पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय
MINISTRY OF PETROLEUM AND NATURAL GAS
Government of India

DIRECTORATE GENERAL OF HYDROCARBONS
(Ministry of Petroleum & Natural Gas,Government of India)

Workshop on "Impact of ORD Act Amendments on the Indian Upstream Sector"

Enabling Cleaner Exploration: Energy Transition Mandates and GHG Reporting under the ORD Amendment Act

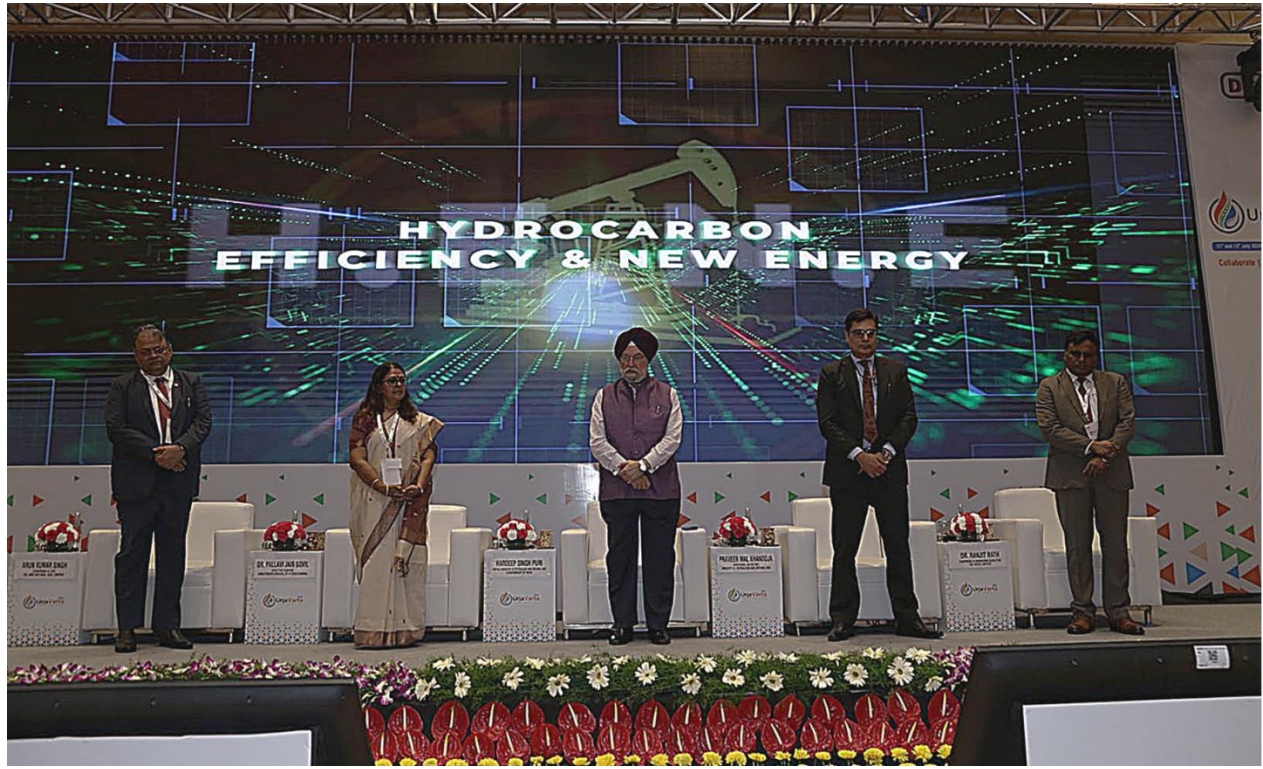
Dr. Prabhakar Thakur
HoD - Hydrocarbon Efficiency & New Energy Department, DGH
13.05.2025

Establishment of HENE Department

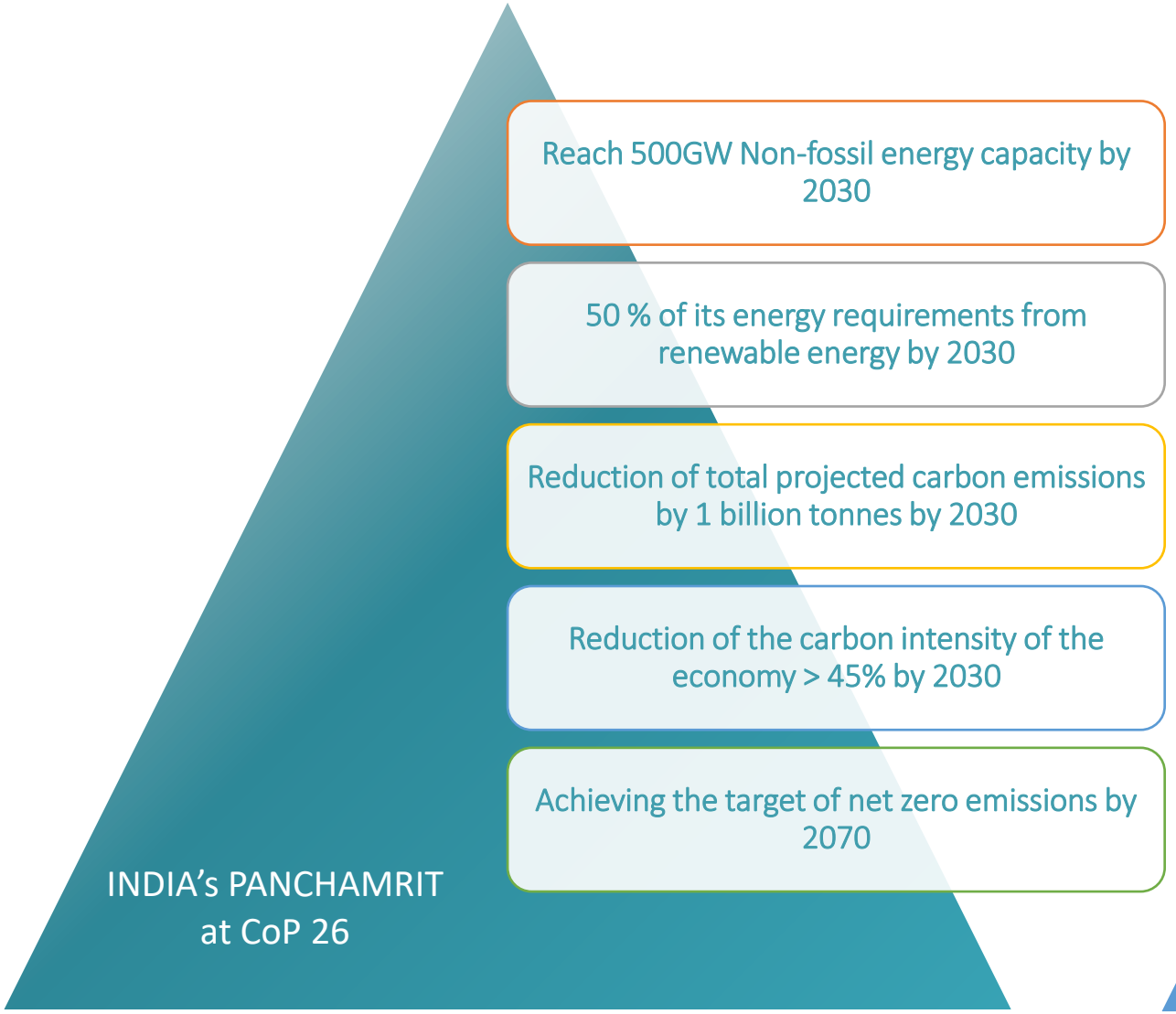
Launched by the Honorable Minister of Petroleum & Natural Gas Shri. Hardeep Singh Puri during the Inaugural edition of UrjaVarta on 11th July 2024

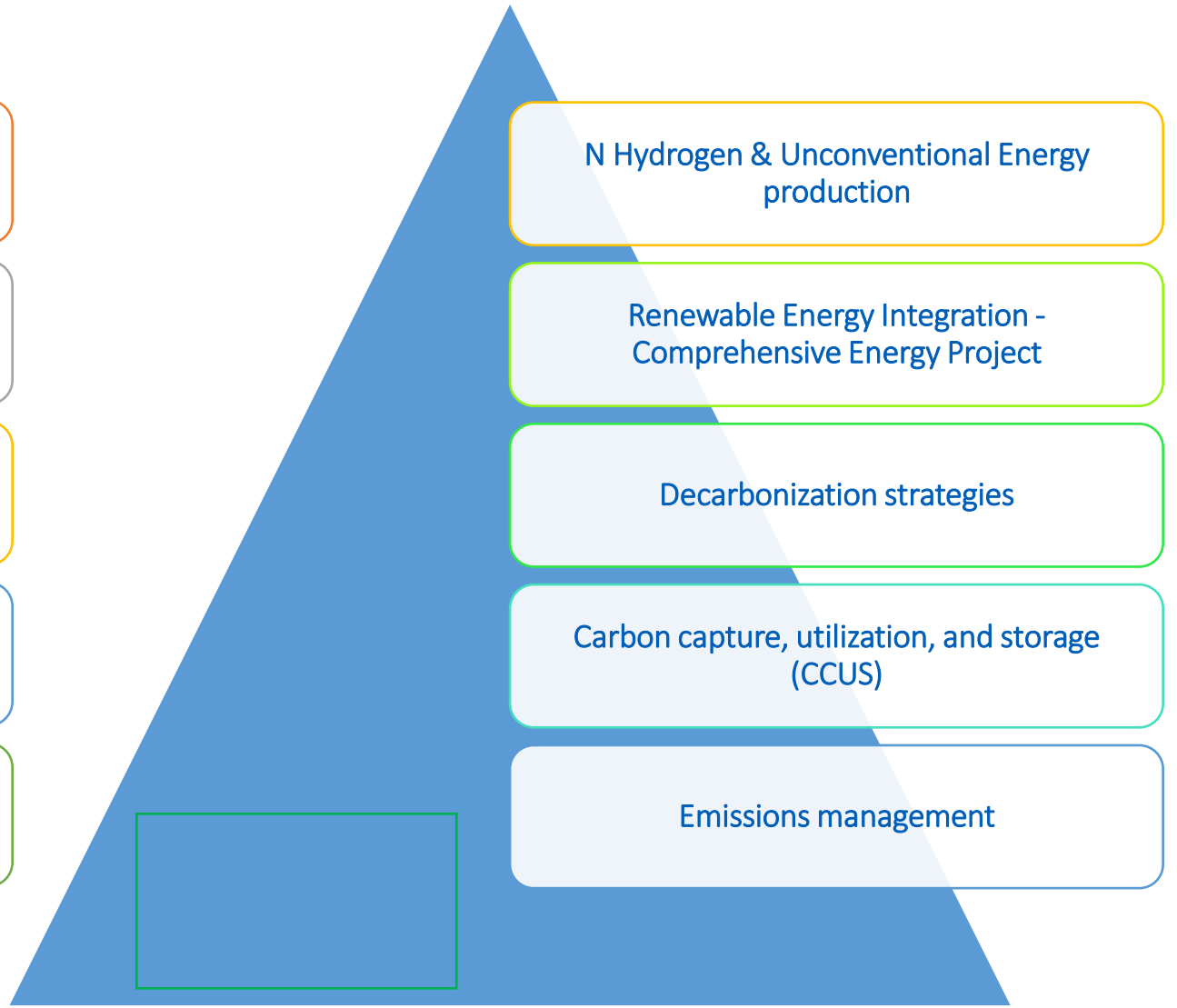
Primary Focus

- Facilitate Hydrocarbon efficiency through promoting **decarbonization** in the upstream Oil & Gas Sector, including **Carbon Capture and Storage** (CCS).
- Monitoring **flaring**, **venting**, and **leakages** in oil and gas operations.
- Integration of New Geological Energies such as **Geothermal** Energy and **Natural Hydrogen** into existing E&P operations.



Scope in India's Upstream Sector





HENE Department at DGH will facilitate the coordination of these new responsibilities

Lok Sabha passes Oilfields (Regulation and Development) Bill

Updated - March 12, 2025 at 08:45 PM. | New Delhi

Photo Credit: Sansad TV via PTI Photo

THE ORD ACT, 2025 received the assent of the President on the 28th March, 2025.

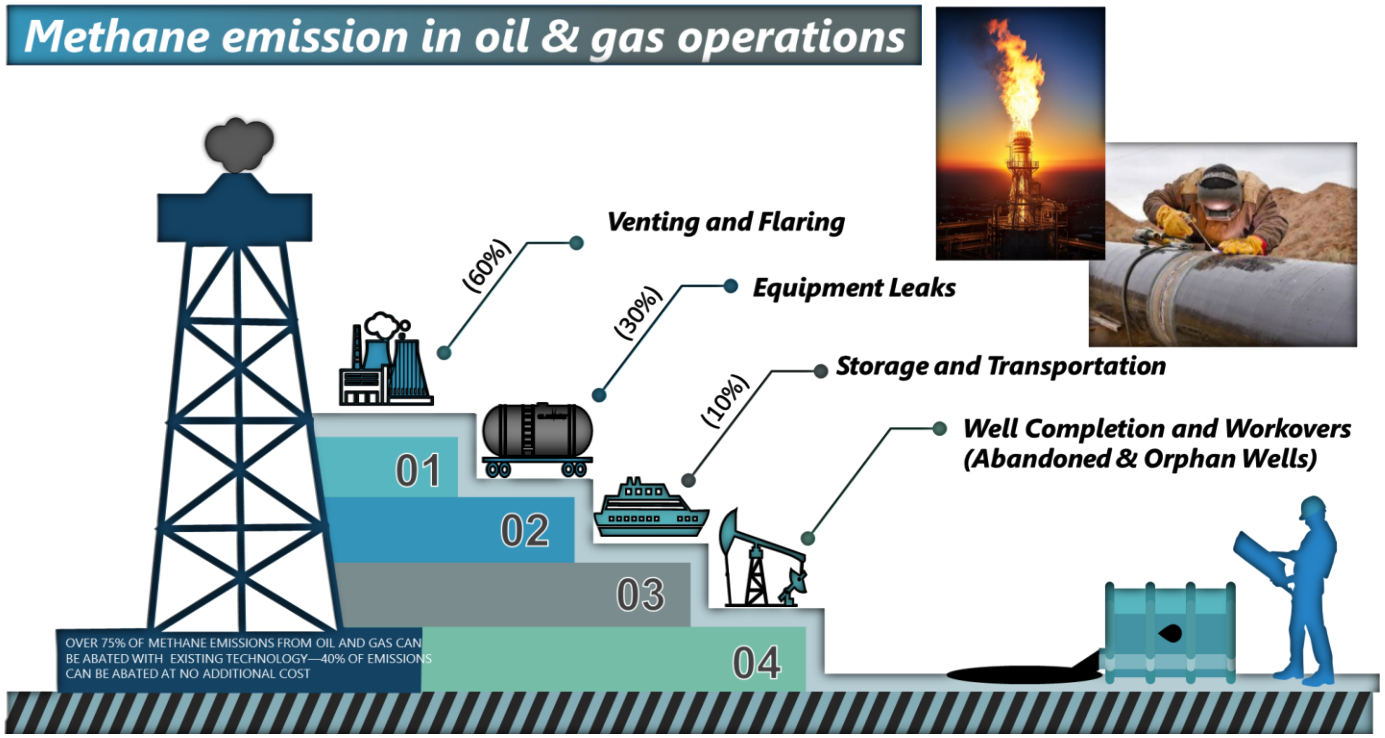
Key Reforms

- Broadening the scope of the term '**Mineral Oils**'- includes CBM, Shale oil & gas, tight oil & gas, gas hydrate
- Introduction of the '**Petroleum**' Lease- replacing the '**Mining**' Lease
- Providing efficient dispute resolution mechanisms
- **Decriminalizing** the Act and introducing penalties, an Adjudicating Authority, and an appellate process
- Facilitation of **hydrogen production, carbon capture, utilization, storage, and coal gasification**
- Mandatory reporting of **carbon and greenhouse gas emissions** from mineral oil operations
- Development of **comprehensive energy projects** at oilfields, including the integration of **renewable energy**

New Provisions after ORD Amendment Act 2025

Aspect	Legacy Framework	Revised Framework (After 2025 Amendment)
Definition of Mineral Oils	Crude oil and natural gas	Includes CBM, shale gas/oil, tight gas, gas hydrates
Hydrogen Inclusion	□ Not recognized	□ Explicitly mentioned (Sec 6(2)(o))
Carbon Capture and Storage (CCUS)	□ Not mentioned	□ Promoted and explicitly included (Sec 6(2)(o))
Environmental/GHG Reporting Obligation	Limited to basic conservation	□ Mandatory GHG reporting and detailed obligations (Sec 6(2)(p), 6(2)(m))
Energy Integration (Renewables)	□ Not provided	□ Encouraged under energy project provisions (Sec 6(2)(q))
Infrastructure Sharing	□ Not enabled	□ Allowed under multi-energy collaboration (Sec 6(2)(k))
Environmental Safety Protocols	□ Unclear	□ Codified under operational guidelines (Sec 6(2)(l))
Data Sharing for Emissions	□ Absent	□ Enabled for MRV of GHG data (Sec 6(2)(ga))
Legal Penalties for Non-Compliance	□ None	□ ₹25 lakh fine + ₹10 lakh/day for non-compliance (Sec 9)

Sources of GHG Emissions in Upstream Operations



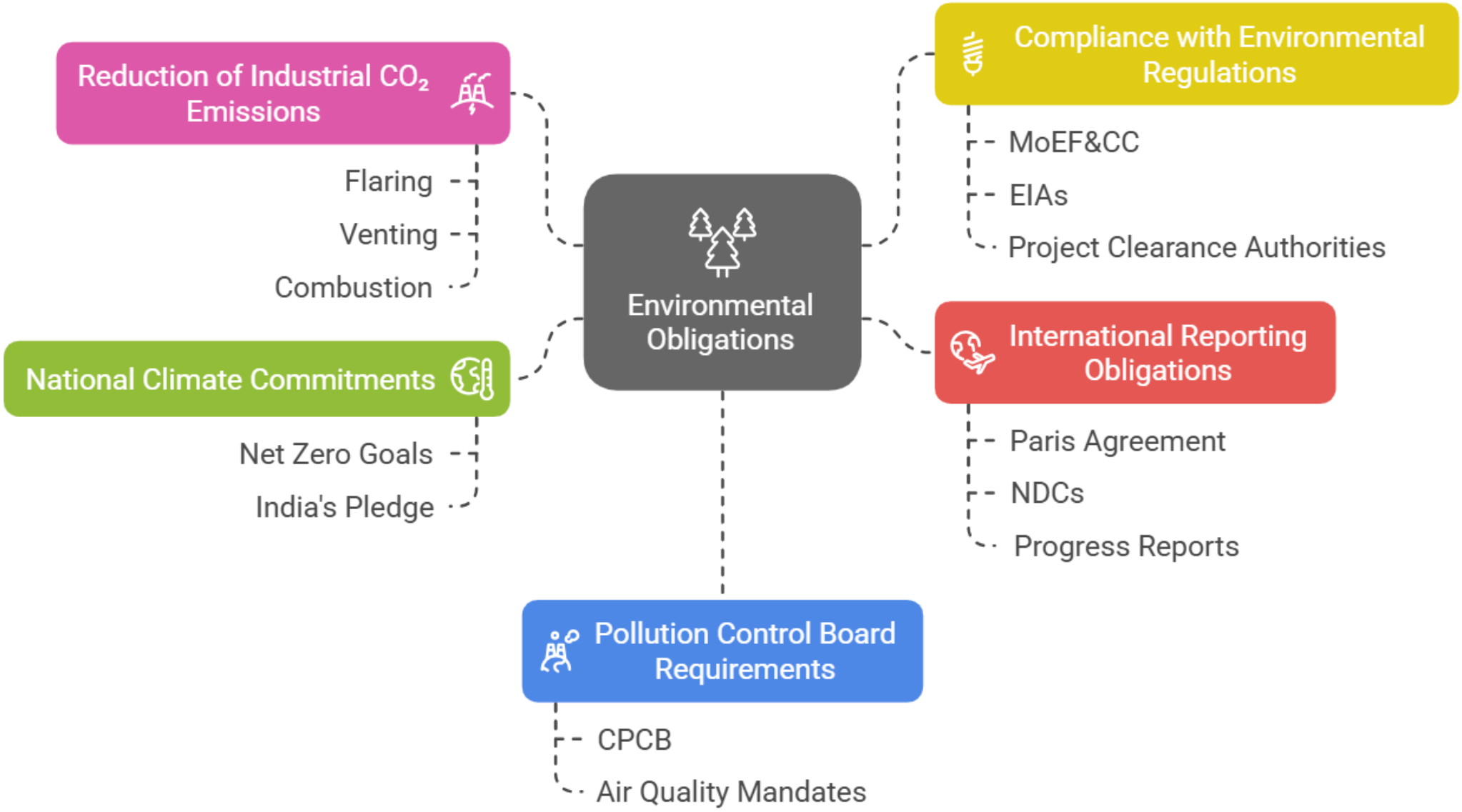
SCOPE 1: Direct GHG Emissions

- **Flaring** of associated gas during oil production
- **Venting** of natural gas
- **Fugitive methane leaks** from equipment
- **Fuel combustion**
- **Well completion and workover emissions**
- Process emissions from **gas treatment**
- **Mobile source emissions** from transport (rigs, vehicles, helicopters)

SCOPE 2: Indirect Energy Emissions

- Emissions from **electricity consumed** at drilling pads, processing units, and offices
- **Power drawn** from external grids to operate pumps, compressors, and control systems

Environmental Obligations



Cleaner & Unconventional Energy Resources

Clean Energy Resources

Solar Energy

Clean, renewable, and abundant energy source.

Wind Energy

Zero emissions and a sustainable resource.

Geothermal Energy

Uses Earth's internal heat for power. Clean, site-specific.

Unconventional Energy Resources

Tidal and Wave

Renewable and predictable energy source, early development.

Biomass and Bioenergy

Energy from organic matter, manage sustainably.

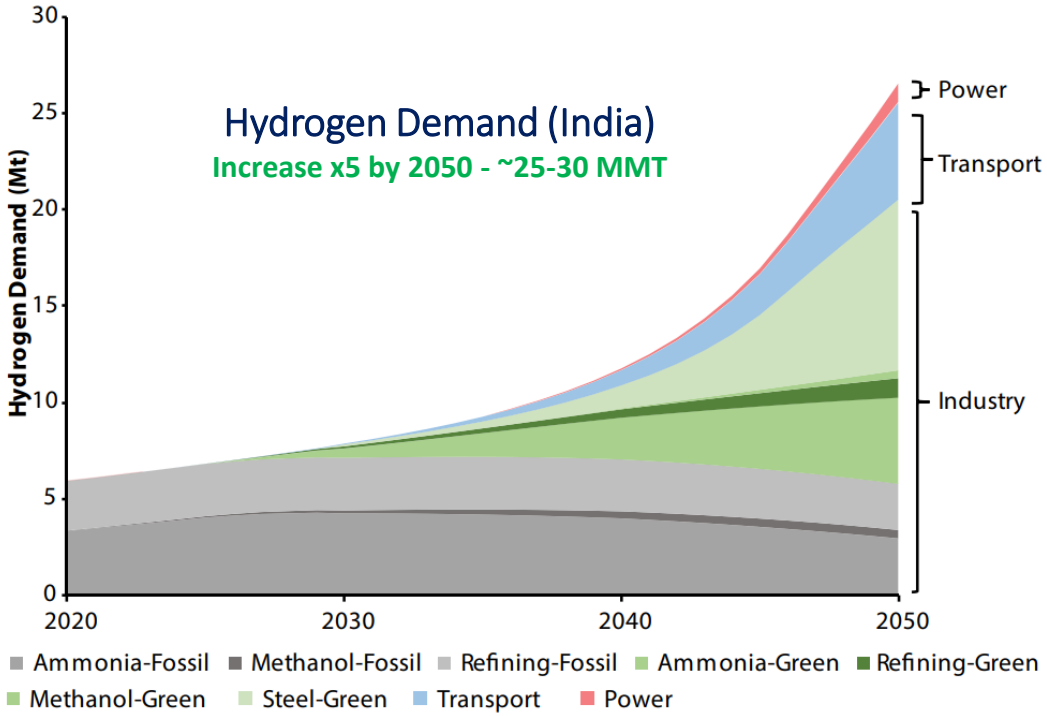
Hydrogen Energy

Clean fuel with zero emissions, water by-product.

Benefits

- Reduces air pollution and carbon footprint.
- Enhances energy security by diversifying sources.
- Promotes sustainable economic development.

National Green Hydrogen Mission



- Global hydrogen demand: ~ 90 million tonnes per annum (Mtpa)
- Hydrogen demand in India: ~ 6 million tonnes per annum (Mtpa)

- 98% of hydrogen production relies on fossil fuels - **Grey** hydrogen
- Grey H_2 - produced from **fossil fuels** without CCUS → GHG Emissions

National Green Hydrogen Mission

(Launched on 15th August 2021)

1. Export of Green Hydrogen: Make India a Global hub for the production & export of green hydrogen.
2. 5 million metric tonnes (MMT) of green hydrogen production annually by 2030.

$ Announced outlay of Rs 19,744 Cr.

National Green Hydrogen Mission targets

At least 5 MMT GH_2 Annual Production	60-100 GW Electrolyser capacity
50 MMT CO_2 Emissions Averted	₹ 1 lakh crores Import Savings
125 GW RE Capacity for GH_2 Generation	₹ 8 lakh cr Investment

Source: Press Information Bureau, Ministry of New and Renewable Energy

Natural Hydrogen

BLACK HYDROGEN
Generated through Coal Gasification

GREY HYDROGEN
Generated through SMR* using natural gas or fossil fuels

BLUE HYDROGEN
Generated through SMR with carbon capture using natural gas or fossil fuels

GREEN HYDROGEN
Generated through electrolysis using renewable electricity

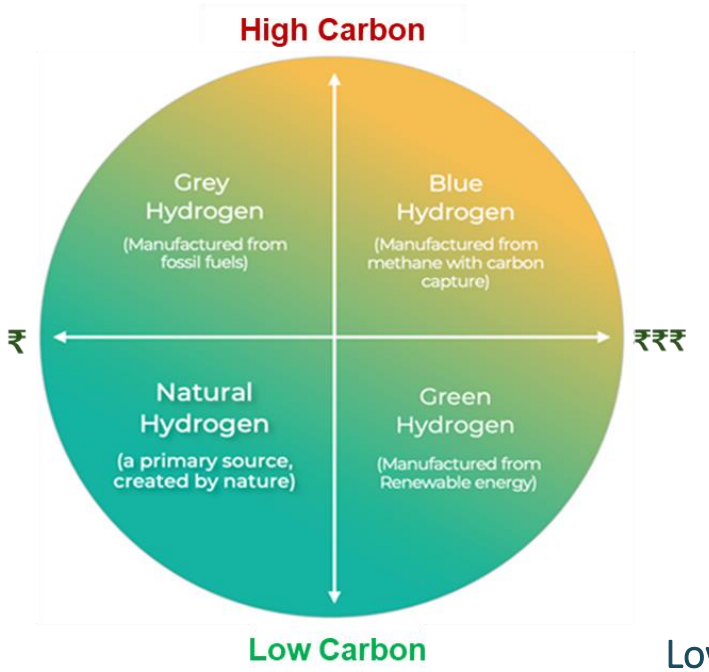
YELLOW HYDROGEN
Generated through electrolysis using solar power, specifically

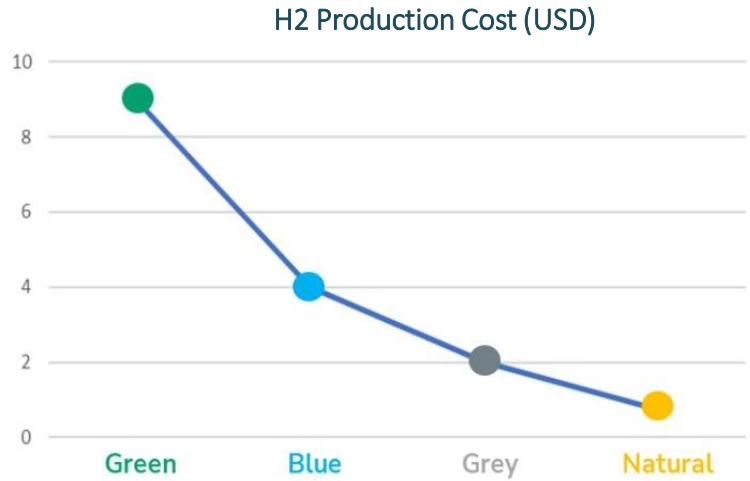
PINK HYDROGEN
Generated through electrolysis using nuclear energy

WHITE HYDROGEN
Natural Hydrogen or Gold Hydrogen Generated Naturally in Subsurface of the Earth

*SMR = steam methane reformation

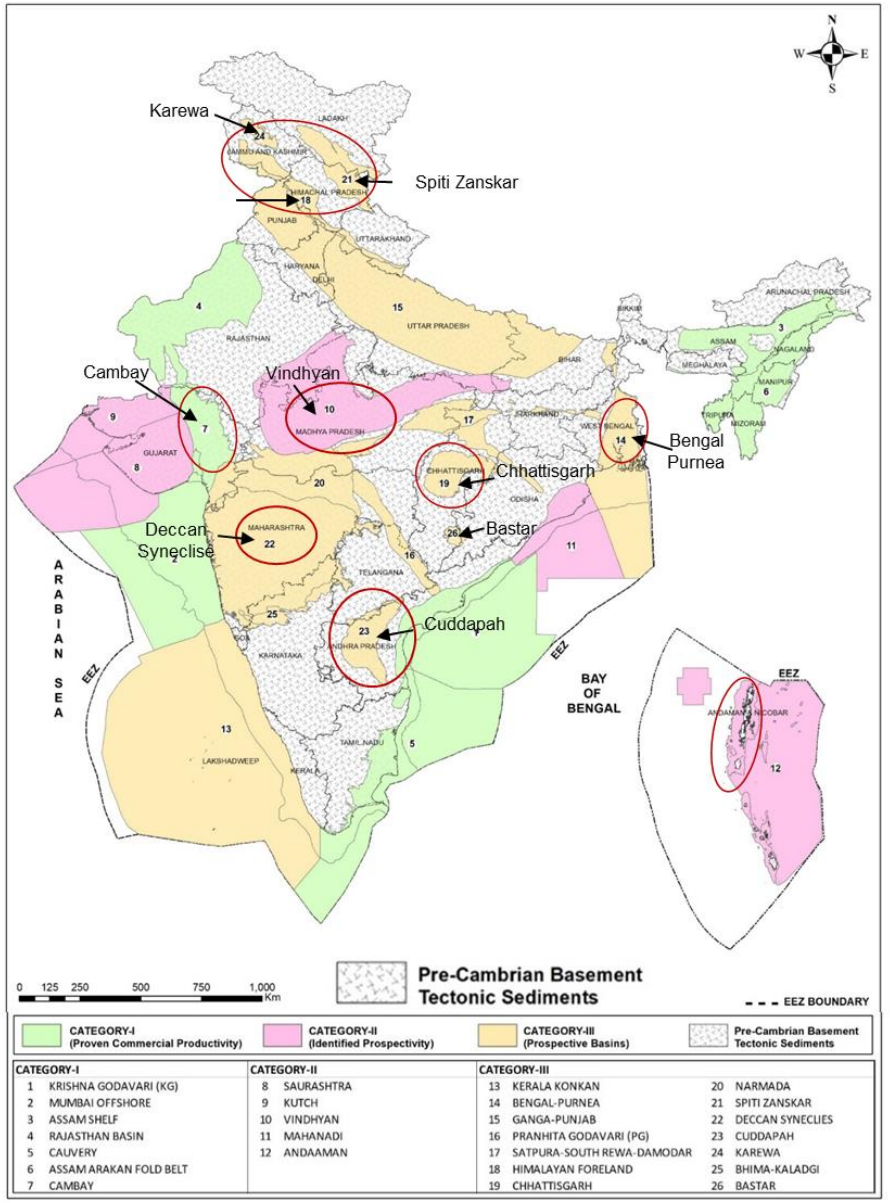
Hydrogen Rainbow





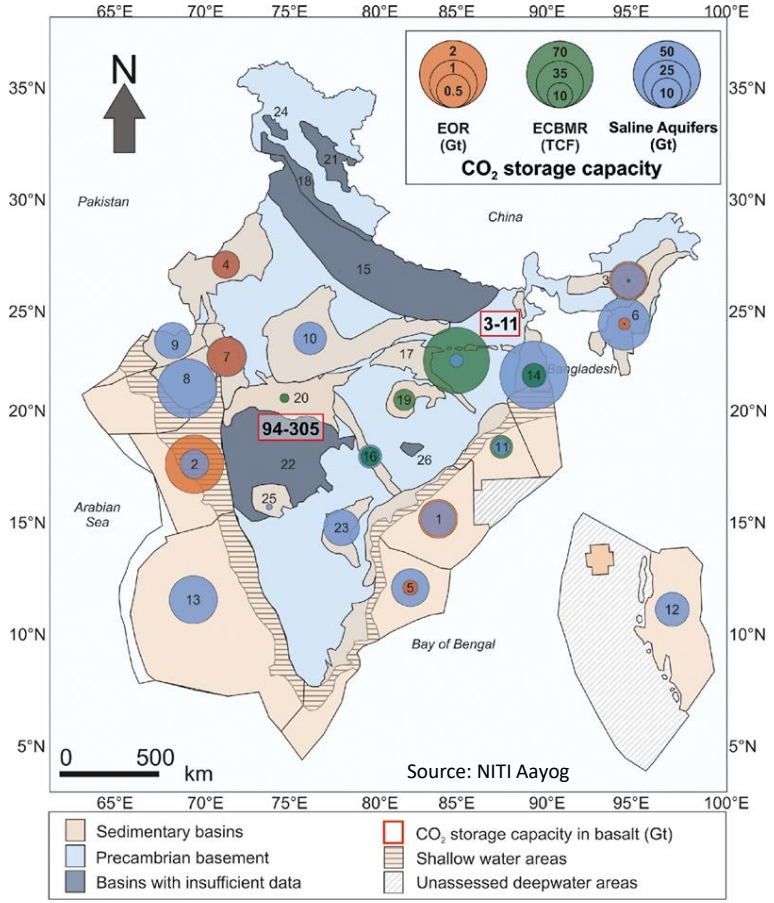
Source: Rigollet, C. and Prinzhofer, A., 2022

Lowest cost and lowest Emission energy supply



Carbon Capture, Utilization, and Storage (CCUS)

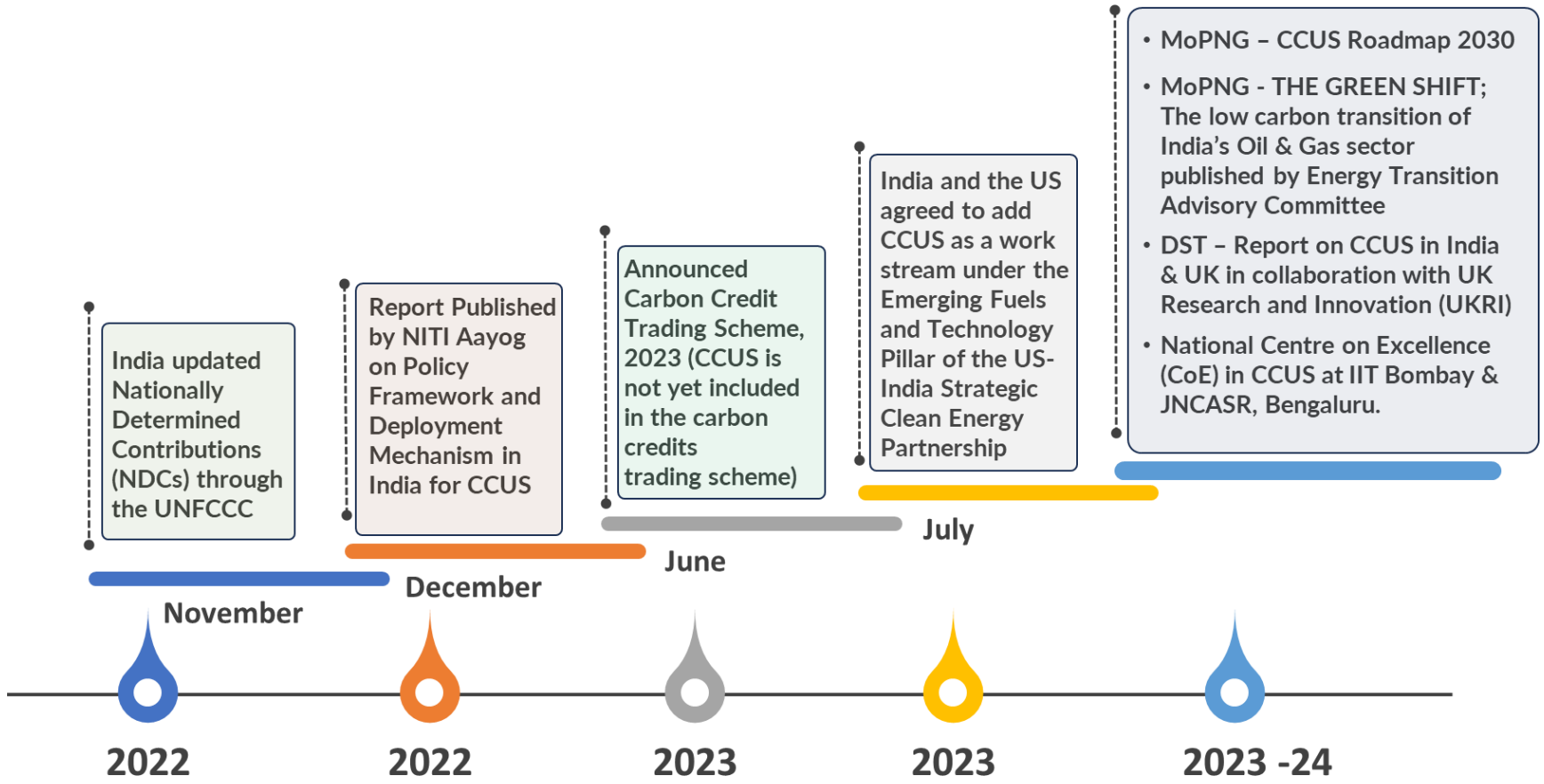
CCUS: Suite of technologies that enable the mitigation of carbon dioxide (CO_2) emissions



CO_2 storage potential through CO2 EOR, ECBMR, in saline aquifers, and in basalt

CO_2 storage capacity: 395-614 Gt

(Theoretical Storage Capacity)



ORD Amendments Act 2025: CCUS technologies recognized as part of decarbonization strategies.

Way Forward

GHG Monitoring Mechanism

- Establish a robust verification mechanism to measure, report, and verify (MRV) GHG emissions, ensuring transparency and accountability.

Development of Reporting Standards

- Collaborate with national and international agencies to establish standardized reporting protocols for GHG emissions, including carbon accounting, emissions tracking, and mitigation measures.

Assessment of CO_2 Storage Potential

- Basin-wise assessments to identify and evaluate geological formations suitable for CO_2 storage.

Natural Hydrogen Exploration

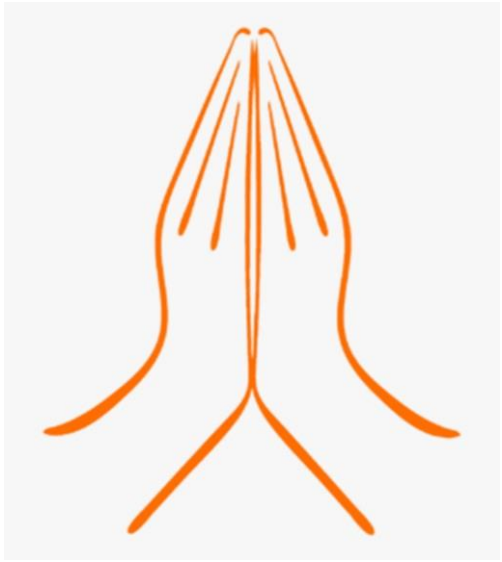
- Geological assessments to evaluate the potential for natural hydrogen
- Formulating Policy support for establishing white Hydrogen within existing oil & gas operations.

Support for Comprehensive Energy Projects

- Recommend, propose and design a composite license framework
- Policy support for testing the Geothermal Potential in existing wells

Pilot Projects & Technology Collaboration

- Collaborate with E&P operators, academic institutions, and international partners to facilitate pilot CCUS projects and enable technology transfer



Thank You