

DHRUBA CHAND HALDER COLLEGE

DEPARTMENT OF COMMERCE

SESSION: 2023-2024

**B.COM HONOURS AND GENERAL (UNDER CBCS)
SEMESTER – III**

PROJECT

NATIONAL GREEN HYDROGEN MISSION

NATIONAL GREEN HYDROGEN MISSION

NODAL MINISTRY

- Ministry of New and Renewable Energy

OBJECTIVE

- Decarbonise energy/industrial/mobility sector
- Develop indigenous manufacturing capacities
- Create export opportunities for GH₂ and its derivative

COMPONENTS OF NGHM

- Strategic Interventions for Green Hydrogen Transition Programme (SIGHT)
- Strategic Hydrogen Innovation Partnership (SHIP) (PPP for R&D)

*GH₂ is not commercially viable at present; current cost in India is around ₹350-400/kg.
The National Hydrogen Energy Mission aims to bring it down under ₹100/kg.*

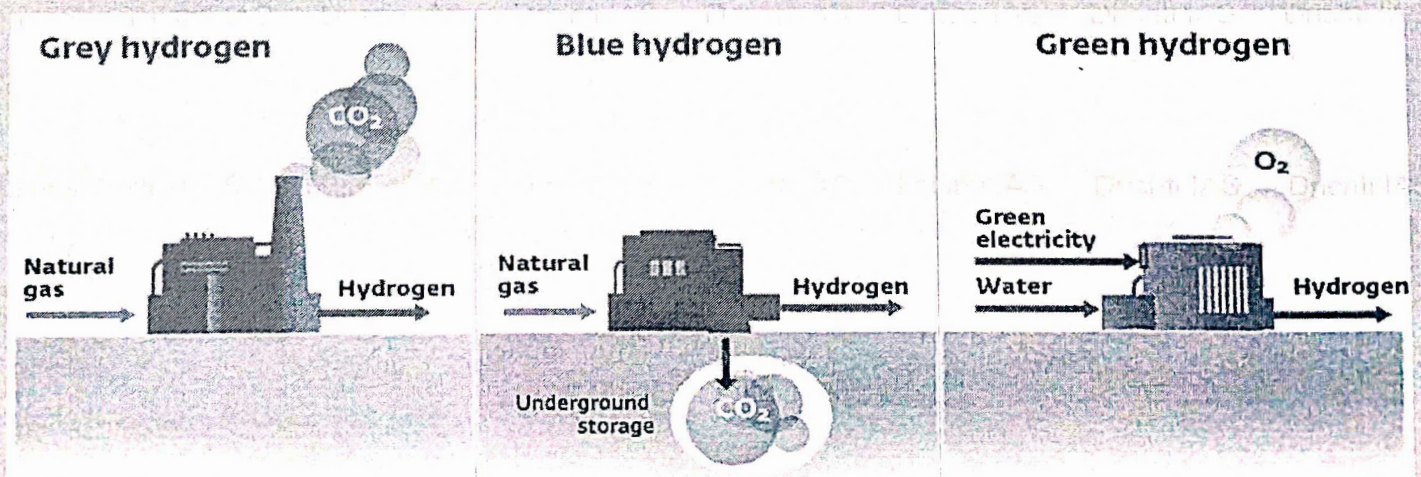
Expected Outcomes by 2030

- ◆ Atleast 5MMT GH₂ annual production
- ◆ Rs 1 lakh crore fossil fuel import savings
- ◆ 6 lakh jobs
- ◆ 50MMT CO₂ annual emissions averted
- ◆ ₹ 8 lakh crore investment

HYDROGEN AND GREEN HYDROGEN

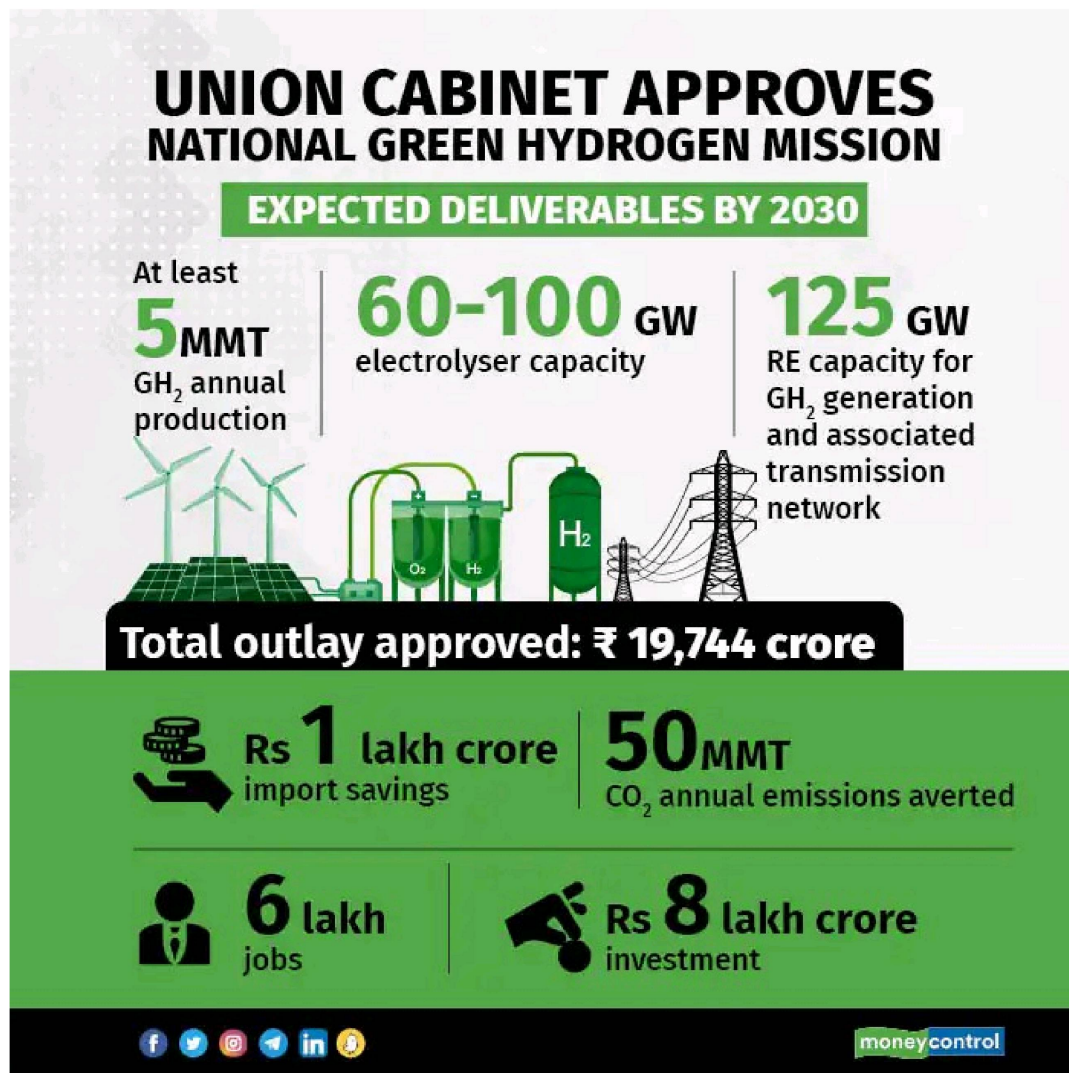
Hydrogen is the most common element in nature but exists only in combination with other elements. It has to be extracted from naturally occurring compounds (like water).

Green Hydrogen (GH₂) is made by splitting water through an electrical process called electrolysis, using an electrolyser powered by renewable energy (RE).



National Green Hydrogen Mission

The Union Government has approved a Rs 19,744 crore National Green Hydrogen mission that aims to make India a 'global hub' for using, producing and exporting green hydrogen.



What is the National Green Hydrogen Mission?

- **About:**

- It is a program to **incentivise the commercial production of green hydrogen and make India a net exporter** of the fuel.
- The Mission will facilitate demand creation, production, utilization and export of Green Hydrogen.

- **Sub Schemes:**
 - **Strategic Interventions for Green Hydrogen Transition Programme (SIGHT):**
 - It will fund the domestic manufacturing of electrolyzers and produce green hydrogen.
 - **Green Hydrogen Hubs:**
 - States and regions capable of supporting large scale production and/or utilization of hydrogen **will be identified and developed as Green Hydrogen Hubs.**
- **Objective:**
 - Developing green hydrogen production capacity of at least **5 MMT (Million Metric Tonne) per annum**, alongside adding **renewable energy capacity of about 125 GW (gigawatt) in India** by 2030.
 - It aims to **entail over Rs 8 lakh crore of total investments** and is expected to generate six lakh jobs.
 - It will also lead to **a cumulative reduction in fossil fuel imports by over Rs 1 lakh crore** and an abatement of nearly 50 MT of annual greenhouse gas emissions.
- **Nodal Ministry:**
 - Ministry of New and Renewable Energy
- **Significance:**
 - It will help entail the **decarbonisation of the industrial, mobility and energy sectors**; reducing dependence on imported fossil fuels and feedstock; developing indigenous manufacturing capabilities; creating employment opportunities; and developing new technologies such as efficient fuel cells.
- **Potential:**
 - India has a **favourable geographic location and abundance of sunlight and wind for the production** of green hydrogen.
 - Green hydrogen technologies are **being promoted in sectors where direct electrification isn't feasible.**

- Heavy duty, long-range transport, some industrial sectors and long-term storage in the power sector are some of these sectors.
- The nascent stage of this industry **allows for the creation of regional hubs that export high-value green products and engineering**, procurement and construction services.

What are the Challenges?

▪ In Nascent Stages Globally:

- Green hydrogen development is still in the nascent stages globally and while India can take the lead in being a major producer, **it doesn't have the necessary infrastructure yet** to execute all these intermediary steps.

▪ Economic Sustainability:

- One of the biggest challenges faced by the industry for using hydrogen commercially is the **economic sustainability of extracting green hydrogen**.
- For transportation fuel cells, hydrogen must be cost-competitive with conventional fuels and technologies on a per-mile basis.

What is Green Hydrogen?

▪ About:

- Hydrogen is a **key industrial fuel that has a variety of applications including the production of ammonia (a key fertilizer)**, steel, refineries and electricity.
- However, all of the hydrogen manufactured now is the **so-called 'black or brown' hydrogen because they are produced from coal**.
- Hydrogen is the most abundant element in the universe. But pure, or the elemental hydrogen, is very scarce. It almost always exists in compounds like with oxygen to form H₂O, or water.
- But when **electric current is passed through water, it splits it into elemental oxygen and hydrogen through electrolysis**. And if the **electricity used for this process comes from a renewable source** like wind or solar then the hydrogen thus **produced is referred to as green hydrogen**.

- Colors attached to hydrogen indicate the **source of electricity used to derive the hydrogen molecule**. For instance, if coal is used, it is referred to as brown hydrogen.

- **Current Production:**

- Green hydrogen currently accounts **for less than 1% of global hydrogen production** due to it being **expensive to produce**.
- A kilogram of black hydrogen costs USD 0.9-1.5 to produce while grey hydrogen costs USD 1.7-2.3 and blue hydrogen can cost anywhere from USD 1.3-3.6. However, green hydrogen costs USD 3.5-5.5 per kg, according to a 2020 analysis by the Council for Energy, Environment and Water.

- **Need for Producing Green Hydrogen:**

- Hydrogen is a great source of energy **because of its high energy content per unit of weight**, which is why it is used **as rocket fuel**.
- Green hydrogen in particular is **one of the cleanest sources of energy with close to zero emission**. It can be used in **fuel cells for cars or in energy-guzzling industries like fertilizers** and steel manufacturing.
- Countries across the world **are working on building green hydrogen capacity as it can ensure energy security** and also help in cutting carbon emission.
- Green hydrogen has become a global buzzword, especially as the world is facing its biggest-ever energy crisis and the threat of **climate change** is turning into a reality.

What are the other Initiatives Related to Renewable energy?

- **Jawaharlal Nehru National Solar Mission (JNNSM).**
- **International Solar Alliance.**
- **PM- KUSUM.**
- **National Wind-Solar Hybrid Policy.**
- **Rooftop Solar Scheme.**

Way Forward

- There is a need to announce **incentives to convince enough users of industrial hydrogen to adopt green hydrogen.**
- India needs to develop **supply chains in the form of pipelines, tankers, intermediate storage and last leg distribution networks** as well as put in place an effective skill development programme to ensure that lakhs of workers can be suitably trained to adapt to a viable green hydrogen economy.
- India has the **potential to bring down the cost of green hydrogen by using low-cost renewable generating plants** and cost-curtailement experience gained through solar and wind reverse auctions.
 - Huge market **potential, owing to the young demography and thriving economy, will be a long-term benefit for the government** while pushing the application of hydrogen-based technologies.