National Green Hydrogen Mission

- Atleast 5MMT GH2 Annual Production
- 6 Lakh new green jobs
- 50 MMT of carbon abatement cumulatively
- 60-100 GW Electrolyzer installations
- 125 GW renewable energy for Green Hydrogen production
- Over 8 Lakh investments

"Govt working on definition of Green Hydrogen, global standard needed"

INTRODUCTION

Hydrogen, as an energy carrier, is becoming crucial for achieving decarbonization of hard-to-abate sectors. Many sectors such as iron ore and steel, fertilizers, refining, methanol, and maritime shipping emit major amounts of CO2, and carbon-free hydrogen will play a critical role in enabling deep decarbonization. For other high-emitting sectors, such as heavy-duty trucking and aviation, hydrogen is among the main options being explored with an outlook to be the preferred solution for several applications.

Various plenary talks, expert panel discussions and technical deliberations held at the conference will provide domestic and international participants from the industry and research communities an opportunity to dive deep into these national and global priorities, in line with the objectives embedded in India's of National Green Hydrogen Mission, a mission launched by the Government of India to help achieve India's target of Net Zero by the year 2070.

This has resulted in growing global momentum towards hydrogen in general, and green hydrogen—hydrogen produced through electrolysis of water using electricity from renewable sources—in particular. Declining prices of hydrogen, coupled with growing urgency for decarbonization means the global demand for hydrogen could grow by almost 400 percent by 2050, led by industry and transportation.

The Prime Minister's Independence Day speech on August 15th, 2021, signaling the launch of the National Hydrogen Mission, attests to India's intent to be a global hub for green hydrogen. As PM Modi's speech outlines, **"Not only will Green Hydrogen be the basis of green growth through green jobs, but it will also set an example for the world towards clean energy transition."**

India's distinct advantage in low-cost renewable energy generation makes green hydrogen the most competitive form of hydrogen in the long run. This enables India to potentially be one of the most competitive producers of green hydrogen in the world. Green hydrogen can achieve cost parity with natural gas-based hydrogen (grey hydrogen) by 2030, if not before. Beyond cost, since hydrogen is only as clean as its source of generation, green hydrogen will be necessary to achieve a truly lowcarbon economy.

Green Hydrogen Conference from 25th June'24 - 27th June'24 at Vigyan Bhawan, New Delhi will be a great opportunity to Gain Insight into the Latest Hydrogen Strategies and broaden your knowledge about Green Hydrogen.

KEY HIGHLIGHTS OF OUR EVENT

- VENUE : Vigyan Bhawan, New Delhi , Hall No.: - 1, 2, 3, 4, 5,6
- Total Stalls: 72
- 4000+ Participants in 3 days for attending Conference and Awards.
- 10+ countries are expected to join the event.
- Knowledge Reports will be published
- 3 Ministers and Government bodies

WHY TO EXHIBIT

Increase In Brand Awareness
Green Hydrogen Exhibition gives us broad awareness and understanding of growing hydrogen community world-wide.

Connect with Potential Clients
One can meet representatives and prospective clients of all companies.

Gain Industry knowledge
offers a chance to showcase your latest innovative products for an opportunity to discuss, collaborate, and do business with investors looking to drive the hydrogen industry forward.

Business Dealings
It will allow to host meetings and secure business deals on your exhibition stand along with generating new leads for your company in a highly targeted environment.

WHO SHOULD ATTEND?

- Research and Academia
- Component Manufacturers & Industrial End-users
- Service Providers
- Government Officials & Regulators
- Intergovernmental Institutions
- Utilities, Power, Water
- Storage and Distribution
- Gas & LNG Infrastructure
- Renewable Energy Producers (Wind, Solar, Hydro and others)
- International and National Oil Companies
- Mobility Sector
- Infrastructure & Construction

TOWARDS A NATIONAL ACTION PLAN ON GREEN HYDROGEN

Given the prospects that green hydrogen presents for India, real action is required for the country to truly benefit from the opportunities. This report provides ten actionable steps that can guide a National Action Plan on Green Hydrogen.

A detailed roadmap focused on all aspects of 'Green Hydrogen'

The recent announcement of the National Hydrogen Mission needs to be complemented with further policy direction in the form of a national roadmap/strategy.8 A long-term roadmap focused on green hydrogen will improve investors' confidence and will converge the entire value chain and the various government agencies towards a singular vision.

Facilitate investment through demand aggregation and dollar-based bidding for green hydrogen

The government can provide financial certainty to early adopters through investment facilitation measures like demand aggregation, ensuring availability of long-tenor and low interest finance and initiation of a functioning carbon market.

Encourage capacity building and skill development

Initiate appropriate and rapid skills development across the ecosystem including government, industry, and academia addressing technologies, business models, policies, and geopolitics.

Encourage state-level action and policy making related to Green Hydrogen

States should be encouraged to launch their own green hydrogen-based policies in order to complement efforts at the national-level. This way the champion green hydrogen states could also be identified.

Establish mandates and provide incentives to achieve a green hydrogen production capacity of 160 GW

The government can propose clear mandates around hydrogen blending in existing (refinery and ammonia) and potentially future consumption sectors (steel and heavy-duty vehicles). This will provide demand certainty for early green hydrogen projects and encourage market development. For new applications, where the viability of using green hydrogen is still nascent, the government can provide incentives such as a production linked incentive (PLI) scheme for green steel targeting export markets.

The refinery sector accounts for almost 3 million tonnes of hydrogen demand, representing 46% of the total hydrogen demand in the country.

Promotion of exports of green hydrogen and green hydrogen-embedded products through a global hydrogen alliance

The government is exploring integrating hydrogen into existing energy and industrial partnerships globally. This should include developing collective frameworks and creating labelling and standards around green hydrogen and hydrogen-embedded products like green steel and green ammonia.

Initiate green hydrogen standards and a labelling programme

Immediate action should be undertaken to further develop standards and a green hydrogen labelling programme.

HYDROGEN FUNDAMENTALS

Hydrogen is an energy carrier and can be used for a wide array of energy and industrial applications. It can also be stored for long time. The opportunities and challenges of hydrogen emerge from its energy characteristics. Central to the green hydrogen production process is the electrolyser technology. Alkaline and polymer electrolyte membrane (PEM) electrolysers are two commercially available technologies for green hydrogen production today. Advanced electrolyser technologies like solid oxide and anion exchange membrane nearing commercial deployment as well.

Other less prevalent sources of production include bio-hydrogen which can either be produced by an SMR process around methane produced by anaerobic digestion of organic waste or through a fermentation process by bacteria.

PRODUCTION OF HYDROGEN

Although hydrogen is the lightest and most abundant element in the universe, it is rarely found in nature in its elemental form and always must be extracted from other hydrogen-containing compounds. It also means that how well hydrogen contributes decarbonization depends on how clean and green the method of production is. Based on the sources and processes, hydrogen can be classified into various colours:

Black / Brown / Grey Hydrogen is produced via coal or lignite gasification (black or brown), or via a process called steam methane reformation (SMR) of natural gas or methane (grey). These tend to be mostly carbon intensive processes.

Blue Hydrogen is produced via natural gas or coal gasification combined with carbon capture storage (CCS) or carbon capture use (CCU) technologies to reduce carbon emissions.

Green Hydrogen is produced using electrolysis of water with electricity generated by renewable energy. The carbon intensity ultimately depends on the carbon neutrality of the source of electricity (i.e., the more renewable energy there is in the electricity fuel mix, the "greener" the hydrogen produced).

> **"Green Hydrogen is a clean energy source that only emits water vapor and leaves no residue in the air, unlike coal and oil."**