STUDY NOTES · BASIC CONCEPT

About Green Hydrogen and National Green Hydrogen Mission

Science & Technology

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Different types of Hydrogen fuel

Type	How It Is Made	Pollution?
Green Hydrogen	From water using renewable electricity	**No pollution**
Blue Hydrogen	From natural gas + carbon capture	Low pollution
Grey Hydrogen	From natural gas	High pollution
Brown/Black Hydrogen	From coal	Very high pollution

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Green hydrogen is a clean, eco-friendly fuel produced by splitting water (H_2O) into hydrogen and oxygen using renewable energy sources like solar, wind, or hydropower. Green hydrogen is hydrogen gas made without causing pollution.

It is created using electricity from renewable sources, so the process produces zero carbon emissions.

How Green Hydrogen Is Produced?

The main method is electrolysis, where:

- Electricity passes through water
- Water splits into hydrogen and oxygen
- Hydrogen is collected as fuel
- If the electricity comes from clean energy, the hydrogen is called green hydrogen.

Why It Is Important?

- Zero carbon emissions: Helps fight climate change and reduce pollution.
- Can replace fossil fuels
- Can store energy
- Excess solar/wind energy can be converted into hydrogen and stored for later use.
- Helps countries become energy-independent

- Reduces dependence on imported oil and gas.

What is National Green Hydrogen Mission?

The National Green Hydrogen Mission, launched by the Government of India on 4 January 2023, is a major national initiative aimed at making India a global hub for production, use, and export of green hydrogen. The mission supports India's goals of energy independence, net-zero emissions by 2070, and reducing dependence on fossil fuel imports.

What Is the Mission's Main Objective?

The mission aims to scale up the production of green hydrogen—hydrogen generated using renewable energy through electrolysis—with zero carbon emissions. It also aims to promote the use of green hydrogen in industries such as:

- Steel
- Fertilizers
- Refineries
- Heavy transport
- Shipping

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Key Targets of the Mission (By 2030)

- 5 million tonnes (5 MTPA) of green hydrogen production per year
- 125 GW of renewable energy capacity dedicated to green hydrogen
- Significant reductions in fossil fuel imports
- India to become one of the world's largest producers and exporters of green hydrogen

Budget Allocation

- The government approved a funding of ₹19,744 crore, which includes:
- Incentives for electrolyzer manufacturing
- Support for green hydrogen production
- Pilot projects for usage in transport, shipping, and industries
- R&D programmes and skill development

Major Components of the Mission

- Strategic Interventions for Green Hydrogen Transition (SIGHT) : Financial incentives for domestic production of green hydrogen & electrolyzers
- Pilot Projects : Use of green hydrogen in mobility, shipping, steel, and natural gas blending

- Research & Development : Developing efficient and low-cost electrolyzers, Innovation in storage, transport, and fuel-cell technologies
- Green Hydrogen Hubs : Development of major production hubs across the country
- Skill Development : Training workforce in electrolyzer manufacturing, hydrogen safety, and fuel-cell tech

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