



## Concept note for “Hydrogen Economy- The New Delhi Dialogue-2021” scheduled on April 15, 2021

The Energy Forum (TEF) and the Federation of Indian Petroleum Industry (FIPI) under the aegis of Ministry of Petroleum and Natural Gas, Government of India, is organising a “Hydrogen Economy- The Indian Dialogue-2021” in a virtual mode to discuss emerging hydrogen ecosystems and exploring opportunities for collaboration, cooperation and coalition.

Global commitments for environmental protection has spurred seismic shifts towards decarbonisation by stakeholders— regulators, investors and policy makers alike. Among varied initiatives, Hydrogen (H<sub>2</sub>), while receiving an unprecedented interest in R&D, demonstration, deployment and investment is emerging as an important lever among the set of technologies to lead the world towards meeting net-zero targets. Higher energy density, flexibility of feedstock, ease of trade, longer storage periods, scalability, adaptability and versatility in terms of end applications favour development of a robust ecosystem for a hydrogen economy.

The interest in hydrogen as a green energy option is not new. However, its production was based on limited technological options and usage restricted to passenger cars. Today, the depth of technology and breadth of the applications being experienced during the current wave are the key differentiators that are propelling the growth of the smallest molecule into a sustainable energy option. Various other colours of the element —depending on the diversity of feedstocks from which it is getting generated—have generated interest in recent times. While the green colour —derived from renewable power sources without any carbon footprint— is gaining unprecedented political and business momentum, the importance of blue hydrogen, sourced from fossil sources but hyphenated with CCUS to mitigate associated carbon emissions, yellow hydrogen extracted from nuclear power and turquoise hydrogen generated from from chemical looping are also being explored as intermediate set of solutions for cleaner energy.

India’s strength in leading the global solar and wind developments provides critical armoury to make strong headways towards evolving greener hydrogen pathways for multiple applications. While ensuing energy security and environmental sustainability, hydrogen as an energy carrier brings on anvil unique advantages for India—India’s potential to get integrated with agrarian economy, adaptability in leveraging the renewable power, especially solar power, compatibility with various feedstocks, versatility of applications and the creation of jobs/business ecosystem. All these potential merits emanate from the fact of higher energy density of hydrogen offering longer range along with lower refuelling time.

Government of India has recently announced the Hydrogen Mission in Budget 2021 for making a hydrogen roadmap for the country. Multiple academic institutes, research laboratories, public sector undertakings and private companies are pursuing hydrogen research programs in the country. Indian Oil’s R&D, under the patronage of the Indian Ministry of Petroleum and Natural Gas is pioneering the hydrogen research program amongst the oil and gas sector in the country for the past two decades. The experiment of operating 50 CNG buses with hydrogen-spiked CNG mixture is under execution in Delhi.



Research programs on the introduction of fuel cell buses based on different green pathways is also being managed by the Indian Oil R&D. Besides this, other Indian PSU oil & gas companies are planning various activities on the production of green hydrogen and its use in refineries and natural gas pipelines for domestic and mobility applications. Automotive OEMs in India are on the verge of introducing the vehicles based on hydrogen fuel cell technology in the country. Tata Motors, India's largest heavy-duty vehicle manufacturer carried out successful demonstration trials of India's first hydrogen fuel cell-powered bus in collaboration with IOCL.

Leading organizations and research institutes, like Indian Space Research Organization, Automotive Research Association of India, Bharat Heavy Electricals Limited, Indian Institute of Science, IITs and various CSIR laboratories are actively pursuing R&D programs in the hydrogen space. Knowing fully that cooperation multiplies force and effectiveness, there is an urgent need to join hands for accelerating the pace of developments in the hydrogen arena. Articulating, demonstrating and sharing the best examples of policy and financing tools being followed /adopted by other geographies will allow the Indian industry to scale up and attract new investments. A convergence in global efforts is critical towards ensuring building significant share of hydrogen in the global energy system in the coming decades. India, with its steadfast efforts towards leading the energy transition backed by the robust political will is committed to engage with partners for ushering in the hydrogen economy.

Objectives of the roundtable:

- The goal of the New Delhi dialogue is to understand the progress of hydrogen ecosystem across continents and contribute to creating synchrony among the global think tanks, the industry and governments to join forces for developing innovative and sustainable technologies at attractive costs.
- Assessing the potential of hydrogen from multiple sources and its relevance in national energy transitions.
- Sharing learnings of creating a hydrogen ecosystem and best practices in other geographies.
- Exchanging views on the different technologies and potential for new projects, and thereby catapulting the scope for international collaboration.

Indicative discussion points:

- National hydrogen roadmaps of respective participating countries and plans for the future.
- Key initiatives with 3-5 years horizons among the industry.
- Efforts by the public and private sectors to scale-up the production and use of green hydrogen, in particular, for hard-to-decarbonise sectors.
- The role green hydrogen can play in the future of the energy transformation, including in energy and development plans for achieving relevant international commitments.
- Some specific steps needed to bring green hydrogen to scale and at a competitive cost.
- Explore low hanging and intermediate pathways along with the applications for introducing hydrogen in the energy mix.
- Government funding, investments and financing in the sector.