IN PARTNERSHIP WITH

NITI Aayog

Ministry of Environment, Forest and Climate Change
Government of India

विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY

DSIR

PHD CHAMBER
OF COMMERCE AND INDUSTRY

INVITES YOU TO

INTERNATIONAL CLIMATE SUMMIT 2021

Powering India's Hydrogen Ecosystem

03 SEPTEMBER 2021
NEW DELHI

REGISTER AT WWW.ICS-HYDROGEN.COM

AN INITIATIVE BY THE ENVIRONMENT COMMITTEE, PHD CHAMBER OF COMMERCE AND INDUSTRY

Co-Organiser

iTEN MEDIA™

Country Partner

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New Delhi

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SWACHH BHARAT NEELA AKASH
CONQUERING GREEN FRONTIERS
PHDCCI ENVIRONMENT COMMITTEE

DRAFT

SPEARHEADING INDIA'S TRANSITION TO CLEAN ENERGY

> There is an urgent need to address all issues pertaining to clean energy together, in order to find a set of balanced, positive and beneficial solutions for the future.

Dr. J.P. Gupta
Summit Chair and
Chairman Environment Committee, PHDCCI

SWACHH BHARAT NEELA AKASH
CONQUERING GREEN FRONTIERS
PHDCCI ENVIRONMENT COMMITTEE

DRAFT

Summit Organiser

PHD CHAMBER OF COMMERCE AND INDUSTRY

SWACHH BHARAT NEELA AKASH
PHDCCI ENVIRONMENT COMMITTEE

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Ministry of Environment, Forest and Climate Change
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DEPARTMENT OF SCIENCE & TECHNOLOGY

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Supporting Ministries

- NEW AND RENEWABLE ENERGY
- MICRO, SMALL & MEDIUM ENTERPRISES
- POWER
- COAL
- PETROLEUM & NATURAL GAS

सत्यमेव जयते

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IH2A
INDIA HYDROGEN ALLIANCE

NEERI

GREENSTAT Norway
Asia

GEXCON
Norway

GREENSTAT Norway
Hydrogen India

Arena H2Cluster
The Norwegian Hydrogen Cluster

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INTERNATIONAL CLIMATE SUMMIT 2021

Powering India's Hydrogen Ecosystem

03 SEPTEMBER 2021
NEW DELHI

Vasudhaiva Kutumbakam
THE WORLD IS ONE FAMILY

Energy that brings the world together

ICS 2021 is an initiative by the Environment Committee, PHD Chamber of Commerce and Industry in partnership with NITI Aayog, Ministry of Environment, Forest & Climate Change, Department of Scientific & Industrial Research, CSIR and the Department of Science & Technology, Government of India.

Hon'ble Prime Minister Shri Narendra Modi is being invited to inaugurate the Summit.

The Summit is supported by the Ministry of New & Renewable Energy, Power, Petroleum & Natural Gas, Coal and MSME, Government of India.

Norway is the Partner Country.

The Summit is a precursor to the 26th Conference of Parties (COP) to the UN Framework Convention on Climate Change (UNFCCC) to be convened in November 2021 at Glasgow.

Greenstat Asia Norway, Gexcon Norway, Arena H2 Cluster Norway, India Hydrogen Alliance and TERI are the knowledge partners of ICS 2021.

DRAFT

MESSAGE FROM HON'BLE PRIME MINISTER OF INDIA

Shri Narendra Modi

Hon'ble Prime Minister of India

Space holder for quote extracted from the Prime Minister's address. Space holder for quote extracted from the Prime Minister's address.

DRAFT

MESSAGE FROM HON'BLE MINISTER OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

Shri Bhupender Yadav

Hon'ble Minister of Environment, Forest and Climate Change, Government of India

Placeholder for extract of message to be received from Hon'ble Minister of Environment, Forest and Climate Change

DRAFT

MESSAGE FROM HON'BLE MINISTER OF POWER AND NEW & RENEWABLE ENERGY

Shri Raj Kumar Singh

Hon'ble Minister of Power and New & Renewable Energy, Goivernment of India

The Summit will be an essential prelude to the National Hydrogen Energy Mission to draw up a road map for using Hydrogen as an energy source.

सत्यमेव जयते

I am delighted to know that PHD Chamber of Commerce and Industry is organising the **'International Climate Summit 2021 - Powering India's Hydrogen Ecosystem'**.

Climate Change is a major environmental threat and one of the most important challenges of our time and demands our utmost attention now more than ever.

Our Carbon Footprint accounts for more than 50 percent of humanity's overall Ecological Footprint and is the most rapidly growing component. The Summit will prove to be an important platform to discuss these significant issues and also be an essential prelude to the **National Hydrogen Energy Mission** that the government is presently pursuing to draw up a road map for using Hydrogen as an energy source.

Green Hydrogen has the potential to provide clean power and mitigate our Carbon Footprint which is impacting human lives and livelihoods worldwide.

I extend my good wishes and wholehearted Congratulations to PHD Chamber, for organizing an event of profound eminence and wish them success.

DRAFT

MESSAGE FROM CEO, NITI AAYOG

Shri Amitabh Kant

Chief Executive Officer, NITI Aayog

NITI Aayog

Green Hydrogen is the future of the Indian energy and chemicals sector. Green Hydrogen will facilitate Indians to capture new avenues of growth and become global champions in this era, where the world is demanding green products.

Locally available Green hydrogen made from India's record low renewable power will help India create high-value green industries like green refining, green ammonia, green steel, and green chemicals.

DRAFT

MESSAGE FROM CHAIRMAN AND MANAGING DIRECTOR, RELIANCE INDUSTRIES LIMITED

Shri Mukesh Dhirubhai Ambani

Chairman and MD, Reliance Industries Limited

RIL's overall initial investment from its own internal resources in the New Energy business will be INR 75,000 crore (over $10 billion), in three years.

I am delighted to know that an **'International Climate Summit 2021'** is being organised on 3rd September, with an ambitious agenda to **'Power India's Hydrogen Ecosystem'**. By actively patronising it, the Government of India has demonstrated its deep commitment to the agenda.

The world is today at the brink of a fundamental and disruptive transition in the way energy is sourced, produced, distributed and used. The era of fossil fuels, which powered economic growth globally for nearly three centuries, is transitioning to a new age of green, clean and renewable energy. This transition has been necessitated by two priorities. First, our planet's fragile ecology has been engendered by the huge quantities of carbon that the use of fossil fuels has emitted into the environment. Therefore, urgent action to overcome the climate crisis has become the prime responsibility of the international community. Second, the energy needs of a large section of the global population of over 7.5 billion and growing, are set to grow steeply. These needs can no longer be met by traditional hydrocarbon fuels.

These two factors are also relevant in the Indian context. As one of the only two countries in the world with a population of over one billion, India has to take the lead in bearing the flag of reversing climate change. At the same time, we also need more energy as we march confidently to become one of the three largest economies in the world. India's power consumption is currently only one third of the global average. This will vastly increase as we endeavor to improve the quality of life of our citizens, a vast majority of whom currently suffer from energy deprivation.

contd/-

DRAFT

Reliance
Industries Limited

> *Under the inspiring leadership of our Prime Minister Shri Narendra Modi ji, I have no doubt that India will emerge as a nation that shows the path of sustainability to the rest of the world while we make ourselves truly 'Atmanirbhar' in achieving energy security.*

Therefore, in order to meet these twin obligations, India must make a rapid transition to ensure ample and affordable clean energy to every Indian and to every sector of the Indian economy.

Together with solar, wind, batteries and carbon capture, hydrogen will be an important element of India's future ecosystem. Hydrogen, the 'energy vector of the 21st century', is the best and cleanest source of energy, which can play a fundamental role in our decarbonisation plans. It is also set to become affordable in the coming years. We can realise this vision with the adoption of breakthrough technologies and the right set of policies that promote an army of new energy entrepreneurs. The draft National Hydrogen Mission is a great leap in the right direction.

Under the inspiring leadership of our Prime Minister Shri Narendra Modi ji, I have no doubt that India will emerge as a nation that shows the path of sustainability to the rest of the world while we make ourselves truly 'Atmanirbhar' in achieving energy security.

I congratulate the organisers of the 'International Climate Summit 2021' and wish the event full success.

DRAFT

MESSAGE FROM PRESIDENT, PHD CHAMBER OF COMMERCE AND INDUSTRY

Shri Sanjay Aggarwal

President,
PHD Chamber of Commerce & Industry

Enabling regulatory framework will give a boost to the Make in India initiative in developing India's Hydrogen Ecosystem.

PHD Chamber of Commerce and Industry (PHDCCI), a National Apex Chamber, established in 1905, has been relentlessly working for the socio-economic development of India and for promotion of Indian industry, trade and entrepreneurship across the globe. PHDCCI has been an active participant in the India Growth Story through its Advocacy Role with Government of India and State Governments. It is one of the Premier Chambers in India to have been accredited with “Diamond Grade” by NABET(QCI), at national and international level. PHDCCI is reaching out to more than 1,50,000 companies through its direct and indirect membership base, and has a special focus on the development of small and medium businesses.

I am extremely pleased to convey my appreciation to Dr. J.P Gupta, Chairman of PHDCCI Environment Committee, for conceiving, planning and executing the **'International Climate Summit 2021: Powering India’s Hydrogen EcoSystem'**. The summit is timely and important for the country in building India’s Hydrogen Economy, its policies and a roadmap for the future. Enabling regulatory framework is needed to give a boost to the **Make in India** initiative in production, supply chain and partnerships. Domestic opportunities for electrolysis and fuel cells storage, training and standards will certainly help in developing the hydrogen ecosystem in India.

I extend my warm welcome to all participants to **ICS 2021** from all over the world, for useful discussions and joining hands to make our planet a better place to live for future generations.

SWACHH BHARAT NEELA AKASH
CONQUERING GREEN FRONTIERS
PHDCCI ENVIRONMENT COMMITTEE

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MESSAGE FROM SUMMIT CHAIR

Dr. J.P. Gupta

Summit Chair & Chairman, Environment Committee, PHDCCI

> *India is uniquely placed to produce hydrogen not only for its own needs, but it could well become a global export hub.*

India with a population of approximately 1.3 billion is the second most populous country and the third largest economy in the world. The country's total primary energy supply has a composition of coal 44.3%, oil 25.3%, bioenergy and waste 21.12% natural gas 5.8%, hydro 1.4% nuclear 1.1% and solar 0.4%. India's per capital energy consumption stands at 30% of the world average, and its energy system is largely dependent on fossil fuels i.e., coal for power generation, oil for transport and industrial sector and biomass for residential heating and cooking.

As the world's third largest consumer of oil, India is heavily dependent on imports. Its energy demand is likely to double and electricity demand triple by 2040. With the rise, the major impact will be on environment. The energy sector is considered to be a major source of atmospheric contamination and in turn is responsible for change in climate. In view of this, there is a dire need to look for non carbon based energy.

As one of the cleanest fuels with zero carbon emission, hydrogen has shown a ray of hope against climate change. It has high energy content per unit mass, that is three times higher than gasoline. It is being used for energy application with suitable fuel cells. Coking coal in steel plants is being replaced with hydrogen to get rid of CO2.

India is uniquely placed to produce hydrogen not only for its own needs but it could well become a global export hub, due to the availability of cheaper renewable energy.

There are, however, several challenges which India faces with respect to technology, storage, transportation, new materials development, electrolysis development, safety standards and regulatory regime.

contd/-

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MESSAGE FROM SUMMIT CHAIR (CONTD/-)

We are pleased to receive support from NITI Aayog, Department of Science & Technology, Govt. of India, TERI, NEERI, India Hydrogen Alliance, Greenstat Norway, Gexcon Norway, Arena H2 Cluster Norway and several Ministries of the Govt. of India, for the **'International Climate Summit 2021: Powering India's Hydrogen Ecosystem'**.

Eminent global speakers on hydrogen representing the entire value chain will join to discuss various issues, which shall be useful for developing programmes and strategies, specific for India. Experts from academia, industries, and policy makers at a common platform is important for faster development of hydrogen energy.

We at PHDCCI suggest the need for an **'International Hydrogen Alliance'** on the lines of 'International Solar Alliance' for rapid introduction of hydrogen energy for various applications, as no single company or country can offer solutions for the entire value chain in hydrogen.

India also needs **Centres of Excellence** at various Universities with the support of Industry and knowledge partners for capacity building.

> *"There is a need for an 'International Hydrogen Alliance' for rapid introduction of hydrogen energy. India also needs 'Centres of Excellence' at various Universities with the support of Industry and knowledge partners for capacity building."*

SWACHH BHARAT NEELA AKASH
CONQUERING GREEN FRONTIERS
PHDCCI ENVIRONMENT COMMITTEE

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WHY IS THE SUMMIT IMPORTANT?

India has emerged as a global leader in climate change and remains committed to substantially reducing its carbon footprint in the future. Given its geographical location, **India is among the best-suited countries to produce renewable energy from solar and wind**, making the production of hydrogen through renewable cost-effective. With abundant natural resources, favourable climatic and geographical conditions, **India has an advantage that needs to be harnessed**.

In this regard, the **National Hydrogen Energy Mission** announced in the Union Budget of India 2021-22 also provides the industry an impetus towards tapping Hydrogen as an alternate source of energy & building capacity to become the cheapest hydrogen producer in the world by 2050.

The **International Climate Summit 2021** is a progressive step towards a cleaner, greener, and sustainable future. A catalytic moment presenting these next-generation clean energy opportunities, the Summit will facilitate global collaboration in building sustainable pathways for production, storage, transportation, distribution, and ambitious deployment of hydrogen technologies.

INTERNATIONAL CLIMATE SUMMIT 2021

Powering India's Hydrogen Ecosystem

03 SEPTEMBER 2021
NEW DELHI

PARTICIPANTS & INVITEES

- Academicians, Researchers & Scholars
- Bureaucrats
- Civil Society representatives (NGOs, Advocacy groups and think-tanks)
- Diplomats
- Ministerial representatives
- Policy Makers
- PSU and Private Sector Industry Representatives (MDs, CEOs, CXOs & senior management) from the energy, technology, finance, transportation and related sectors)
- Press and Media

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EXPECTED TAKEAWAYS

SUMMIT AGENDA

- International Alliances and Coalitions
- International and Private Sector Funding
- Hydrogen Production Technologies
- Fuel Cell and Hydrogen in Transportation
- Hydrogen Storage
- Policy Regulations - developing a framework for policies, regulations and safety standards
- Setting up of Centre of Excellence in Hydrogen (CoE-H2)
- Ecology, Agriculture & Climate Change Mitigation
- Role of Hydrogen for a Carbon Neutral Ladakh

INTERNATIONAL CLIMATE SUMMIT 2021

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- Key insights from country leaders, policy makers, regulators on policy frameworks, global developments & Green Hydrogen roadmaps
- India-centric and action-oriented approach for building self-reliance in Hydrogen ecosystem and solutions
- Access to Nobel Laureates, Ministry officials, industry leaders, experts & scientists from across the globe
- Opportunities for bilateral trade, joint ventures, technology transfer & international funding to strengthen the 'Make in India' mission
- Access to breakthrough innovations, technologies & solutions for the Hydrogen value chain
- Insights from industrial customers & Hydrogen clusters including those from steel, refineries, fertilizers, cement, ports and logistics industries
- Access to National Hydrogen Portal - www.greenhydrogen-india.com, a single information source for research, production, storage, transportation and application of hydrogen

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SUGGESTED RECOMMENDATIONS

International Climate Summit 2021 will be a step forward in the mission of the 26th CoP summit and would facilitate meeting the climate challenges through a consolidated approach and timely interventions. **Together with India's Honourable Prime Minister** and other world leaders, the Summit will bring together **stakeholders from across the global clean energy industry**, to arrive at a consensus in matters pertaining to climate change and sustainability.

Basis the Summit deliberations, the Environment Committee of PHD Chamber of Commerce & Industry would recommend the formation of an **'International Hydrogen Alliance'** similar to **'International Solar Alliance'**, and the **setting up of 'Centres of Excellence'** in select Universities across India - key Initiatives that will assist in capacity building through a strong knowledge base and R&D. Other key recommendations include **building of an enabling regulatory framework** to boost domestic manufacturing of Hydrogen under the **Make in India** initiative & promoting **Ladakh as a carbon neutral model region**.

A special Knowledge Book to compliment the Summit recommendations, aptly titled **'Self-Reliant India – Harnessing the Power of Hydrogen'** authored by Dr. Karen Landmark and her team of international experts from Norway would be released by the Hon'ble Prime Minister during the Summit. The Summit would be followed by monthly round table conferences and discussions with key players across the value chain. Subsequently, a final report with suggestions and final recommendations on **'Powering India's Hydrogen Ecosystem'** would be submitted to the Government of India by the end of year 2021.

DESIRED OUTCOME

International Climate Summit 2021 is a progressive step towards a cleaner, greener and sustainable future and will provide a platform to deliberate on the challenges India faces in introducing and adopting hydrogen as a preferred source of alternate energy.

The summit would encompass technical discussions on all related topics and matters that would be followed by monthly round table conferences and discussions with key players across the value chain. Subsequently, a final report with suggestions and recommendations would be prepared on the entire value chain, a copy of which would be submitted to the Govt. of India by the end of year 2021. This report would be India centric and action oriented with a special focus on **'Powering India's Hydrogen Ecosystem'**.

More than 2000 national and international scientists are expected to get connected by this program. The proceedings of the summit will reach a wide audience in more than 150 countries.

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INTERNATIONAL CLIMATE SUMMIT 2021

Powering India's Hydrogen Ecosystem

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SUMMIT SCHEDULE

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PHDCCI ENVIRONMENT COMMITTEE

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INDIAN STANDARD TIME

9:00-10:00 HRS	**ASSEMBLY/ REGISTRATION**	
10:00-13:30 HRS	**INAUGURAL/ OPENING SESSION**	
	Arrival of Chief Guest	National Anthem
	Welcome Address and Program Perspective	**PHDCCI**
	Address by the Chief Guest • Release of Knowledge Book "Self-Reliant India - Harnessing The Power Of Hydrogen" by Dr. Karen Landmark, Norway • Launch of National Hydrogen Portal www.greenhydrogen-india.com	**Shri Narendra Modi*** Hon'ble Prime Minister of India
	India's Commitments towards UN Sustainability - Goal - 17	**Shri Bhupender Yadav*** Hon'ble Minister of Environment, Forest & Climate Change
	National Hydrogen Energy Mission	**Shri Raj Kumar Singh*** Hon'ble Minister of Power and New & Renewable Energy
	Green Hydrogen as a Key player in Energy Transition	**Shri Amitabh Kant** CEO, NITI Aayog
	Green Hydrogen - A Global Outlook	**Håkon Haugli** CEO, Innovation Norway
	Challenges and Solutions in introducing Hydrogen Energy	**Mr. Sturle Harald Pedersen** Chairman Greenstat India, Norway

Country Partner

Norwegian Embassy *New Delhi* | Innovation Norway

To be confirmed

All timings are in Indian Standard Time (IST)

INTERNATIONAL CLIMATE SUMMIT 2021

Powering India's Hydrogen Ecosystem

SWACHH BHARAT NEELA AKASH

CONQUERING GREEN FRONTIERS

PHDCCI ENVIRONMENT COMMITTEE

03 SEPTEMBER 2021 | NEW DELHI

SUMMIT SCHEDULE

INDIAN STANDARD TIME

10:00-13:30 HRS **INAUGURAL/ OPENING SESSION** *contd/-*

Is the Golden Age of Hydrogen Coming?

Mr. Nobuo Tanaka
Special Advisor, The Sasakawa Peace Foundation (SPF) Tokyo, Japan; Former Executive Director, International Energy Agency (IEA)

13:30-14:30 HRS **LUNCH BREAK**

14:30-16:30 HRS	**Session 01**	International Alliances and Coalitions
14:30-16:30 HRS	**Session 02**	International, Private Sector Funding and Green Bond Market
14:30-18:30 HRS	**Session 03**	MAKE IN INDIA A. Hydrogen Production Technologies B. Fuel Cell and Hydrogen in Transportation C. Hydrogen Storage
14:30-18:30 HRS	**Session 04**	A. Policy Regulations B. Setting up Centres of Excellence in Hydrogen (CoE-H2)
14:30-18:30 HRS	**Session 05**	A. Ecology, Agriculture & Climate Change Mitigation B. Role of Hydrogen for a Carbon Neutral Ladakh

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INTERNATIONAL CLIMATE SUMMIT 2021

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Session 01

14:30-16:30 HRS (IST)

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International Alliances and Coalitions

International alliances and coalitions are important to meet the ambitious deployment of hydrogen technologies by 2040 / 2050, bringing together renewable and low-carbon hydrogen production, demand in industry, mobility and other sectors, and hydrogen.

With such alliances, India can build its hydrogen leadership similar to the International Solar Alliance for carbon neutrality. Global energy and other industrial firms led by Indian private-sector conglomerate Reliance Industries (RIL) and US-based engineering company Chart Industries have already formed an energy transition coalition - the India H2 Alliance (IH2A) - to commercialize hydrogen technology and systems that will help develop a net-zero carbon pathway in India.

The session will focus on cooperative efforts that will help provide solutions for storing and transporting pressurized and liquefied hydrogen, in order to build a hydrogen economy and supply chain in India. It will also explore possibilities in blue and green hydrogen production & storage; transport powered by hydrogen fuel cells & other heavy duty transportation; hydrogen-use clusters including industrial clusters - specifically for steel, refineries, fertilizers, cement, ports and logistics.

Keynote Speaker:
Prof. K. Vijay Raghavan*
Principal Scientific Advisor
Govt. of India

Moderator

Sturle Harald Pedersen
Chairman, Greenstat India
Norway

Speakers

Anurag Pandey*
India H2 Alliance (IH2A)
Co-Lead; R&D Team Lead
Reliance Industries Limited

Dr. Karen Landmark
Chair of the Board
Greenstat Asia, Norway

Kowtham Raj VS
Fellow
World Energy Council

To be confirmed

INTERNATIONAL CLIMATE SUMMIT 2021

Powering India's Hydrogen Ecosystem

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Session 02

14:30-16:30 HRS (IST)

International, Private Sector Funding and Green Bond Market

Countries globally work for their high GDP for accelerated economic growth. At the same time, countries need to discharge their climate mitigation obligations. In this regard, it is important to consider the vital role of finance. Funding will always be a key driver to put new low carbon technologies in place.

In this session panelists will share viewpoints from a multilateral, government and public finance, as well as private sector investor perspective.

Keynote Speaker:
Jillian Evanko
President and CEO, Chart Industries
Strategic Investor into FiveT H2 Fund
(world's first H2 dedicated Investment Fund)
India H2 Alliance (IH2A) Co-Lead

Moderator

Rajnish Kumar
Former Chairman
State Bank Of India

Speakers

Takeo KONISHI
Country Director, India Resident Mission (INRM) - Asian Development Bank (ADB), New Delhi

Isabelle Laurent
Deputy Treasurer & Head of Funding
European Bank for Reconstruction and Development (EBRD), London

Dr.Sunita Satyapal
Director, Hydrogen and Fuel Cell Technologies Office, Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Kailash Vasvani
President, Corporate Finance
Renew Power, New Delhi

Chintan Shah
Director (Technical), Indian Renewable Energy Development Agency Ltd., New Delhi

Surbhi Goyal
Senior Energy Specialist
World Bank

Neeraj Gupta
CFO, ACME Solar
India

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INTERNATIONAL CLIMATE SUMMIT 2021

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Session 03

14:30-16:00 HRS (IST)

MAKE IN INDIA

A. Hydrogen Production Technologies

Currently, over 95% of hydrogen is produced from hydrocarbons and about 4% is produced through electrolysis of water. Hydrogen is also produced as a by-product in chloralkali industries. There are several other methods to produce hydrogen that are at different stages of research and demonstration. These methods include hydrogen production through:

a) Biomass and biological route
b) Photo electrochemical route
c) Thermo-chemical decomposition of water using nuclear energy or solar energy
d) Electrolysis using renewable energy (solar, wind)

Globally, there is increasing trend toward climate mitigation and increasing concern with associated issues of air pollution. In this context hydrogen offers compelling benefits. It supports a gradual transition towards lower-carbon sources of energy as it can be generated from natural gas. And the other is by non-renewable by-products. Demand for hydrogen production technologies is rising given its potential to accelerate the transition to more sustainable forms of energy.

This session will discuss various elements of hydrogen production technologies, cost aspects including hydrogen value chain from source to service.

Keynote Speaker:
Dr. V.K. Saraswat
Member Energy, NITI Aayog
Topic: *Blue Hydrogen as an enabler to the Green Hydrogen Economy*

Moderator

Prof. S. Dasappa
IISc Bangalore, India

Speakers

Dr. Ashish Lele
Director, National Chemical Laboratory, Pune, India

Dr. SSV Ramakumar
Director (R&D), IOC India

Dr. P. Selvam*
IIT Madras, India

Vegard Frihammer
Founder & CEO, Greenstat
Chair H2 Cluster, Norway

Rajat Seksaria
CEO, ACME Solar India

To be confirmed

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INTERNATIONAL CLIMATE SUMMIT 2021

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Session 03

16:00-17:30 HRS (IST)

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CONQUERING GREEN FRONTIERS
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MAKE IN INDIA

B. Fuel Cell and Hydrogen in Transportation

Hydrogen has the potential to play a significant role in the transportation sector. It can have a wide range of transport sector applications that include local public passenger transport, heavy-duty road transport and commercial vehicles, as well as in marine, rail, and possibly, even in aviation. However, challenges are many that include reducing delivery cost, increasing energy efficiency, maintaining purity, and leakages. Hence a number of important challenges must need to be overcome if it has to make a major energy contribution in the transport sector.

The esteemed panelists of the session will discuss and take forward the session theme.

Moderator

Shri Prakash
Distinguished Fellow,
Transport & Urban Governance,
TERI, India

Speakers

Vikram Gulati*
Senior Vice President
Toyota Kirloskar Motors (KTM)

Dr.Sushil S Ramdasi*
Dy. Director
Powertrain Engineering, ARAI

Mohit Bhargava
Executive Director, NTPC

Suresh Arikapudi
General Manager, Tata Motors

*To be confirmed

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INTERNATIONAL CLIMATE SUMMIT 2021

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PHDCCI ENVIRONMENT COMMITTEE

03 SEPTEMBER 2021 | NEW DELHI

Session 03

17:30-18:30 HRS (IST)

MAKE IN INDIA

C. Hydrogen Storage

Hydrogen storage is a key enabling technology. None of the current technologies satisfies all the hydrogen storage attributes sought by manufacturers and end users. On this front, Government-Industry coordination on research and development is needed to lower the costs, improve performance, and develop advanced materials. Once produced, hydrogen can be in the form of a compressed gas, cryogenic liquid or chemical, each requiring specific methods of storage essential to successful distribution. The unusual physical characteristics of hydrogen present particular problems with regard to its storage. A number of methods have already been outlined. Some amplification is necessary e.g. pressurized hydrogen gas storage involves two major methods of containment.

- metal tanks using iron or iron compounds as materials of construction
- natural containers including depleted oil and gas fields, mines caverns and aquifers

Salt caverns are used for storage of natural gas in many parts of the world. Cryogenic liquid hydrogen storage may not be practical, at present, due to high energy consumption required for the liquefaction process. Exploring higher-risk storage technologies involving advanced materials such as lightweight metal hydrides and carbon nanotubes, etc. is imperative.

The panelists of this session will share insights into the latest developments for hydrogen storage and challenges.

Keynote Speaker:
Dr. Akira Yabe
Director General
Energy System & Hyrogen Unit,
Technology Strategy Centre (TSC),
New Energy and Industrial
Technology Development
Organization (NEDO), Japan

Moderator

Dr. B. Viswanathan
Professor
IIT Madras, India

Speakers

Dr. N. Rajalakshmi
Senior Scientist & Head
Centre for Fuel Cell Technology
ARCI, IIT Madras Research Park
India

Prof. Jayant K. Singh
Professor
IIT Kanpur, India

Dr. T.P. Yadav
Scientist
BHU, India

Dr. R. Vijay
Scientist
ARCI, IIT Madras Research Park
India

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INTERNATIONAL CLIMATE SUMMIT 2021

Powering India's Hydrogen Ecosystem

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Session 04

14:30-16:30 HRS (IST)

SWACHH BHARAT NEELA AKASH

CONQUERING GREEN FRONTIERS

PHDCCI ENVIRONMENT COMMITTEE

A. Policy Regulations

Developing a framework for policies, regulations and safety standards

Hydrogen's potential as a clean fuel, energy storage medium and renewable energy enabler has captured the attention of energy sector players, governments, environmental advocacy groups, and users. Given that hydrogen development is at its nascent stage and there remains a lot of uncertainty surrounding its safety, it is pertinent and important to deliberate and understand the legal and regulatory requirements, investment cases, financing structures, operational requirements, revenue stream, sharing and other elements that need to be considered to formulate an effective acceptable commercialization model. A gradual transition with adequate policy and safety standards will help build confidence among stakeholders and provide a conducive environment for a Hydrogen based economy

Moderator

A.K. Saxena
Senior Director,
Electricity and Fuels
Division, TERI, India

Speakers

S.C. Gupta*
Joint Advisor
Petroleum & Natural
Gas Regulatory Board

Dr. R.K. Malhotra
Director General
The Federation of Indian
Petroleum Industry

P.K. Banerjee
Executive Director
SIAM

Anshu Bhardwaj
CEO
Shakti Foundation

*To be confirmed

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INTERNATIONAL CLIMATE SUMMIT 2021

Powering India's Hydrogen Ecosystem

SWACHH BHARAT NEELA AKASH

CONQUERING GREEN FRONTIERS

PHDCCI ENVIRONMENT COMMITTEE

03 SEPTEMBER 2021 | NEW DELHI

Session 04

16:30-18:30 HRS (IST)

DRAFT

B. Setting up of Centres of Excellence in Hydrogen (CoE - H2)

There is a shortage of qualified engineers who can install, monitor, operate and maintain integrated fuel-cells and hydrogen systems. **Centres of Excellence (CoE)** are the need of the hour in order to have capacity building in the entire value chain in hydrogen.

CoE-H2 will be a collaborative hydrogen competence center established by joint efforts between Government institutions and agencies, industry, research institutions and academia from both Norway and India.

Moderator

Girish Sethi
Senior Director,
Energy Program,
TERI, India

Speakers

Prof. James C. Holste*
Emeritus Professor of
Chemical Engineering,
Texas A&M University

Dr. Scott Davis
President
Explosion and Fire Safety,
Gexcon US

Prof. Jan Roar Bakke
Executive Vice President
Process Safety, Gexcon AS,
Norway

Rajendra Narkhede
Managing Director
Gexcon India

**To be confirmed*

INTERNATIONAL CLIMATE SUMMIT 2021

Powering India's Hydrogen Ecosystem

03 SEPTEMBER 2021 | NEW DELHI

Session 05

14:30-16:30 HRS (IST)

SWACHH BHARAT NEELA AKASH

CONQUERING GREEN FRONTIERS

PHDCCI ENVIRONMENT COMMITTEE

A. Ecology, Agriculture & Climate Change Mitigation

In the past few decades, there has been a growing realization about the importance of living in harmony with nature. Today, there is a greater need for ecological principles to be implemented in our civic actions.

Population growth has been putting undue stress on our natural systems which have supported humanity for a long time. Now is the time for ecologizing economy, in order to save the earth from environmental degradation and the catastrophic effects of climate change.

India's agricultural sector faces grave challenges of climate change and the impact is likely to continue in the form of dry spells, heat waves and erratic rainfall. Climate induced temperature & rainfall variations and the frequency and intensity of extreme weather events are adding to pressures on global agricultural and food systems. Climate change is expected to negatively affect both crop and livestock production systems in most regions, although some countries may actually benefit from the changing conditions. The changing climate is also adding to resource problems, such as water scarcity, pollution and soil degradation.

In this session experts will discuss the impact of changing climatic conditions on crops, livestock & seafood, and the importance of ecology for a sustainable economy and overall wellbeing of society.

Keynote Speaker:
Hon'ble Dr. Jitendra Singh
Union Minister of State (IC)
Science & Technology
Govt. of India

Keynote Speaker:
Prof. Dr. Arthur Riedacker
(IPCC Co-Nobel Prize laureate as a contributor since 1990)
Honorary Professor, INRA, France

Moderator

Dr. Rakesh Kumar
Director, CSIR

Speakers

Prof. Dr. Robert Costanza
American/Australian Ecological Economist, Chair in Public Policy, The Australian National University & Full Member of the Club of Rome
Topic: *Building a Sustainable wellbeing economy and society*

Prof. Ashutosh Sharma
Secretary, Department of Science and Technology

Dr. Adrian Percy, UPL, USA
Topic: *The role of agriculture in mitigating the effects of climate change*

***To be confirmed**

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INTERNATIONAL CLIMATE SUMMIT 2021

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16:30-18:30 HRS (IST)

SWACHH BHARAT NEELA AKASH

CONQUERING GREEN FRONTIERS

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B. Role of Hydrogen for a Carbon Neutral Ladakh

Ladakh is a mountainous region and a Union Territory (UT) in the north India, in the area known as the Trans-Himalaya. Leh is the largest urban zone having a population of 30,870 (census 2011). Compared to the national average of 69% Ladakh has a significantly higher share of the rural population of 89%. Nearly 58% of the total population depends on agriculture indicating that the region agriculture provides the main source of the livelihoods. With growing economic activities energy demand too will increase in the form of electricity and transportation fuels. Because of the absence of renewables, to cater to the increasing demand for fuels, the dependence on fossil fuels will rise which will not only increase local pollution in the form of particulate matter emission that can pose serious health impacts, it also leads to CO2 emission, the primary cause of global warming. Hydrogen can prove to be game changer. It has the potential to find its environmental benefits in sectors and application like power generation, transportation and indoor heating in commercial and residential sector. Use of Green hydrogen that is produced locally can be promising sustainable source of energy in Ladakh. Local production of Hydrogen will significantly reduce the transportation fuel cost while reducing emissions.

Presentation on Carbon Neutral Strategy for Ladakh by TERI

Keynote Speaker:
Umang Narula
Advisor to
Lt. Governor of UT
of Ladakh

Moderator

R.R. Rashmi
Distinguished Fellow
TERI, India

Speakers

Munish Jauhari
Joint Secretary
NITI Aayog

Gailius Draugelis
Lead Energy
Specialist, South
Asia, The World Bank

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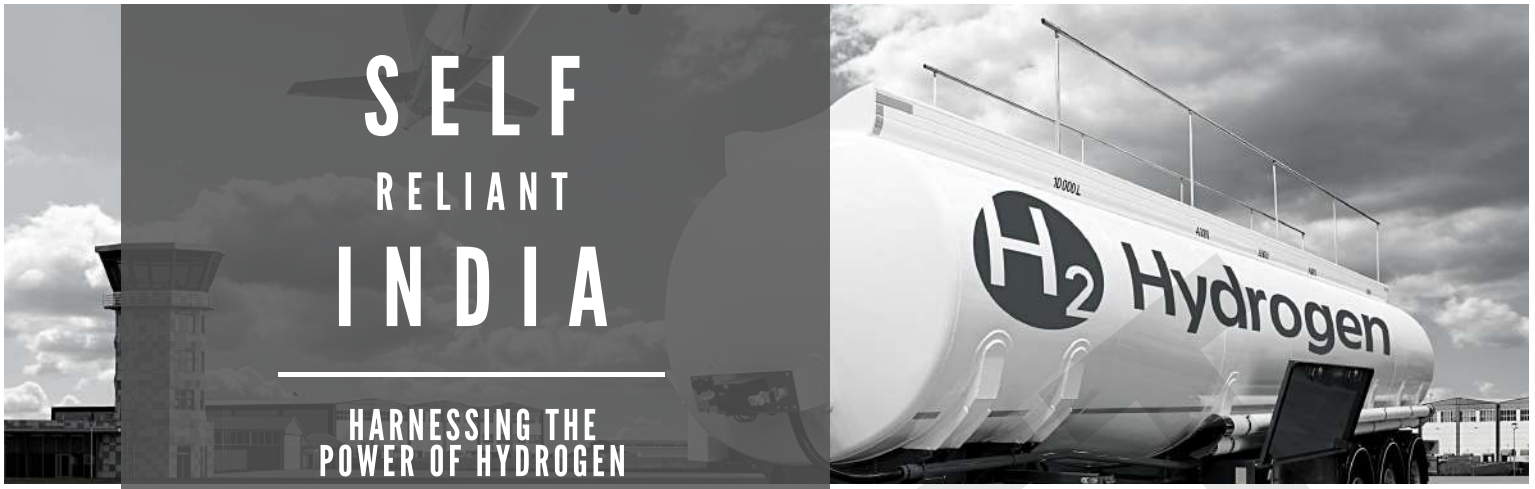

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CONQUERING GREEN FRONTIERS
PHDCCI ENVIRONMENT COMMITTEE

Country Partner

Norwegian Embassy
New Delhi

Innovation Norway

Release of Knowledge Book on Green Hydrogen

PHD Chamber of Commerce and Industry through its **Environment Committee** is bringing out a Knowledge Book titled **'Self Reliant India - Harnessing the Power of Hydrogen',** to be released at the **International Climate Summit 2021.**

Jointly authored by a Norwegian-Indian team of scientists, researchers and academicians, it is led by Dr. Karen Landmark, Chair of the Board, Greenstat Asia, Norway, as the lead author.

With valued inputs from Greenstat Norway, GEXCON Norway, SINTEF (one of Europe's largest independent research organisations) and NEERI, India, the knowledge book would be a repository of information and a useful guide for every institution or company embarking on energy transformation and making a transition from fossil fuels to new value chains, which are based on renewable energy.

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GREEN HYDROGEN INDIA

THE NATIONAL HYDROGEN PORTAL

www.greenhydrogen-india.com

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CONQUERING GREEN FRONTIERS

PHDCCI ENVIRONMENT COMMITTEE

Launch of the National Hydrogen Portal

The National Hydrogen Portal **www.greenhydrogen-india.com** will be launched at the **International Climate Summit 2021**.

Envisioned to be a one stop information source for research, production, storage, transportation and application of hydrogen, it will be a repository of all academic & research work, and other significant developments in the field of hydrogen; with a focus on Green Hydrogen.

An initiative of **PHD Chamber of Commerce and Industry** through its **Environment Committee,** the portal will be available to all registered members after the launch.

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GOVERNING COUNCIL

SWACHH BHARAT NEELA AKASH
CONQUERING GREEN FRONTIERS
PHDCCI ENVIRONMENT COMMITTEE

STEERING COMMITTEE

Dr. V.K. Saraswat
Member (Energy), NITI Aayog
Govt. of India
Chairman of the Steering Committee

Prof. Ashutosh Sharma
Secretary, Department of Science & Technology, India

Dr. Shekhar C. Mande
Secretary, DSIR;
Director General, CSIR, India

R.R. Rashmi
Former Spl. Secy, MOEFCC;
Former Chief Secy. Manipur;
Distinguished Fellow,
Program Director Earth Sciences and Climate Change, TERI, India

Dr. Ashish Lele
Director, National Chemical Laboratory, Pune, India

Prof. Dr. Arthur Riedacker
(IPCC Co-Nobel Prize laureate as a contributor since 1990); Honorary Professor, INRA, France

Dr. SSV Ramakumar
Director (R&D), IOC, India

Sanjay Aggarwal
President, PHD Chamber of Commerce & Industry, India

Dr. Rakesh Kumar
Director, CSIR, India

Nobuo Tanaka
Special Advisor, The Sasakawa Peace Foundation (SPF) Tokyo, Japan;
Former Executive Director,
International Energy Agency (IEA)

Dr. Karen Landmark
Chair of the Board,
Greenstat Asia, Norway

Sturle Harald Pedersen
Chairman, Greenstat Hydrogen Asia, Bergen, Norway

Dr. R.K. Malhotra
Director General, The Federation of Indian Petroleum Industry, India

Krishnamurthi Venkataramanan
Former CEO & MD and Board Member, L&T, India

Prof. Jan Roar Bakke
Executive Vice President,
Process Safety, Gexcon AS, Norway

Prof. Dr. Robert Costanza
American/Australian Ecological Economist; Chair in Public Policy, The Australian National University and a Full Member of the Club of Rome

Yamaji Kenji
Sr. Vice President/ Director-General, Research Institute of Innovative Technology for the Earth (RITE);
Professor Emeritus, The University of Tokyo, Japan

R.R. Sonde
Ex-VP Thermax;
Presently at IIT Delhi, India

Anurag Pandey
India H2 Alliance (IH2A) Co-Lead;
R&D Team Lead
Reliance Industries Limited, India

Kowtham Raj VS
Fellow, World Energy Council

ORGANIZING COMMITTEE

Dr. J.P. Gupta
Summit Chair & Chairman Environment Committee, PHDCCI, India

Dr. J.S. Sharma
Co-Chair, Environment Committee, PHDCCI, India

Mahendra Rustagi
Co-Chair, Environment Committee, PHDCCI, India

Prof. C.P. Kaushik
Co-Chair, Environment Committee, PHDCCI, India

Prasanto Roy
India H2 Alliance (IH2A)
Secretariat Lead, India

Saurabh Sanyal
Secretary General, PHDCCI, India

Kanchan Zutshi
Secretary, PHDCCI, India

Abhishek Bhatnagar
CEO, ITEN Media Pvt Ltd., India

Er. Ankit Gupta
Sr. Scientist, CSIR-NEERI, Nagpur, India

Er. Hemant Bherwani
Scientist, CSIR-NEERI, Nagpur, India

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PARTICIPATING OPPORTUNITIES

Business Opportunity

International Climate Summit 2021 is the industry's gateway to exclusive next generation clean energy business opportunities. Facilitating stakeholders from the entire value chain in **Green Hydrogen,** from production, storage, transportation and applications. The summit would provide networking & collaboration opportunities for:

- Bilateral Trade
- International Joint Ventures
- Technology Transfer & Research collaboration and Centre of Excellence in Green Hydrogen
- International Funding

Explore ICS 2021's host of business opportunities today.
Mail us at **chairman@ics-hydrogen.com**.

Attendee Registration

Making face-to-face connections with policy makers, regulators, energy leaders, key influencers, new market entrants and the global industry is one of the key benefits of attending India's flagship event on **Green Hydrogen**. In view of existing COVID-19 safety protocols, local public gathering restrictions in NCT of Delhi and security guidelines. the number of physical attendee registrations is strictly capped and available only on first come first serve basis.
Register online at **www.ics-hydrogen.com/register.**

Partnership Opportunity *(Sponsorship & Branding)*

The summit provides a host of sponsorship, branding & advertising opportunities suited to meet your brand objectives. From thought leadership positioning, networking opportunities to high visibility branding and advertising campaigns, our packages are designed to maximize benefits and ensure high returns on your investments. Be at the forefront of the global hydrogen industry. Get in touch with one of our team members or explore more at **www.ics-hydrogen.com/partnerships**.

Exhibit Opportunities

Exclusive opportunities to exhibit at the region's largest event on **Green Hydrogen**; showcase your brand/ products/ services to industry leaders and key decision-makers of the global energy industry. Benefits include one complimentary delegate pass per display booth of 4 sq mtr. Limited booths available on first come first serve basis.
Find out more at **www.ics-hydrogen.com/exhibit**.

Virtual Opportunities Attend. Exhibit. Partner.

The **International Climate Summit 2021** would be a hybrid event offering participants an opportunity to attend the face-to-face event in person or attend the virtual edition of the event digitally. For more details on virtual participation opportunities connect with one our team members or visit **www.ics2021.com/virtual**.

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TOWARDS A GREENER FUTURE TOGETHER

> Global cooperation is needed in exchange for technologies. All the countries need to come together to make green energy available at the earliest opportunity.

Dr. J.P. Gupta
Summit Chair and
Chairman Environment Committee, PHDCCI

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AATMANIRBHAR BHARAT

Self reliance in energy through Green Hydrogen

"As demand for energy rises worldwide, there is a growing need for tapping alternate energy sources that are not only greener, but also renewable and abundant in supply. Hydrogen is one such source that has a much higher energy output per unit mass.

India's advantage due to its geographical location, climate conditions and abundance of renewable sources of energy like solar, wind and hydro make it ideal for becoming the world's cheapest hydrogen hub by 2050."

WWW.ICS-HYDROGEN.COM

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Summit Organiser

PHD CHAMBER OF COMMERCE AND INDUSTRY

SWACHH BHARAT NEELA AKASH

PHDCCI ENVIRONMENT COMMITTEE

Co-Organiser

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