - Extracted from hydrocarbons (fossil fuels, natural gas).
 - By product: CO₂
 - **Blue Hydrogen:**
 - Sourced from fossil fuels.
 - By product: CO, CO₂
 - **By products are Captured and Stored**, so better than grey hydrogen.
 - **Green Hydrogen:**
 - Generated from renewable energy (like Solar, Wind).
 - Electricity splits water into hydrogen and oxygen.
 - By Products : Water, Water Vapor

▪ Asia-Pacific Stance:

- In Asia-Pacific sub-continent, **Japan** and **South Korea** are on the **front foot** in terms of **hydrogen policy making**.
- In 2017, **Japan** formulated the **Basic Hydrogen Strategy** which sets out the country's action plan till 2030, including the establishment of an international supply chain.
- **South Korea** is operating hydrogen projects and **Hydrogen Fuel Cell** production units under the auspices of its **Hydrogen Economy Development and Safe Management of Hydrogen Act, 2020**.
 - **South Korea** has also passed the Economic Promotion and Safety Control of Hydrogen Act, which deals with three key areas - **hydrogen vehicles, charging stations** and **fuel cells**. This law is **intended to bring transparency to the nation's hydrogen pricing system**.

▪ Indian Context:

- India has a **huge edge in green hydrogen production** owing to its **favorable geographic conditions** and presence of **abundant natural elements**.
- The government has given impetus in **scaling up the gas pipeline infrastructure** across the length and breadth of the country, and has introduced reforms for the power grid, including the **introduction of smart grids**. Such steps are being taken to **effectively integrate renewable energy in the present energy mix**.
- Capacity addition to renewable power generation, storage and transmission, **producing green hydrogen in India can become cost effective** which will not only guarantee energy security, but also ensure self-sufficiency gradually.

▪ Policy Challenges :

- One of the biggest challenges faced by the industry for using hydrogen commercially is the **economic sustainability of extracting green or blue hydrogen**.
 - The technology used in production and use of hydrogen like **Carbon Capture and Storage (CCS)** and **hydrogen fuel cell technology** are at **nascent stage** and are expensive which in turn increases the cost of production of hydrogen.
- **Maintenance costs** for fuel cells post-completion of a plant can be costly.
- The commercial usage of hydrogen as a fuel and in industries **requires mammoth investment in R&D of such technology and infrastructure** for production, storage, transportation and demand creation for hydrogen.

Way Forward

- At this juncture, with a calibrated approach, India can uniquely position itself to take advantage **with increasing investment in R&D, capacity building, compatible legislation**, and the **opportunity for creation of demand** among its vast population. Such initiatives can propel India to become the most favored nation by exporting hydrogen to its neighbors and beyond.

Source: IE