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News: Centre clears ₹19,744 cr. Green Hydrogen Mission

- The Union Cabinet recently approved the National Green Hydrogen Mission with an initial outlay of ₹19,744 crore, in a move aimed at making the country a global hub to produce, utilise and export green hydrogen and its derivatives.

National Hydrogen Energy Mission

- The focus of National Hydrogen Energy Mission will be **on generating hydrogen from green power sources while the approach thus far has relied on the use of fossil fuels.**
- India is **already keen on developing a hydrogen economy.**
- It is a participant, one among **16 nations or groupings, in the Mission Innovation Renewable and Clean Hydrogen Challenge.**
- A report titled 'India Country Status Report on Hydrogen and Fuel Cells', launched by the Department of Science and Technology in mid-October last year, outlines **the benefits of hydrogen in comparison to conventional fuels and with respect to tackling challenges in the energy sector.**
- The use of hydrogen **can reduce the CO₂** related emissions significantly at the point of use and if green hydrogen is used then there is capability to

decarbonize the entire value chain, enabling reduced emissions and climate change threats.

- It can even decarbonize the sectors where it is difficult to reduce emissions, says the report.
- Funding agencies, which include the **Ministry of Science and Technology, CSIR laboratories, Ministry of Petroleum and Natural Gas, Defence Research and Development Organisation, Indian Space Research Organisation, and oil and gas companies** are supporting projects centered around hydrogen production, storage, and utilisation for power generation and transportation applications.
- The focus of the research is said to be around the development of new materials, processes, components, and systems.
- A '**Hydrogen Valley Platform**' is also in the works, courtesy the Department of Science and Technology. The **platform will look to create an integrated hydrogen ecosystem covering production, storage, distribution and end use.**
- As for applications, transportation is high up the list for hydrogen use. The transportation sector is a major consumer of oil, and India is heavily dependent on imports in this area.

- Vehicles powered by hydrogen are said to be best-suited for use in the long haul, heavy transport, and commercial fleets. In Germany and Italy, plans are already underway to power trains with hydrogen.
- By 2050, nearly 80% of India's hydrogen is projected to be 'green' – produced by renewable electricity and electrolysis.
- The initiative will help abate nearly 50 million tonnes (MT) of annual greenhouse gas emissions by 2030 and cumulatively reduce fossil fuel imports estimated at over ₹1 lakh crore.

Types of Hydrogen

Grey Hydrogen

- Grey Hydrogen is extracted from Hydrocarbons (Fossil fuels and natural gases). It constitutes the major chunk of India's Hydrogen production. Carbon dioxide is the major byproduct of Grey Hydrogen and so is considered less eco-friendly.

Blue Hydrogen

- Blue Hydrogen is also extracted from Hydrocarbons as Grey Hydrogen. The byproduct is captured and stored. So, Blue Hydrogen is considered to be better than Grey Hydrogen.

Green Hydrogen

- Green Hydrogen is generated from Electricity generated out of renewable sources like Solar energy and Wind. Thus generated electricity is passed into water, which is split into Hydrogen and Oxygen. Byproducts of Green Hydrogen is Water and Water Vapor. It is favoured by policy makers.
- The 'production cost' of 'Green hydrogen' has been considered to be a prime obstacle.
- According to studies by the International Renewable Energy Agency (IREA), the production cost of this 'green source of energy' is expected to be around \$1.5 per kilogram (for nations having perpetual sunshine and vast unused land), by the year 2030.
- Recently, NTPC awarded India's first Green Hydrogen based Microgrid Project at Simhadri, Andhra Pradesh. It would be a precursor to large scale hydrogen energy storage projects.
- The project offers benefits of decarbonising far-off regions (e.g. Ladakh) and meets the clean energy goals because of its features like sustainability, easy to store etc.

Pink hydrogen

- Similar to green hydrogen, pink hydrogen is made via electrolysis, but using nuclear energy as its source of power.

Yellow hydrogen

- Another type of hydrogen made by electrolysis is yellow, where electrolysis is achieved solely through solar power (unlike green which could use a combination of renewable energy sources such as wind or solar).

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.

National Hydrogen Policy

Background

- Hydrogen and Ammonia are envisaged to be the **future fuels to replace fossil fuels.**
- Production of these **fuels by using power from renewable energy, termed as green hydrogen and green ammonia, is one of the major requirements towards environmentally sustainable energy security of the nation.**
- Government of India is taking various measures to facilitate the transition from fossil fuel / fossil fuel based feed stocks to green hydrogen / green ammonia.

The policy provides as follows:

- Green Hydrogen / Ammonia manufacturers **may purchase renewable power from the power exchange or set up renewable energy capacity themselves or through any other, developer, anywhere.**
- **Open access will be granted within 15 days of receipt of application.**
- The Green Hydrogen / Ammonia manufacturer **can bank his unconsumed renewable power, up to 30 days, with Distribution Company** and take it back when required.

- Distribution licensees can also procure and supply Renewable Energy to the manufacturers of Green Hydrogen / Green Ammonia in their States at concessional prices which will only include the cost of procurement, wheeling charges and a small margin as determined by the State Commission.
- Waiver of inter-state transmission charges for a period of 25 years will be allowed to the manufacturers of Green Hydrogen and Green Ammonia for the projects commissioned before 30th June 2025.
- The manufacturers of Green Hydrogen / Ammonia and the renewable energy plant shall be given connectivity to the grid on priority basis to avoid any procedural delays.
- The benefit of Renewable Purchase Obligation (RPO) will be granted incentive to the hydrogen/Ammonia manufacturer and the Distribution licensee for consumption of renewable power.
- To ensure ease of doing business a single portal for carrying out all those activities including statutory clearances in a time bound manner will be set up by MNRE.
- Connectivity, at the generation end and the Green Hydrogen / Green Ammonia manufacturing end, to the ISTS for Renewable Energy capacity set up for the purpose of manufacturing Green Hydrogen / Green Ammonia shall be granted on priority.

- Manufacturers of Green Hydrogen / Green Ammonia shall be allowed to set up bunkers near Ports for storage of Green Ammonia for export / use by shipping. The land for the storage for this purpose shall be provided by the respective Port Authorities at applicable charges.
- The implementation of this Policy will provide clean fuel to the common people of the country. This will reduce dependence on fossil fuel and also reduce crude oil imports. The objective also is for our country to emerge as an export Hub for Green Hydrogen and Green Ammonia.
- The policy promotes Renewable Energy (RE) generation as RE will be the basic ingredient in making green hydrogen.

Saudi Green Initiative and Middle East Green Initiative

- Two recent initiatives were launched by Saudi to combat the threat of climate change — the ‘Saudi Green Initiative’ and the ‘Middle East Green Initiative’.
- In fact, one of the main pillars of the Saudi G20 presidency was to “safeguard the planet”. The Saudi leadership of the summit highlighted how climate change had negatively impacted the planet, people’s lives and their wellbeing.

- The G20 introduced initiatives like establishing a **Global Coral Reef Research and Development Accelerator Platform** to accelerate scientific knowledge and technology development in support of coral reef survival, conservation, resilience, adaptation and restoration. G20 leaders also acknowledged the **Circular Carbon Economy (CCE) Platform** as a tool towards affordable, reliable, and secure energy and economic growth.
- The **Saudi Green Initiative** aims to raise the vegetation cover, reduce carbon emissions, combat pollution and land degradation, and preserve marine life.
- As part of the initiative, **10 billion trees will be planted in the Kingdom**. It aims to reduce carbon emissions by more than 4% of global contributions, through a renewable energy programme that will generate **50% of Saudi's energy from renewables by 2030**. With the understanding that the need of the hour is to do more than enough, Saudi Arabia is working towards **raising the percentage of its protected areas to more than 30% of its total land area, representing roughly 6,00,000 km², exceeding the global target of 17%**.
- As part of the Middle East Green initiative, **Saudi Arabia will work with the Gulf Cooperation Council countries and regional partners to plant an additional 40 billion trees in the West Asian region**. It represents **5% of the global target of planting one trillion trees and reducing 2.5% of global carbon levels**.

- Saudi Arabia currently operates the largest carbon capture and utilisation plant in the world, turning half a million tonnes of CO₂ annually into products such as fertilizers and methanol.
- It also operates one of the region's most advanced CO₂-enhanced oil recovery plants that captures and stores 8,00,000 tonnes of CO₂ annually.
- Plans are afoot to deploy additional carbon capture, utilisation and storage infrastructure. Saudi Arabia believes that nature-based solutions will play an important role in removing carbon as part of the CCE. Saudi have already joined hands in February 2019 with India when it joined the International Solar Alliance.