



सत्यमेव जयते

पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय
Ministry of Petroleum & Natural Gas
Government of India



“Hydrogen holds great promise to meet many of our future energy needs, and it addresses national security and our environmental concerns. Hydrogen is the simplest, most abundant element in the universe”.

-Dan Lipinski



हरित ऊर्जा से आत्मनिर्भर भारत की ओर

Salient Feature:

- This is the fourth edition of Hydrogen Times, a quarterly newsletter published by MoPNG. Hydrogen Times highlights the evolving discussions surrounding hydrogen technology, policies, and initiatives in the changing energy landscape.
- The current issue focuses on policies and regulations, elucidating key features of prevailing hydrogen policies and regulations in the USA, Europe, Australia, and China.
- This issue provides a comprehensive overview of the Indian National Green Hydrogen Mission (NGHM), detailing various schemes and initiatives under the mission and outlining their progress in detail.
- This issue highlights the most recent advancements in the field of green hydrogen, covering developments both on the global stage and within domestic

Key Points

- The USA has committed \$100 billion by 2030 for various Green Hydrogen initiatives, including \$9.5 billion in the Infrastructure Investment and Jobs Act (IIJA), a new production tax credit in the Inflation Reduction Act (IRA), and \$500 million under the Hydrogen Shot program to accelerate clean hydrogen technology development.
- Europe has committed €85 billion by 2030 for Green Hydrogen initiatives, including the Green Deal Action Plan 25, a guarantee of origin system, and the Fit for 55 policy package, which aims to reduce GHG emissions by 55% by 2030.
- Australia's National Hydrogen Strategy focuses on using hydrogen technology to achieve net zero emissions by 2050 and reduce emissions by 43% below 2005 levels by 2030. Several existing laws have been amended to support the development of Green Hydrogen.
- China is investing \$1.6 trillion over the next decade in hydrogen initiatives, including the Mid- and Long-Term Hydrogen Industrial Development Plan, the Hydrogen Fuel Cell Vehicle Promotion Plan, and the Hydrogen Infrastructure Development Plan. China offers a subsidy of \$1.5 per kg for Green Hydrogen production.
- India's National Green Hydrogen Mission, with an outlay of ₹19,744 crore, aims to achieve 5 million metric tons (MMT) of annual Green Hydrogen production by 2030. The mission has formulated the definition of Green Hydrogen, and its SIGHT program, a key component, and progressing rapidly. Capacity allocation for Component-I and Component-II has been completed under SIGHT-Mode-1, with guidelines for SIGHT-Mode-2 recently published.
- Latest development in India
 - Gujarat set target to produce 3 MMPTA of green hydrogen by 2030
 - L&T commissions indigenously built hydrogen electrolyser at Hazira
 - Construction kicks off for first-ever green hydrogen shortsea containership
 - Greenzo Energy introduces alkaline electrolyser for green hydrogen
 - Cochin Airport signs MoU with BPCL to establish first green hydrogen plant
 - IH2A submits \$5 billion proposal for hydrogen projects
 - Steel minister inaugurates first green hydrogen plant in stainless steel sector
 - Draft Gas Cylinder (Amendment) Rules issued
- Latest Development - Global
 - Honda unveils new fuel cell electric vehicle
 - Green hydrogen projects in Morocco need land, government offers 1 million hectares
 - Thyssenkrupp, Fraunhofer IKTS to set up 1 GW of electrolyser production by 2030
 - Sungrow Hydrogen Launches the 300Nm³/h PEM Water Electrolyser
 - Fuel-cell train travels more than 1,700 miles on one tank of hydrogen
 - Chinese green hydrogen station's prices are one seventh of those in California
 - ZeroAvia's Hydrogen Fuel Cells – Unlocking Efficient, Longer Flights
 - MIT Enters the Hydrogen Extraction Equation



"Green Hydrogen Policies & Regulations"

The International Energy Agency emphasizes that achieving a 1.5-degree Celsius limit on global temperature rise by 2100 necessitates a comprehensive transformation of our energy production, transportation, and consumption. This transition away from greenhouse gas-intensive activities demands concerted efforts from all nations. Success in this endeavour hinges on several factors specific to each country, including access to funding, available technology, existing infrastructure, and renewable energy resources. Governments play a crucial role by establishing legal frameworks that incentivize investment and foster green hydrogen development.

To create an environment which is conducive to positive change, governments must establish legal frameworks that attract investment and promote development. This will require the formulation of supportive policies and laws that create certainty and predictability. These policies and laws will form the legal basis for any contractual arrangements between governments in countries hosting green hydrogen projects and project developers. The following sections will explore various green hydrogen policy and regulatory developments around the globe.

USA Hydrogen Policy

Total Outlay-\$ 100 Billion by 2030

- The release of the U.S. National Clean Hydrogen Strategy and Roadmap in June 2023. This document sets out a comprehensive plan for the development and deployment of green hydrogen in the United States.
- The inclusion of \$9.5 billion in funding for clean hydrogen in the Infrastructure Investment and Jobs Act (IIJA). This funding will support the development of clean hydrogen production, transportation, and infrastructure projects.
- The announcement of a new production tax credit for clean hydrogen in the Inflation Reduction Act (IRA). This tax credit will provide financial incentives for the production of clean hydrogen.
- The launch of the Hydrogen Shot, a \$500 million initiative to accelerate the development of clean hydrogen technologies. This initiative will support the development of new and improved technologies for producing, storing, and using green hydrogen.

Other Steps:

- Establishing a Hydrogen Council to bring together government, industry, and academia to accelerate the development of the hydrogen economy.
- Launching a Hydrogen Action Plan to outline the

HYDROGEN SHOT

"Hydrogen Shot" - "111" aims to reduce cost of clean hydrogen to \$ 1 per Kg in just a decade.



1 Dollar



1 Kilogram



1 Decade

New Production Tax Credit for Green Hydrogen

Carbon Intensity (kg Co ₂ Per Kg H ₂)	Max Hydrogen Production Tax Credit (\$/KG H ₂)
4-2.5	\$0.60
2.5-1.5	\$0.75
1.5-0.45	\$1.00
0.45-0	\$3.00

administration's priorities for the development of the hydrogen economy.

- Inviting other countries to join the U.S. in a global effort to accelerate the development of green hydrogen

Europe Hydrogen Policy

Investing €86 Billion by 2030

- **A guarantee of origin (GO) system for green hydrogen.** This would allow consumers to verify that the hydrogen they are using was produced with renewable energy.
- **Investment in the development of regional hydrogen hubs.** These hubs would bring together producers, users, and infrastructure providers to create a critical mass for the hydrogen economy.
- **Support the development of standards for the transportation and storage of green hydrogen.** This would help to ensure the safe and efficient movement of hydrogen across the EU.

The Green Deal Industrial Plan²⁵ announced in February 2023, outlines a decade of funding and reform based on four pillars:

- ❖ Regulatory framework
- ❖ Faster access to sufficient funding
- ❖ Skill development for EU citizens
- ❖ Open trade for resilient supply



"Green Hydrogen Policies & Regulations"

Fit for 55 policy package

Fit for 55 package offers the preparatory path to meet the targets of the European Green Deal (EGD). This package aims to reduce 55 percent of the GHG emissions by 2030 (compared to 1990 levels).

The primary objectives of the package include:

- Guaranteeing environmental integrity and addressing solidarity
- The European Union Emissions Trading System (EU ETS) will be tightened and strengthened, helping to ensure effort sharing with relevant targets
- Additional policies will help ensure the implementation of carbon prices
- All revenues from carbon pricing aim to positively influence final consumers.

CBAM: Carbon Border Adjustment Mechanism

The new Mechanism will ensure that **imported products will also pay a carbon price at the border** in the sectors covered. This is a valuable tool for promoting global emissions reductions and leveraging the EU market to pursue our global climate goals. In combination with the EU Emissions Trading System, it reduces the risk of 'carbon leakage', whereby companies would move their production out of Europe to countries with less strict environmental standards.

Renewable Energy Directive (RED-III)

The agreement on the revised Renewable Energy Directive (RED-III) sets the EU's **binding renewable energy target for 2030 at a minimum of 42.5%**, up from the current 32% target. In practice, this would almost double the existing share of renewable energy in the EU. It is also agreed that Europe will **aim to reach 45% of renewables in the EU energy mix by 2030**.

Australia

LEGAL AND POLICY FRAMEWORK

The National Hydrogen Strategy is built upon the 2019 Strategy and focus on the role hydrogen technology needs to play for Australia to meet its commitment to achieve net zero emissions by 2050 and to reduce greenhouse gas emissions by 43% below 2005 levels by **2030**.

Strategic Objective

- Australia is on the path to be a global hydrogen leader by 2030.
- Enable domestic decarbonization through the development of the hydrogen industry
- Ensure economic benefit for all Australians through the development of the hydrogen industry.

- The Climate Change Act, 2022 embed the Paris Agreement and targets found in the nationally determined contribution (NDC) into the national framework, with subnational legislation leading the way on climate policy.
- The National Electricity Law National Gas Law and the National Energy Retail Law are three overarching laws which are relevant to the governance of energy markets and help regulate access to natural gas pipeline services (transmission and distribution).
- The Clean Energy Future package and the Renewable Energy target (RET) policies have focused on materially reducing emissions in the electricity sector.
- Amendment to the National Gas Law, 2022 regulations to further blending of hydrogen and derivatives under the national framework.
- Australia's National Hydrogen Strategy, 2019 provides a national vision for advancement of a domestic clean hydrogen sector.
- Native Title Legislation Amendment Bill 2021 provides indigenous title holders a strong position to insist best practice agreements are negotiated.
- South Australia- The Principal Act amended petroleum and geothermal regulations making hydrogen, and its compounds and by-products, regulated substances.
- New South Wales hydrogen strategy, 2021 supports green hydrogen, with a planned amendment Bill targeting blending of up to 10% hydrogen and biomethane into natural gas pipelines by 2030, and also provides specific exemptions for electricity used in the production of green hydrogen.



"Green Hydrogen Policies & Regulations"

China Hydrogen Policy

Investing \$1.6 trillion over next decade

Policy Recommendations

- The Mid-and-Long-Term Hydrogen Industrial Development Plan (2021-2035) sets a goal of producing 100,000 to 200,000 tons of renewable hydrogen per year by 2025.
- The Hydrogen Fuel Cell Vehicle Promotion Plan (2021-2025) sets a goal of deploying 50,000 hydrogen fuel cell vehicles by 2025.
- The Hydrogen Infrastructure Development Plan (2021-2025) sets a goal of building 1,000 hydrogen refueling stations by 2025

Policies to Promote the Development of Green Hydrogen

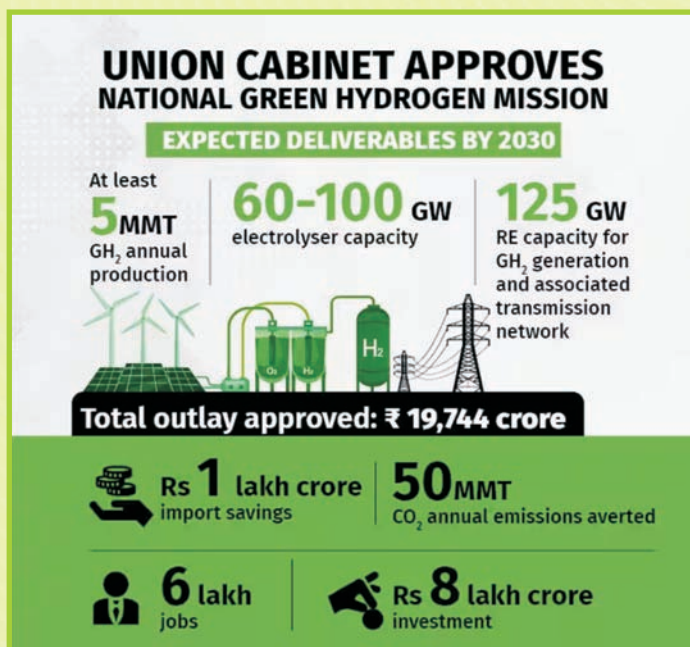
- A subsidy of \$1.50 per kilogram for green hydrogen produced from renewable energy sources.
- A tax exemption for the import of equipment for hydrogen production and use.
- A reduction in the sales tax for hydrogen fuel cell vehicles.

India Hydrogen Policy

On 4th January 2023, National Green Hydrogen Mission with an initial outlay of Rs. 19,744 crore up to the year 2029-30 was launched. This Mission aims to make India the Global Hub for production, usage and export of Green Hydrogen and its derivatives. Major components of the Mission include incentives for electrolyser manufacturing and Green Hydrogen production; pilot projects; Research & Development, framework of regulations, codes and standards; Green Hydrogen hubs; and Skill development programme.

production capacity with an associated renewable energy capacity of about 125 GW, 60-100 GW Electrolyser capacity and about Rs. 1 lakh crore of Import saving. The Mission will avert 50 MMT CO₂ annual emissions. Initiatives undertaken by Govt. for implementation of NGHM are as follows:

- The Green Hydrogen standard has been notified on 18th August, 2023, which sets a limit of 2kg CO₂ equivalent per kg of Hydrogen.
- The National Single Window Portal for Green Hydrogen and Electrolyser Manufacturing has been made live on 7th October 2023.
- In order to support Research and Development initiatives under the Mission, the R&D roadmap for Green Hydrogen has also been released on 7th October 2023. Scheme guidelines for implementation of Research & Development scheme under NGHM have been issued on 15th March 2024. Call for Proposals for projects under the scheme have also been issued on 15th March 2024.
- The SIGHT programme, which is a key component of the Mission, provides for incentives for setting up of Green Hydrogen production and electrolyser manufacturing facilities.
 - o Under the RfS for the Selection of Electrolyser Manufacturers (EM) for Setting up 1.5 GW annual Electrolyser Manufacturing Capacities under SIGHT Scheme (Tranche-I), capacity has been allocated to 8 companies for 1.5 GW per annum of electrolyser manufacturing capacity on 11th January 2024.

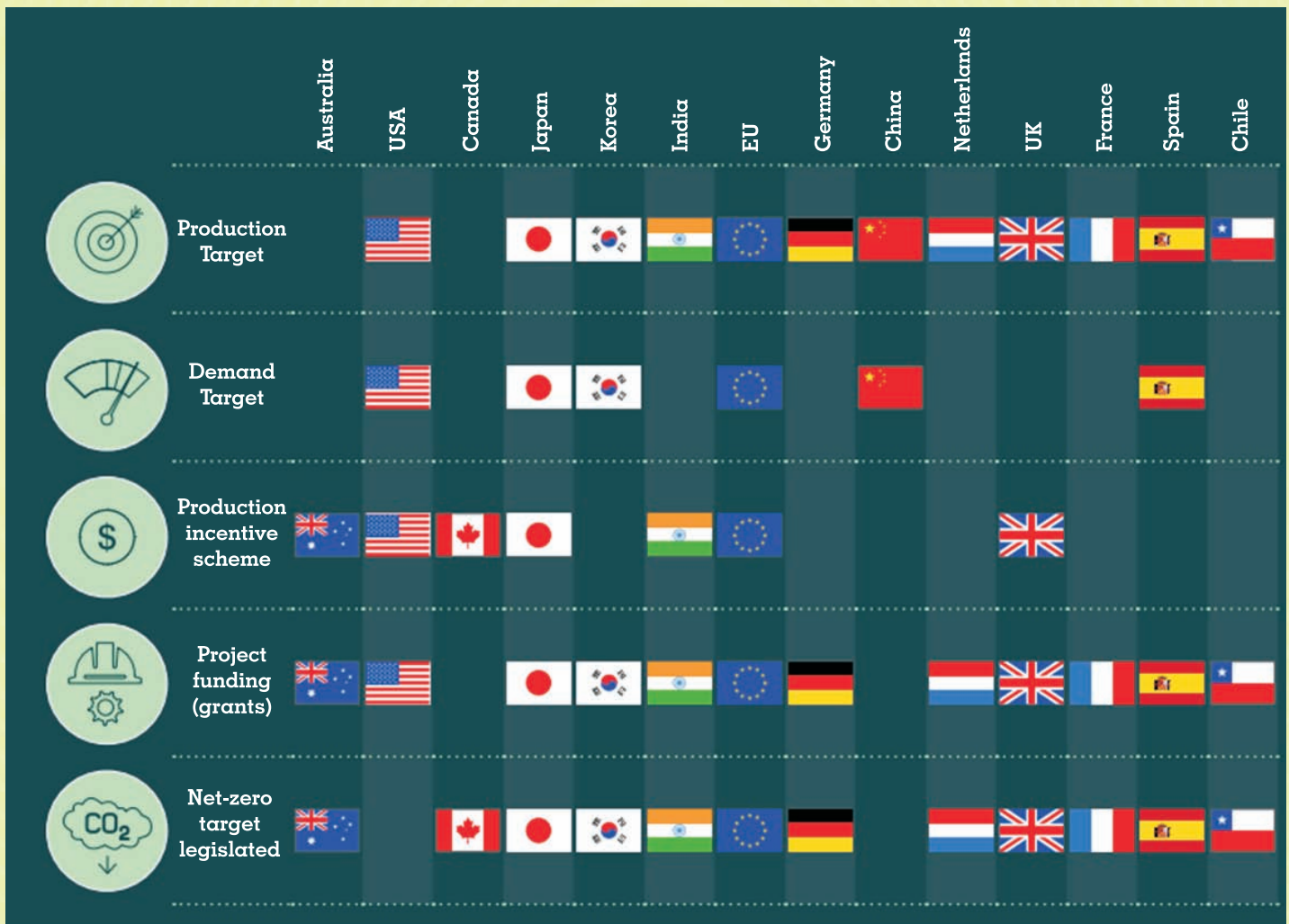


By the year 2030, the Mission targets to achieve at least 5 MMT (Million Metric Tonne) of annual green hydrogen



"Green Hydrogen Policies & Regulations"

- o Scheme guidelines for Tranche II of the incentive scheme for electrolyser manufacturing, have been issued on 16th March 2024. RfS has also been floated for the same on 16th March 2024.
 - o Further, under the RfS for Selection of Green Hydrogen Producers for Setting up Production Facilities of 450,000 tons for Green Hydrogen in India under the Strategic Interventions for Green Hydrogen Transition (SIGHT) Scheme (Mode-1-Tranche-I), capacities have been allocated to 10 companies for a total Green Hydrogen production capacity of 412000 MT per annum.
 - v. MNRE has also issued guidelines for implementation of SIGHT Programme – Component II (the demand aggregation model), wherein incentives will be provided for production of Green Ammonia
- Production under Mode-2A & Green Hydrogen Production Mode-2B has been published on 16th January 2024. Refinery industry has been allocated 200,000 Tons of Hydrogen and Fertiliser Industry has been allocated 550,000 Tons of Ammonia; on demand aggregation model.
- vi. Scheme guidelines for implementation of pilot projects for use of Green Hydrogen in steel, shipping and mobility segments have also been issued on 02.02.2024, 01.02.2024 and 14.02.2024 respectively.
 - vii. Scheme guidelines for setting up Hydrogen Hubs in India under NGHMs have been issued on 15th March 2024.
 - viii. Scheme guidelines for skilling, up – skilling and re – skilling under NGHMs have also been issued on 16th March 2024.



Source: National Hydrogen Strategy Review Consultation Paper I July 2023)

Summary of international hydrogen policy measures



Latest Developments

INDIA

Gujarat set target to produce 3 MMPTA of green hydrogen by 2030: Gujarat has floated a pilot project for producing 7.58 tonnes of green hydrogen per day and is also analyzing the feasibility of hydrogen blending with Piped Natural Gas (PNG) for efficient utilization. The state has set a target of producing 3 million metric tonnes per annum (MMPTA) of green hydrogen by 2030 and has allocated two lakh hectares of land for this purpose. "For green growth in the state, Gujarat has allocated ₹2 lakh crore budget for five years. A special land policy has been made for the production of green hydrogen and has allocated 2 lakh hectares of land in Kutch and Banaskantha for this purpose. The Chief Minister said his government is also giving incentives for producing electrolyzers. "The Prime Minister has set a target of 5 MMPTA of hydrogen production by 2030. To meet this target, Gujarat has set itself an ambitious target of producing 3 MMPTA of green hydrogen.

L&T commissions indigenously built hydrogen electrolyser at Hazira: Engineering major Larsen & Toubro (L&T) has commissioned its first indigenously manufactured electrolyser at the green hydrogen plant at A M Naik Heavy Engineering Complex in Hazira, Gujarat, the company said in a regulatory filing. The electrolyser, featuring a rated power capacity of 1 MW (expandable to 2 MW), can produce hydrogen of 200 Nm³/Hr. It features two stacks and an Electrolyser Processing Unit (EPU) ML-400, both developed and assembled in India, conforming to international standards. The focus now shifts to extensive testing over the upcoming weeks to refine its performance and enable large-scale manufacturing capabilities.

Construction kicks off for first-ever green hydrogen shortsea containership: The ceremony marks the official start of construction for the SamskipSeaShuttle, the world's first green hydrogen shortsea boxship, a project undertaken by Samskip, a Dutch logistics solutions provider, with the help of Cochin Shipyard, an Indian shipbuilder. Samskip says its Sea Shuttle is the first zero-emission shortsea container vessel in the world to be powered by green hydrogen. The vessel, which will be 135 meters (442.9 feet) in length, will be powered by a 3.2-megawatt hydrogen fuel cell, and have a diesel generator installed for backup power. The H₂ containerships will be built by Cochin. Samskip has ordered two green hydrogen shortsea container ships from Cochin. Both will be built with the same specs. The order for the two ships was placed a year ago, and the delivery of the vessels is set for the third and fourth quarters of 2025.

Greenzo Energy introduces alkaline electrolyser for green hydrogen: Greenzo Energy India Limited has launched its 1 MW Alkaline Electrolyser recently in India. This electrolyzer, crafted under the Make in India initiative, represents a significant innovation poised to expedite India's shift towards a sustainable energy future. The electrolyser has a plant capacity of 250 MW. Through the utilization of green hydrogen, Greenzo provides customised green energy solutions, contributing to the establishment of a robust and sustainable future. In support of its expansion and innovative endeavors, the company is establishing a manufacturing facility with a capacity of 250 MW per year. The company has also disclosed its intentions to produce alkaline-based technology, with a capacity of up to 5 MW per single stack, at its facility situated in the Sanand-2 industrial area, GIDC Ahmedabad, Gujarat, India.

Cochin Airport signs MoU with BPCL to establish first green hydrogen plant: The Cochin International Airport Limited (CIAL) has signed a MoU with Bharat Petroleum Corporation Limited (BPCL) to develop the world's first green hydrogen plant within the premises of Cochin airport. According to the agreement, BPCL will supply the technology, manage the operational aspects while taking charge of setting up the comprehensive green hydrogen plant and refueling station at Kochi Airport. CIAL will provide appropriate land, water, and green energy resources. The initial production from the plant will be used to power vehicles within the airport premises.

IH2A submits \$5 billion proposal for hydrogen projects: The India Hydrogen Alliance (IH2A) has presented a request to the Ministry of Finance, Government of India, seeking an augmentation in budgetary assistance for the National Green Hydrogen Mission (NGHM) and the establishment of a National Hydrogen Transition and Development Fund with a budget of \$5 billion. The National Hydrogen Transition and Development Fund, amounting to \$5 billion and modeled after the EU Green Hydrogen Fund, proposes to provide backing for extensive hydrogen initiatives, the development of hydrogen hubs, hydrogen supply chains extending beyond electrolyser production, sector-specific plans for transitioning to hydrogen, skill development, and the establishment of hydrogen infrastructure within the nation. IH2A's suggested funding mechanism for the National Hydrogen Transition is reminiscent of the EU Green Hydrogen Fund, which backs nationally significant green hydrogen projects and hydrogen hubs.



Latest Developments

INDIA

Steel minister inaugurates first green hydrogen plant in stainless steel sector: Union Minister for Steel and Civil Aviation virtually inaugurated India's first green hydrogen plant in stainless steel sector. The plant has been commissioned by Hygenco at Jindal Stainless's Hisar facility. The minister highlighted the national green hydrogen mission's support for pilot projects in the steel sector, with a budget of approximately Rs 5 billion until the fiscal year 2029-30. In addition to becoming the first off-grid green hydrogen plant for the stainless steel sector globally, this plant will also be the first to combine rooftop and floating solar. The project has a target of cutting carbon emissions by roughly 2,700 metric tonnes annually and 54,000 tonnes of emissions over the next 20 years.

Draft Gas Cylinder (Amendment) Rules: Department for Promotion of Industry and Internal Trade issued the Draft Gas Cylinder (Amendment) Rules, 2024. Bulk hydrogen compressed gas system means a gaseous hydrogen system with a storage capacity exceeding 5000 standard cubic feet (141.6 Normal cubic meter) of compressed hydrogen gas and includes bulk storage sources such as mobile or static cascade, tube trailer, tube bank, high pressure storage vessel that serves the piping system that transports hydrogen to the end user, transfer piping, manifold system, including filling and decanting post, buffer pressure vessel, compression system having booster or online compressor, hydrogen generation systems such as electrolyser, and other associated components.

GLOBAL

Honda unveils new fuel cell electric vehicle – the CR-V e:FCEV: Honda unveiled its new fuel cell electric vehicle, the CR-V e:FCEV, an SUV it is marketing as the only H₂-powered passenger vehicle made in America. The design of the fuel cell electric vehicle is meant to provide zero-emission transportation that makes sense both in the city as well as on longer trips. The US-made system allows drivers to plug in to recharge for driving an EV, which is ideal for urban areas and short jaunts, as well as fast H₂ refuelling that provides greater range and practicality for longer drives. The vehicle has a 270-mile EPA range rating while still providing power, cargo capacity and comfortable cabin space. Honda has committed to 100 percent battery electric and fuel cell electric vehicle sales by 2040. This new announcement represents the first production of a plug-in H₂ vehicle in the US in the form of the 2025 Honda CR-V e:FCEV.

Green hydrogen projects in Morocco need land, government offers 1 million hectares: The government of Morocco is throwing its support behind green H₂ development in the nation. It's reportedly doing so by allocating one million hectares (2.5 million acres) of public lands to develop green hydrogen. This is part of a new policy designed to back Morocco's efforts to reduce its carbon emissions as well as to make the nation a contender in the global market. According to the Moroccan government, the North African country could "play a major role" in the global energy transition. Boosting the development of green hydrogen via the "Morocco Offer" – a program recently launched by Prime Minister Aziz Akhannouch – is another way the country plans to contribute as a key player in the global transition to clean energy.

Thyssenkrupp, Fraunhofer IKTS to set up 1 GW of electrolyser production by 2030: Thyssenkrupp nucera and Fraunhofer IKTS want to develop and mass produce electrolysers based on solid oxide electrolyser cell (SOEC) technology. They are now setting up a pilot plant in Germany that is scheduled to start operations in about a year. Thyssenkrupp nucera and Fraunhofer IKTS have launched a strategic partnership to develop and scale up the production of SOEC technology. Thyssenkrupp nucera expects to reach 1 GW of manufacturing capacity by 2030. They will initially do it in small quantities to gain a better understanding of the production process and optimize it for large-scale production.

Sungrow Hydrogen Launches the 300Nm³/h PEM Water Electrolyser: During the Smart Energy Week 2024 H₂ & FC EXPO hosted in Tokyo Big Sight International Exhibition Center, Sungrow Hydrogen has received extensive attention and praise with the world debut of its 300Nm³/h PEM water electrolyzer. The newly released PEM water electrolyzer from Sungrow Hydrogen not only breaks through the record of hourly hydrogen yield per PEM stack in the Chinese domestic market but also catches up with the international advanced level in a number of key indicators. The operation pressure has reached up to 3.5MPa with the adaptation of Sungrow Hydrogen's patented sailing structure, the original creation of the integrated structure and multi-functional flow channel design make the rated DC power consumption less than 4.15kwh/Nm³ H₂, the wide regulation range from 5% to 110%, and the load regulation rate of 10%/s show significant advantages in scenarios that require higher dynamic performance adjustment. Furthermore, multi-



Latest Developments

GLOBAL

gradient coating structures with better corrosion resistance have enhanced the design lifetime of the product.

Fuel-cell train travels more than 1,700 miles on one tank of hydrogen: A hydrogen fuel-cell passenger train developed by Swiss rail vehicle maker Stadler Rail has achieved a new Guinness World Record, traveling for almost two days around the clock for a distance of 1,741.7 miles. Efforts to clean up dirty trains are already well underway, with heavy investment in electrifying networks around the world as well as rolling out battery-electric locomotives such as the FLXDrive, the Blues train and the Flirt Akku. That last example is made by Stadler Rail AG, and managed to achieve a Guinness World Record in 2021 for the longest per-charge battery-only journey of 224 km (~140 miles), on a route between Berlin and Warnemünde. Not all rail networks can support electrification and that battery range won't be enough for long-haul transportation of goods or people. That's where hydrogen could come in, making extended travel possible and only emitting steam and water. Stadler first introduced its Flirt H2 passenger model at InnoTrans 2022 in Berlin and began testing in Switzerland.

Chinese green hydrogen station's prices are one seventh of those in California: China is the home of the biggest green hydrogen and refueling station complex in the world, and those using the clean energy are able to obtain it for a fraction of the price being paid in California. The complex charges 35 yuan per kilogram. At 35 yuan per kilogram (about \$4.86 per kilogram), it means that the price of green hydrogen at the station is about the same as what is being paid for diesel. This not only makes the station stand out when compared to stations in the US, but it also makes it unique in China, where the low cost of the clean energy is not universal. Unlike most H₂ refueling stations in China, the location Sany has opened in Hunan

province's city of Changsha has done things differently. It just started a testing phase this month, in which it uses alkaline electrolyzers to produce its own H₂. Meanwhile, in California, the largest market for H₂ in the United States, the prices being paid at the pump are about \$36 per kilogram. That makes it over seven times higher than what customers are paying at the Sany facility.

ZeroAvia's Hydrogen Fuel Cells – Unlocking Efficient, Longer Flights: In a landmark development for the aviation industry, ZeroAvia is making headway with its pioneering high-temperature hydrogen fuel cell technology. The green tech innovator is creating waves, offering a sustainable alternative that could significantly reduce commercial aviation emissions. Addressing the carbon footprint of commercial flights, particularly from larger aircraft on long-distance routes, has become a pressing issue. ZeroAvia is responding to this need by prioritizing high energy density, which is vital for aircraft operation. The company's commitment to developing hydrogen electric and fuel cell-based power plants demonstrates its vision for a high-powered, low-emission future.

MIT Enters the Hydrogen Extraction Equation: New tech may soon stimulate underground H₂ production, extracting it out of rocks below. New technology is in development to help stimulate the natural production of hydrogen fuel underground, opening the potential to obtain H₂ more cheaply than the current most popular methods. The research is being conducted at MIT. The strategy is being pursued by Professor Iwnetim Abate, a Chipman Career Development Professor and Assistant Professor of Minerals Science and Engineering at MIT. The goal is to be able to obtain hydrogen fuel efficiently, cleanly and affordably to help support global decarbonization.

