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NOTÍCIAS

Produção de Hidrogénio

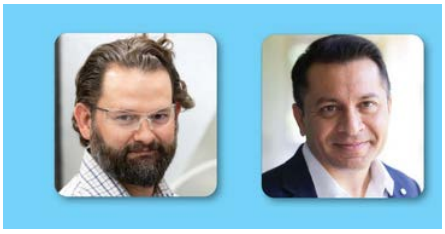
1 Bosch halts planned $200M hydrogen fuel manufacturing facility in Anderson

04/03/2025 | Hydrogen Central | **Link**

Bosch has halted its planned $200 million hydrogen fuel manufacturing facility in Anderson, South Carolina. The decision comes amid shifting market conditions and economic uncertainties affecting the hydrogen sector. The facility was intended to produce fuel cell components for commercial vehicles, supporting Bosch's broader hydrogen strategy. Despite this setback, the company remains committed to hydrogen technology and continues investing in other projects aligned with the evolving market landscape.

2 Dallas Startup DirectH2 Lands Seed Round to Commercialize Rice University's Breakthrough Hydrogen Tech

12/03/2025 | Yahoo Finance | **Link**



Dallas-based hydrogen technology company DirectH2 has secured seed funding from HL Energy Ventures to advance the development and commercialization of its modular hydrogen production solutions. The company holds exclusive rights to intellectual property from Rice University, underpinning its innovative technology. This collaboration aims to address critical challenges in the clean energy sector by integrating renewable energy with hydrogen production. The funding will be used to expand the team, refine technology, and establish industry partnerships to bring these innovations to market.

3 ABB, Charbone Hydrogen Join to Advance Green Hydrogen Production

14/03/2025 | Yahoo Finance | **Link**

ABB and Charbone Hydrogen signed an MoU to develop up to 15 modular green hydrogen facilities in North America over five years. ABB will provide engineering and modular substations, supporting Charbone's standardization efforts. The first plant in Sorel-Tracy, Quebec, will connect to Hydro-Québec's grid by mid-2025, serving as a model for future sites. This initiative supports Quebec's strategy to reduce fossil fuel use and greenhouse gas emissions.

4 Charbone Hydrogen and ABB partner to scale hydrogen production - ICYMI

15/03/2025 | Proactive Investors| **Link**

Charbone Hydrogen has partnered with ABB to scale hydrogen production, signing a five-year memorandum of understanding (MOU). The deal will lead to the development of up to 15 modular hydrogen production facilities, based on Charbone's flagship project in Sorel-Tracy. This collaboration aims to advance green hydrogen technologies and support the growth of sustainable energy. The initiative is an important step in Charbone's strategy to expand its hydrogen production capabilities.

5 Europe's largest electrolyzer unveiled, can produce 8,000 tons of hydrogen annually

18/03/2025| Interesting Engineering| **Link**

BASF has commissioned a 54-megawatt proton exchange membrane (PEM) water electrolyzer at its Ludwigshafen site in Germany, developed in collaboration with Siemens Energy. This electrolyzer, Germany's largest, is integrated into the site's chemical production infrastructure and is expected to produce up to 8,000 metric tons of CO_2-free hydrogen annually. This initiative aims to reduce greenhouse gas emissions at the Ludwigshafen plant by up to 72,000 metric tons per year. The hydrogen produced will serve as a raw material for manufacturing products with a reduced carbon footprint and support mobility in the Rhine-Neckar Metropolitan Region.

6 'Best of both worlds' | Michelin partners with French universities to develop AEM electrolysers for cheaper green hydrogen

18/03/2025 | Hydrogen Insight | **Link**

Michelin has partnered with French universities to develop anion exchange membrane (AEM) electrolysers, aiming to produce green hydrogen more cost-effectively. AEM technology combines benefits from both proton exchange membrane (PEM) and alkaline electrolysers, potentially reducing costs by avoiding expensive metals and better accommodating variable renewable energy inputs. This collaboration seeks to enhance the efficiency and affordability of green hydrogen production.

NOTÍCIAS

Produção de Hidrogénio

7 EU approval | Hydrogen sector in line for share of €2.3bn Finnish tax credit scheme

18/02/2025| Hydrogen Insight| **Link**

The European Commission has approved a €2.3 billion tax credit scheme from the Finnish government, designed to support the hydrogen sector. This initiative aims to stimulate investment in clean energy, including green hydrogen production, and to promote sustainable technologies. The tax credits will be pivotal in helping Finland achieve its climate targets, while reinforcing its position within the rapidly growing hydrogen economy and contributing to the EU's broader green transition goals.

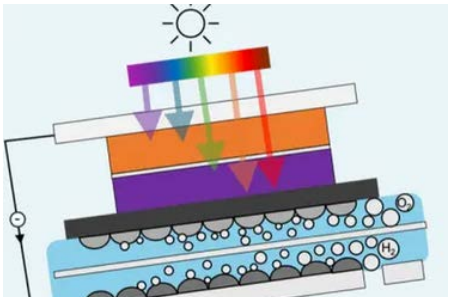
8 New Paths To More Efficient Hydrogen Production Discovered

18/03/2025 | Securities | **Link**

Researchers have discovered new ways to improve hydrogen production efficiency, particularly through advancements in electrolysis. These innovations focus on reducing energy loss and improving scalability, making hydrogen more cost-effective for large-scale use. As hydrogen becomes a critical part of clean energy solutions, these findings could significantly impact industries relying on sustainable fuels. The discoveries contribute to the transition to greener energy sources, with the potential to lower the cost of hydrogen production.

9 UK-Led Breakthrough Offers Path to Stable, Low-Cost Solar Hydrogen Production

19/03/2025 | Fuell Cells Works| **Link**



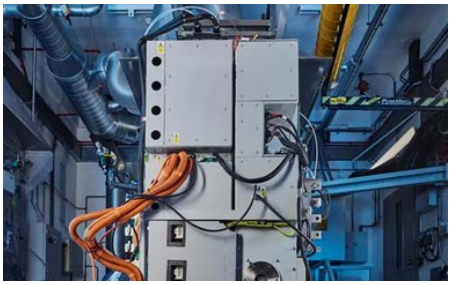
A UK-led breakthrough has made strides toward stable, low-cost solar hydrogen production. This breakthrough could significantly reduce the cost of producing hydrogen through solar energy, supporting the global transition to green hydrogen. Researchers have developed a more efficient method for harnessing solar energy, which could scale up to provide hydrogen as a sustainable fuel for various industries.

NOTÍCIAS

Células de Combustível

1 Ricardo's hydrogen fuel cell module successfully reaches full power

03/02/2025 | Ricardo| **Link**



Ricardo, a global strategic, environmental, and engineering consulting company has successfully developed a high-powered, multi-stack hydrogen fuel cell module that reached 393 kW of net electrical power in just three months. Initially created for the Sustainable Hydrogen Powered Shipping (sHYpS) project, the module can provide scalable power, including for maritime, rail, and stationary applications. Ricardo has also designed a containerized solution that can scale power output to 6 MW, enough to power a 1,000-passenger cruise ship. The achievement highlights hydrogen's potential in clean energy innovation.

2 Bosch's Exit from Fuel Cells Signals a Turning Point for Hydrogen Innovation

21/02/2025 | Hydrogen Fuels News| **Link**

Bosch is shifting its focus from solid-oxide fuel-cell technology to hydrogen production, particularly proton-exchange membrane (PEM) electrolysis. This decision follows slower market adoption of fuel-cell systems and aims to position Bosch within the rapidly growing green hydrogen market. The company also ended its partnership with Ceres Power, citing the limited commercial potential of fuel-cell electricity conversion. Bosch's strategy aligns with global trends, emphasizing hydrogen's role in decarbonization, though it criticizes Europe's slow policy response to hydrogen utilization.

3 HRS wins a strategic European order for a very high-capacity hydrogen station (4 tons H2/day) dedicated to public transport.

01/03/2025 | Hydrogen Central| **Link**

HRS has secured a major European order to build a high-capacity hydrogen refueling station, capable of compressing 4 tons of hydrogen per day. This station, set to be operational by 2026, will serve public transport and is the first of its kind in Europe. It highlights HRS's leadership in hydrogen infrastructure for decarbonizing heavy-duty mobility, reinforcing its presence in the fast-growing market. The station will feature 6 distribution terminals, meeting the needs of large fleets.

4 Hyundai to build new fuel-cell plant in South Korea amid plans to expand hydrogen vehicles business

11/03/2025 | Hydrogen Insight| **Link**

Hyundai will build a new fuel-cell plant in Ulsan, South Korea, set to begin mass production by 2028. This initiative supports Hyundai's hydrogen vehicle expansion, including cars, buses, and commercial vehicles. The plant will enhance production capacity for fuel-cell systems to meet the growing global demand for sustainable transportation. The project is part of Hyundai's broader strategy to strengthen its position in the hydrogen sector and contribute to the future of green mobility.

5 Sinopec Guangzhou Petrochemical Launches the Largest Hydrogen Fuel Cell Supply Center

12/03/2025 | Fuell Cells Works| **Link**

Sinopec Guangzhou Petrochemical has launched Phase II of its hydrogen fuel cell supply center, marking a significant step in advancing China's hydrogen infrastructure. This center will focus on producing hydrogen to fuel fuel-cell vehicles and support green energy initiatives. The expansion is expected to strengthen Sinopec's role in the hydrogen economy, supporting efforts toward decarbonization. The project highlights China's commitment to growing its hydrogen energy sector as part of its sustainable energy transition.

6 Hopium Begins Hydrogen Fuel Cell Testing for Maritime Applications

18/03/2025 | Fuel Cells Works| **Link**

Hopium has started testing hydrogen fuel cells for maritime applications as part of its commitment to cleaner energy in the shipping sector. The testing aims to evaluate the fuel cell's performance and reliability in maritime conditions, advancing efforts to decarbonize the shipping industry. By developing hydrogen-based solutions for ships, Hopium seeks to contribute to a more sustainable and eco-friendly maritime transport future.

NOTÍCIAS

Tecnologia de Armazenamento de Hidrogénio

1 Norway's Hoegh maps out hydrogen delivery plans to Germany

05/02/2025 | Reuters| **Link**

Hoegh Evi plans to deliver ammonia-derived hydrogen to Germany by 2027. The company is working with Deutsche ReGas to develop a floating hydrogen terminal in Lubmin, Baltic Sea. This facility will convert ammonia to hydrogen and integrate into Germany's hydrogen grid, backed by a €24 billion loan from KfW. Hoegh aims to offer green hydrogen at $3–$3.5/kg by 2027, a significant reduction from current prices. This project will support Germany's decarbonization goals.

2 Luxfer Gas Cylinders – Addressing the Hydrogen Storage Challenge

12/02/2025 | Fuel Cells Works| **Link**

Luxfer Gas Cylinders is addressing the hydrogen storage challenge by providing innovative solutions for high-pressure hydrogen storage. Their advanced composite cylinders are designed to safely and efficiently store hydrogen, making them ideal for applications in transportation, industrial processes, and energy systems. These cylinders play a crucial role in the growing hydrogen economy, ensuring that hydrogen can be stored and transported safely at high pressures, supporting the clean energy transition.

3 RWE Gas Storage West launches market survey for its hydrogen storage capacities

26/02/2025 | Hydrogen Central| **Link**

RWE Gas Storage West has launched a market survey to gauge interest in its upcoming hydrogen storage capacities at the Gronau-Epe site in Germany, set to be operational by 2027. With 30% of its planned storage still available, the company aims to align the product design with customer demand. The storage facility will offer 38 million cubic meters of capacity to buffer fluctuating hydrogen production, supporting industrial customers in Germany and contributing to the hydrogen economy's growth.

4 Kern Energy Announces Hydrogen Storage, Utilization and Decarbonization Initiative at Bakersfield Refinery, Partners with Claire Technologies & HyAxiom for Pioneering Collaboration

27/02/2025 | Hydrogen Central| **Link**

Kern Energy is launching a hydrogen storage and utilization project at its Bakersfield refinery, partnering with Claire Technologies and HyAxiom to decarbonize its operations. The project will store co-produced hydrogen using Claire Technologies' EzH_2 technology, with HyAxiom's fuel cells converting hydrogen into zero-emission electricity. The initiative, which is expected to begin in 2027, combines existing infrastructure with innovative solutions to reduce the carbon footprint of the refinery and contribute to California's clean energy goals.

5 HYBRIT: Large-scale storage of fossil-free hydrogen gas successfully proven

27/02/2025 | Hydrogen Central| **Link**

HYBRIT's pilot project in Sweden has successfully demonstrated large-scale storage of fossil-free hydrogen gas for steel production. The project uses steel-lined rock cavern technology, which reduces hydrogen production costs by up to 40%. The storage facility underwent accelerated testing and proved safe and efficient for long-term use. This success supports future hydrogen production for fossil-free iron and steel, contributing to decarbonization in the industry. HYBRIT plans to extend the project for further testing until 2026.

6 Taylor-Wharton and GenH2 Partner to Deliver Zero-Loss Liquid Hydrogen Storage Systems

04/03/2025 | Hydrogen Central| **Link**

Taylor-Wharton
Equipping the Hydrogen Infrastructure

Taylor-Wharton and GenH2 have partnered to create zero-loss liquid hydrogen storage systems, addressing the problem of hydrogen loss during storage, transfer, and dispensing. Using GenH2's Controlled Storage technology, which originated from the NASA space program, this innovation prevents boil-off losses, which are typically 20-40%. This breakthrough aims to make hydrogen a more viable and cost-effective fuel source. The collaboration combines GenH2's technology with Taylor-Wharton's vacuum-insulated tanks to deliver efficient storage and fueling solutions.

NOTÍCIAS — Tecnologia de Armazenamento de Hidrogénio

7 HyPStore: Advancing low-carbon hydrogen production and safe storage for mobility

12/03/2025 | Hydrogen Central| **Link**

HyPStore is advancing low-carbon hydrogen production and storage solutions, focusing on the development of robust, impermeable all-composite tanks for liquid hydrogen. These tanks, made using graphene nanoplatelets, will feature self-healing systems and enhanced safety with Leak-Before-Break (LBB) design. They will improve hydrogen storage efficiency and safety, contributing to sustainable mobility, particularly in aviation. With up to 50% more hydrogen storage capacity than traditional tanks, the technology supports the transition to green hydrogen in multiple sectors.

8 Minhang firm drives commercialization of hydrogen storage technology

18/03/2025 | Shine| **Link**

Minhang-based company Hydrexia has made strides in the commercialization of hydrogen storage, exporting the world's first magnesium-based solid-state hydrogen storage tank to Malaysia in 2024. This innovative technology offers high storage density, safety, and longevity, addressing challenges in long-distance hydrogen transport. Hydrexia's rapid growth has been supported by domestic policies and government initiatives. The company also established an R&D center in collaboration with academic institutions to further develop hydrogen solutions.

NOTÍCIAS — Distribuição de Hidrogénio

1 H2Terminals Signs MOU with Cadent to Supply Hydrogen Through East London Pipeline

17/02/2025| Fuel Cells Works| **Link**

H2Terminals has signed a Memorandum of Understanding (MOU) with Cadent to supply hydrogen through the East London pipeline. This collaboration will support the development of hydrogen infrastructure and accelerate the transition to cleaner energy in the region. By utilizing Cadent's existing network, the partnership aims to boost the delivery of hydrogen to industries and businesses, contributing to the UK's hydrogen economy goals.

NOTÍCIAS

Distribuição de Hidrogénio

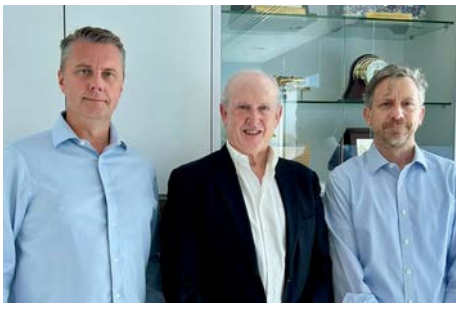
2 University takes leading role in boosting UK hydrogen distribution network

20/02/2025 | Hydrogen Central | **Link**

The University of Aberdeen is leading the MHYSTIC project to boost the UK's hydrogen distribution network. The project focuses on developing new materials and methods for hydrogen transportation and storage, leveraging existing energy infrastructure. With support from international collaborators and industry partners, it aims to overcome challenges such as hydrogen leakage and steel embrittlement. The research will help facilitate hydrogen economies in Scotland and the UK, supporting the country's transition to clean energy.

3 Climate Impact and Purus Marine join forces on net-zero hydrogen supply

14/03/2025| Offshore Energy | **Link**



Climate Impact Corporation (CIC) and Purus Marine have partnered to develop a net-zero shipping pathway for renewable hydrogen. CIC's modular hydrogen solution will be transported globally using Purus' low-carbon shipping capabilities. This collaboration aims to make renewable hydrogen an affordable, sustainable fuel option, helping customers achieve their net-zero goals. The project will focus on ensuring a $2/kg price for hydrogen while maintaining sustainable shipping practices.

4 INA gets EUR 15 million grant for hydrogen production for transport

18/03/2025 | Balkan Green Energy News| **Link**

Croatian oil and gas company INA has secured a EUR 15 million grant from the Croatian government to develop a green hydrogen production and distribution project for transport. The project will feature a 10 MW electrolyzer and an 11 MW solar plant at INA's Rijeka refinery. The initiative aims to produce 4,000 kg of hydrogen daily and distribute it across ten filling stations for road transport. The funding comes from the EU's National Recovery and Resilience Plan to support decarbonization and the development of alternative fuels.

NOTÍCIAS — Distribuição de Hidrogénio

5 GASCADE to Convert 249 Miles of Natural Gas Pipeline in Germany for Hydrogen Transport in 2025

18/03/2025 | Pypeline and Gas Journal | **Link**

Gascade, a German gas transmission company, is set to convert 249 miles of its natural gas pipeline into a hydrogen transport network by 2025. The conversion is part of Germany's efforts to build a robust hydrogen infrastructure, enabling the transportation of hydrogen for clean energy applications. This initiative will contribute to the country's transition towards sustainable energy and the development of hydrogen as a key fuel for industries and transport.

6 LLNL, Verne demonstrate efficient H2 densification pathway, progresses H2 distribution opportunities

19/03/2025 | Composites World| **Link**

Lawrence Livermore National Laboratory (LLNL) and Verne have demonstrated an efficient hydrogen densification process. This breakthrough reduces energy requirements for hydrogen storage and improves the potential for its distribution. The development enhances the viability of hydrogen as a clean fuel by making transportation and storage more cost-effective. The technology shows promise for scaling up hydrogen use in sectors like transportation and energy.

NOTÍCIAS — Mobilidade Terrestre com Hidrogénio

1 Pure Hydrogen Corporation Advances Zero-Emission Vehicle Sales and Hydrogen Projects in Q2 FY2025

31/01/2025 | Fuel Cells Works | **Link**

Pure Hydrogen Corporation is making significant strides in its zero-emission vehicle sales and hydrogen projects. The company is focusing on expanding its hydrogen infrastructure and advancing its vehicle fleet. By the second quarter of FY2025, it plans to increase its efforts to reduce carbon emissions, supporting the transition to clean energy solutions in the transportation sector. These developments mark a continued push toward sustainability, while aiming to accelerate the adoption of hydrogen technologies.

2 Mais 861 autocarros elétricos graças a reforço de investimento nos transportes públicos

15/02/2025| Governo de Portugal| **Link**

O Governo, através do Plano de Recuperação e Resiliência (PRR), decidiu reforçar em 137 milhões de euros a dotação do aviso n.º 01/C21-i12/2024, elevando o total do investimento para 227 milhões de euros.
Esta decisão permitirá aumentar a frota de autocarros de emissões nulas e expandir a rede de infraestruturas de carregamento e abastecimento em todo o País.
Este reforço da dotação financeira permitirá que mais 390 autocarros de emissões nulas sejam adquiridos, atingindo um total de 861 veículos até 2026. A implementação será acompanhada pela instalação de postos de carregamento elétrico e abastecimento a hidrogénio.

3 Insolvent hydrogen truck maker Hyzon decides to deregister as a public company ahead of final dissolution vote

21/02/2025 | Hydrogen Insight| **Link**

Hyzon Motors, a hydrogen truck manufacturer, has decided to deregister from the Nasdaq as it faces financial difficulties and prepares for dissolution. This decision follows the company's struggle to recover from insolvency and its inability to meet financial obligations. The company will now hold a final vote on its dissolution. The closure marks a significant setback for the hydrogen-powered transportation sector.

4 South Korea slashes fuel costs for hydrogen buses by 22% with huge subsidy increase

24/02/2025 | Hydrogen Insight | **Link**

South Korea has significantly reduced fuel costs for hydrogen buses by 22% through a substantial increase in subsidies. This move, effective next month, aims to make hydrogen buses more competitive against battery-electric vehicles. The subsidy boost is part of the government's strategy to promote hydrogen-powered public transport and encourage broader adoption of clean energy solutions.

NOTÍCIAS

Mobilidade Terrestre com Hidrogénio

5 Shell says goodbye to hydrogen cars – they are closing all their stations in the state

04/03/2025 | Hydrogen Central| **Link**

Shell has announced the closure of most of its hydrogen stations in California, leaving only one operational in the state. The company cited supply issues and other market factors as reasons for this decision, despite having plans to expand hydrogen infrastructure in the region. While Shell still focuses on heavy mobility hydrogen applications, the company is pivoting toward electric vehicle charging stations, signaling that hydrogen cars may face challenges in competing with electric vehicles in passenger transportation.

6 'Not interesting financially' | State-owned operator ends the use of hydrogen buses

07/03/2025 | Hydrogen Insight | **Link**

A state-owned transport operator in Antwerp has discontinued its hydrogen-powered buses due to financial concerns and difficulties in accessing technical support. The operator found that the costs associated with maintaining and operating the hydrogen buses outweighed the benefits. As a result, the five hydrogen buses were taken out of service. This highlights the ongoing challenges in integrating hydrogen vehicles into public transport systems.

7 Only five new hydrogen-powered cars registered in Germany in first two months of 2025

11/03/2025 | Hydrogen Insight| **Link**

In the first two months of 2025, only five hydrogen-powered cars were registered in Germany, a sign of the slow uptake of hydrogen vehicles. This figure underscores the challenges facing the hydrogen mobility sector, such as limited refueling infrastructure and consumer hesitation. Despite Germany's significant efforts to promote clean energy alternatives, hydrogen-powered cars are still a niche market compared to electric vehicles.

8 Germany pressured to remove tax hurdles for hydrogen ICEs

13/03/2025 | H2 View | **Link**

Germany faces pressure to eliminate tax barriers for hydrogen-powered internal combustion engine (ICE) vehicles, which are currently taxed higher than hydrogen fuel cell vehicles. Industry leaders argue that this unfair tax treatment hampers the growth of hydrogen-powered mobility, calling for a more balanced approach to foster the transition to hydrogen in the transportation sector.

9 EKA Mobility, KPIT & BPCL Collaborate To Introduce Kerala's First Hydrogen Fuel Cell Bus

17/03/2025 | Hydrogen Central | **Link**

EKA Mobility, KPIT Technologies, and BPCL have introduced Kerala's first hydrogen fuel cell bus, unveiled at the Global Hydrogen & Renewable Energy Summit in Kochi. This collaboration highlights the integration of hydrogen fuel cell technology with EKA's electric bus platform, and BPCL has set up the necessary hydrogen generation and refueling infrastructure. This initiative is poised to boost India's transition to hydrogen-powered transportation, marking a significant step in creating a hydrogen mobility ecosystem that can expand across the country.

10 Extreme H: a race to drive hydrogen adoption

24/03/2025 | H2 View | **Link**

Extreme H is a hydrogen-powered motorsport series aiming to promote hydrogen adoption and raise awareness about sustainable energy. It focuses on clean mobility and innovation by showcasing hydrogen fuel cells in high-performance vehicles. This event highlights the role of hydrogen as an alternative fuel, particularly in the transportation sector, pushing for broader acceptance and use of hydrogen technologies.

NOTÍCIAS

Corredores de Hidrogénio: Aspetos Normativos e de Promoção

1 La trazabilidad del hidrógeno verde, clave para cumplir con las normativas europeas de sostenibilidad

20/01/2025 | Hidrogéno Verde | **Link**

La Unión Europea ha establecido regulaciones estrictas para garantizar la sostenibilidad del hidrógeno verde, destacando la importancia de su trazabilidad. Este requisito asegura que el hidrógeno producido cumpla con estándares ambientales y sea verificable desde su origen hasta su uso final. La implementación de herramientas de trazabilidad contribuye a la transparencia en el mercado y fomenta la confianza entre los productores, distribuidores y consumidores. Además, estas normativas refuerzan la competitividad del hidrógeno verde europeo frente a otras alternativas energéticas menos sostenibles.

2 Lorenzana anuncia que la Xunta convocará este año tres nuevas líneas de ayuda para proyectos de descarbonización industrial y energías renovables

06/02/2025 | IGAPE | **Link**

La conselleira de Economía e Industria, María Jesús Lorenzana, anunció hoy que la Xunta de Galicia va a convocar este año tres nuevas líneas de ayuda para descarbonización industrial y energías renovables que suman 16,2 M€ con cargo al Fondo de Transición Justa.

En una jornada empresarial sobre instrumentos financieros que clausuró el conselleiro de Facenda e Administración Pública, Miguel Corgos, Lorenzana avanzó que a Galicia le corresponden para el período 2021-2027 más de 100 M€ de este fondo, que se gestionan desde el Igape (71,5 M€) o el Instituto Energético de Galicia (Inega) (28,8 M€) para diferentes actuaciones en la provincia de A Coruña, Zona de Transición Justa.

3 España logra 72,7 millones de euros de Europa para instalar 589 puntos de recarga eléctricos, descarbonizar puertos e impulsar el hidrógeno

06/02/2025 | Min. Transportes| **Link**

MINISTERIO DE TRANSPORTES Y MOVILIDAD SOSTENIBLE

España ha logrado 72,7 millones de euros de fondos europeos para financiar el despliegue de infraestructura de suministro de combustibles alternativos, en el marco de la convocatoria de 2024 del Mecanismo Conectar Europa (CEF) - Alternative Fuels Infrastructure Facility (AFIF).

En concreto, ocho proyectos empresariales validados por el Ministerio de Transportes y Movilidad Sostenible recibirán las ayudas de Europa para instalar 589 puntos de recarga eléctricos con una potencia de entre 150 kW y 350 KW, construir 26 estaciones de carga de hidrógeno verde y descarboniza los puertos de la Red Transeuropea de Transporte. En total, con estas subvenciones se movilizarán cerca de 400 millones de euros de inversión en España destinados a impulsar un transporte sostenible y bajo en emisiones.

NOTÍCIAS

Corredores de Hidrogénio: Aspetos Normativos e de Promoção

4 EU mobilises €422 million to support the deployment of alternative fuels infrastructure in road, maritime and air transport

06/02/2025 | European Commission | **Link**

European Commission

Today, the Commission has selected 39 innovative projects across the EU, dedicated to deploying alternative fuels infrastructure. A total investment of €422 million, provided through the Alternative Fuels Infrastructure Facility (AFIF), will support these initiatives in driving the transition to cleaner transport. The selected projects will focus on installing public electric recharging stations, including high-power megawatt chargers for both heavy-duty and light-duty vehicles, developing hydrogen refueling stations and onshore power installations in ports as well as electrifying airports and providing infrastructure for alternative fuels such as ammonia and methanol for shipping.

5 1.º leilão eletrónico biometano e hidrogénio

12/02/2025 | DGEG | **Link**

Divulgação dos resultados do 1.º leilão eletrónico para a compra centralizada, pelo Comercializador de Último Recurso Grossista, de biometano e hidrogénio produzido por eletrólise a partir da água, com recurso a eletricidade com origem em fontes de energia renovável.

6 EXCLUSIVE | 'Watering down the EU's strict green hydrogen rules now would hurt the industry, not help it'

14/02/2025 | Hydrogen Insight | **Link**

Loosening the EU's strict green hydrogen regulations could harm the sector by creating market confusion and diminishing investor confidence. The current rules are seen as essential for ensuring stability and achieving long-term clean energy goals. Relaxing these standards now might hinder the growth of the green hydrogen industry rather than support it.

NOTÍCIAS

Corredores de Hidrogénio: Aspetos Normativos e de Promoção

7 Industrial users of hydrogen could see 60% of equipment costs subsidised under new EU state aid rules: leaked draft

17/02/2025 | Hydrogen Insight| **Link**

The article discusses a draft of new EU state aid rules that could subsidize up to 60% of the equipment costs for industrial users of hydrogen. This initiative aims to support sectors adopting hydrogen technology, helping them transition to cleaner energy solutions. The leaked proposal focuses on facilitating the integration of hydrogen in industrial processes by providing financial assistance, thus promoting its wider use and aiding the decarbonization of heavy industries.

8 El MITECO asigna 1.214 millones a siete futuros clústeres de hidrógeno renovable

21/02/2025 | MITECO | Link

El Ministerio para la Transición Ecológica y el Reto Demográfico (MITECO) ha publicado la propuesta de resolución provisional de la convocatoria de ayudas a la creación de grandes valles o clústeres de hidrógeno renovable, que puede consultarse aquí. Asigna un total de 1.214 millones de euros de fondos NextGenEU a siete proyectos ubicados en Aragón, Andalucía, Castilla y León, Cataluña y Galicia. Así lo ha anunciado esta mañana la vicepresidenta Sara Aagesen, quien ha destacado que "Es una convocatoria de relevancia estratégica que avanza en la agenda de la descarbonización.

9 A Clean Industrial Deal for competitiveness and decarbonisation in the EU

26/02/2025 | European Commission| Link

European Commission

Today, the Commission presents the Clean Industrial Deal, a bold business plan to support the competitiveness and resilience of our industry. The Deal will accelerate decarbonisation, while securing the future of manufacturing in Europe.

Faced with high energy costs and fierce and often unfair global competition, our industries need urgent support. This Deal positions decarbonisation as a powerful driver of growth for European industries. This framework can drive competitiveness as it gives certainty and predictability to companies and investors that Europe remains committed to become a decarbonised economy by 2050.

10 La Plataforma de Tecnologías Estratégicas para Europa moviliza en su primer año más de 15 000 millones de euros para estimular las inversiones en Europa.

04/03/2025 | European Commission| Link

La Plataforma de Tecnologías Estratégicas para Europa (STEP) celebra hoy su primer año de actuación en pro del desarrollo y la fabricación de tecnologías cruciales en Europa. A lo largo del último año, STEP ha mancomunado la capacidad de inversión de once programas de la UE, movilizando así más de 15 000 millones de euros en apoyo de la competitividad de Europa en tres sectores estratégicos: las tecnologías digitales y la innovación de tecnología más avanzada, las tecnologías limpias y eficientes en el uso de los recursos, y las biotecnologías.

11 Call to Action: Make Hydrogen a Priority in the Next EU Budget

06/03/2025| Clean Hydrogen Partnership | **Link**

As the EU prepares its next Multiannual Financial Framework (MFF), it is crucial that hydrogen remains at the core of European strategic priorities —notably competitiveness, sustainability, and energy security. In conjunction with its Communication on 'The Road to the next Multiannual Financial Framework' proposal, the Commission has initiated a public consultation to gather insights on the next MFF from various stakeholders, including Member States governments, regional entities, and citizens.

12 Over-subscribed European Hydrogen Bank auction receives 61 bids for Innovation Fund support, including 8 maritime projects

07/03/2025 | European Commission| **Link**

The European Hydrogen Bank's second auction for the production of renewable hydrogen has attracted 61 bids from projects in 11 countries within the European Economic Area (EEA). Eight of the bids were submitted under the dedicated maritime topic by hydrogen producers with off-takers in the maritime sector.

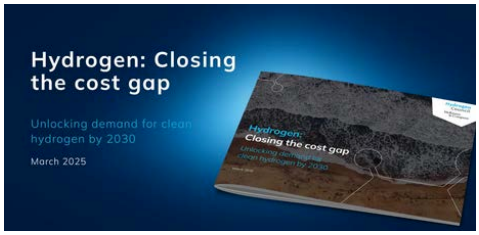
The total grant support requested is more than €4.8 billion, four times the available budget of €1.2 billion provided by the Innovation Fund. All bids taken together account for a total electrolyser capacity of around 6.3 Gigawatts (GWe). Over ten years, these projects would produce more than 7.3 million tonnes of renewable hydrogen. On a yearly basis, this would cover 7% of the EU's REPowerEU ambition for domestic renewable hydrogen production in 2030.

NOTÍCIAS

Corredores de Hidrogénio: Aspetos Normativos e de Promoção

3 Closing the Cost Gap for Clean Hydrogen Demand by 2030 – New Report Outlines Solutions to Unlock Business Cases

11/03/2025 | Hydrogen Council | **Link**



The article discusses a new report by the Hydrogen Council, outlining strategies to close the cost gap for clean hydrogen by 2030. Key solutions include policy support, technological advancements, and scaling up production to make hydrogen more affordable. It emphasizes the importance of collaboration between governments, industries, and other stakeholders to create favorable business cases and accelerate the adoption of clean hydrogen technologies.

4 21 House Republicans push to preserve hydrogen tax credits under IRA

12/03/2025 | H2 View| **Link**

A group of 21 Republican House members has pushed to preserve hydrogen tax credits under the Inflation Reduction Act (IRA). These tax incentives aim to support the growth of the hydrogen sector by making investments more appealing to businesses. The lawmakers emphasize the role of these credits in boosting energy security, advancing clean technologies, and creating jobs in the U.S. They are advocating for the inclusion of hydrogen as a key part of the nation's transition to cleaner energy.

5 EU looks to protect steelmakers, accelerate grid connections and hydrogen uptake

19/03/2025 | H2 View | **Link**

The EU is focusing on supporting steelmakers and accelerating the adoption of hydrogen technologies. Key measures include improving grid connections and providing incentives for hydrogen integration, especially in industries. These initiatives aim to strengthen the regulatory framework and promote low-carbon solutions, with particular attention to hydrogen's role in steel production and other industrial processes.

NOTÍCIAS

Corredores de Hidrogénio: Aspetos Normativos e de Promoção

6 'Lead markets' | EU proposes new procurement criteria to force uptake of green hydrogen-based steel

19/03/2025 | Hydrogen Insight | **Link**

The EU has proposed new procurement criteria to encourage the use of green hydrogen in steel production, aiming to reduce carbon emissions. These criteria are part of the EU's strategy to create "lead markets" for industries utilizing green hydrogen, specifically in sectors like steel. This initiative seeks to boost the uptake of hydrogen-based technologies through regulatory and market-driven actions.

7 Canadian election: jobs, taxes, Trump – what about clean energy and H2?

24/03/2025 | H2 View | **Link**

The article discusses the role of clean energy, specifically hydrogen, in the Canadian election. It highlights the importance of hydrogen in job creation and its potential to drive sustainable economic growth. The piece contrasts political views on energy, addressing taxation, clean energy investments, and the influence of figures like Trump on energy policy. It emphasizes the need for government action to promote hydrogen technologies in Canada's future energy landscape.

8 German €5bn CfD scheme for industrial switches to H2, carbon capture approved

24/03/2025 | H2 View| **Link**

Germany has approved a €5 billion CfD (Contracts for Difference) scheme to support industrial transitions to hydrogen and carbon capture technologies. This initiative aims to promote the use of low-carbon solutions and reduce emissions, particularly in heavy industries. The scheme is a significant step in advancing hydrogen-related policies, helping to financially back projects that align with national decarbonization goals.

NOTÍCIAS

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9 Overlap in hydrogen and CCUS skills, but UK companies struggle with supply

25/03/2025 | H2 View | **Link**

The article discusses the overlap in skills between the hydrogen sector and Carbon Capture, Utilisation, and Storage (CCUS) in the UK. It highlights that while these industries share expertise, UK companies are facing difficulties in securing a sufficient supply of skilled workers. The shortage of qualified personnel is creating a bottleneck in the development of clean energy projects. The report emphasizes the need for targeted workforce training and policy support to ensure that the UK can meet its clean energy goals. It also suggests that better coordination between industry stakeholders and government initiatives is essential for scaling up hydrogen and CCUS technologies.

13 El MITECO asigna 300 millones a 34 proyectos de fabricación de equipos y componentes de tecnologías renovables y almacenamiento

28/03/2025 |MITECO| **Link**

El Ministerio para la Transición Ecológica y el Reto Demográfico (MITECO) ha publicado la asignación preliminar de 297,3 millones de euros en ayudas a 34 proyectos de fabricación de equipos y componentes esenciales para el desarrollo tecnológico e industrial de las energías renovables en España. La propuesta de resolución provisional del programa RENOVAL del Instituto para la Diversificación y Ahorro de la Energía (IDAE) –disponible aquí– incluye, mayoritariamente, desarrollo de electrolizadores para hidrógeno renovable y de componentes para eólica, así como iniciativas en tecnología fotovoltaica, baterías y bomba de calor.

14 Portugal Launches 2025 Incentive Programmes to Boost Zero-Emission Mobility

31/03/2025 | EAFO | **Link**

In January 2025, the Portuguese Environmental Fund (Fundo Ambiental) launched two incentive programmes to promote the uptake of zero-emission vehicles (ZEVs). These support schemes target both private individuals and commercial operators and aim to contribute to national climate objectives and the EU's Fit for 55 targets.

The initiatives are part of the annual “Green Mobility” programme and reflect Portugal’s ongoing commitment to climate change mitigation through transport electrification. The programmes are structured to facilitate the introduction of zero-emission passenger and goods vehicles into the national fleet in 2025.

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Produção de Hidrogénio

1 Ultrasound-driven seawater splitting catalysed by TiO2 for hydrogen production

C. C. Y. Wong et al., International Journal of Hydrogen Energy, vol. 111, pp. 723-734, 2025. **Link**

Abstract Seawater splitting presents a promising approach for sustainable hydrogen production, yet its application remains limited by competing side reactions and expensive catalyst in electrolysis. In this study, we present an alternative hydrogen production approach using ultrasonic-driven seawater splitting catalysed by TiO2 at room temperature. The application of high-frequency ultrasound (780 kHz, 5.1 W) with a bespoke sonoreactor, designed to focus pulsed ultrasound waves, induces inertial cavitation and generates highly reactive radicals to produce hydrogen. By optimising acoustic parameters and TiO2 catalyst concentration of 0.3 mg/mL, the system achieved the highest reported sonochemical efficiency for hydrogen production in both pure and natural seawater, reaching 8086 and 4210 μmol gcat−1 L−1 Whr−1, respectively. We further investigated the significant decrease in hydrogen production in salty environments. Through bubble dynamics simulations and electron paramagnetic resonance measurements, we attributed the salt-scavenging chemical effect has a dominant role in reducing the efficiency. Our findings demonstrate the potential of sonocatalytic seawater splitting with TiO2 as a viable alternative for renewable hydrogen production.

2 Green hydrogen for a sustainable future: A review of production methods, innovations, and applications

C. Anand et al., International Journal of Hydrogen Energy, vol. 111, pp. 319-341, 2025. **Link**

Abstract Green hydrogen is essential for advancing sustainable energy systems and achieving a low-carbon economy. Various production methods have been developed, each with distinct technological characteristics, efficiency levels, and environmental impacts. Conventional and advanced approaches include water electrolysis such as alkaline electrolysis, proton exchange membrane (PEM) electrolysis, and solid oxide electrolysis (SOE)—as well as innovative processes like biological hydrogen production through biophotolysis, fermentation, biological water-gas shift reactions, and microbial fuel cells. Other significant techniques encompass thermochemical hydrogen production methods like biomass gasification, steam methane reforming, and thermochemical cycles, alongside photoelectrochemical (PEC) water splitting systems, including single-junction, dual-junction, integrated PEC cells, and photocatalytic PEC cells. Emerging plasma-assisted water splitting methods, such as corona discharge, dielectric barrier discharge (DBD), and microwave plasma-assisted splitting, also offer promising alternatives for efficient hydrogen production. Among these methods, water electrolysis powered by renewable electricity holds substantial potential for large-scale green hydrogen production. Photoelectrochemical water splitting and plasma-assisted methods have demonstrated unique advantages in terms of sustainability and integration with renewable energy sources. The scalability, cost-effectiveness, and environmental benefits of these processes depend on technological advancements in reactor design, materials, and catalytic efficiency. Integrating green hydrogen with carbon sequestration technologies further enhances its role in reducing carbon footprints and promoting sustainability. Sustainable applications extend to energy storage solutions, where green hydrogen can store surplus renewable energy, and transportation, particularly in fuel cell vehicles, promoting zero-emission mobility. This review examines these hydrogen production methods, highlighting their efficiencies, challenges, and recent innovations that are pivotal for achieving competitive, large-scale green hydrogen production. Furthermore, the integration of green hydrogen with carbon sequestration technologies is discussed, underscoring its role in reducing carbon footprints and enhancing sustainability.

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3 Biomass valorization in green hydrogen production, storage and transportation using low and high-temperature water electrolyzers: A thermo-economic approach

M. Nasser, Energy, vol. 319, 2025. **Link**

Abstract Hydrogen is regarded as a compelling substitute for fossil fuels, mainly produced from renewable sources. However, the production cost is an obstacle in the green hydrogen path. Therefore, the current study aims to maximize hydrogen generation with minimum production cost by integrating solar and wind energy with biomass. Moreover, the current research is in one location with high solar power and the other with high wind speed. Effects of high and low water electrolyzers on system performance are investigated. The results revealed that a SOEC significantly improves the hydrogen generation rate and overall system efficiency. Due to this, electrolyzers increased efficiency from 15.3 % to 20.2 % in solar systems and 25.4 %–33.1 % in wind systems. The lowest LCOH is 1.8 $/kg in Gabal El-Zeit and 2.27 $/kg in Benban. The effect of the overall system degradation rate is considered to predict performance over time to ensure reliability and economic viability. In other words, increasing this rate led to high production cost by about 60 %. The amount of CO2 avoided and produced is investigated. Finally, the cost of hydrogen storage is calculated for each scenario and found to vary from 0.038 to 0.49 $/kg.

4 Unravelling the photoactivity of metal-loaded TiO2 for hydrogen production: Insights from a combined experimental and computational analysis

S. Hamdan et al., International Journal of Hydrogen Energy, vol. 118, pp. 394-406, 2025. **Link**

Abstract Despite being the most employed material for photocatalytic hydrogen generation, TiO2 suffers limitations such as a high rate of electron-hole recombination and poor light absorption in the visible spectrum. Among the various strategies developed to overcome these drawbacks, combining TiO2 with a metal co-catalyst emerged as one of the most promising. In this study, we integrated experimental findings, advanced characterization tech niques, and computational methods to shed light on how different noble metals influence the enhancement of the photocatalytic activity of TiO2. Among the tested noble metal co-catalysts, the hydrogen production rate under UV and visible light irradiation followed the trend Pt >Au ≈Pd >Ag >bare TiO2, with Pt-decorated TiO2 exhibiting a hydrogen production rate of 28 mmol/h g. The noble metals were found to significantly suppress the electron-hole recombination rate compared to bare TiO2. Upon photodeposition, Pd and Pt formed the smallest nanoparticles with average sizes of 13.4 nm and 4.1 nm, respectively. Computational analyses were conducted to rationalize the difference in nanoparticle sizes by analyzing the binding and cohesive energies of the metal clusters on the TiO2 surface. Additionally, calculations demonstrated the strong interaction of Pt, Au, and Pd nanoclusters with adsorbed hydrogen, with Pt achieving the closest-to-zero Gibbs free energy of hydrogen adsorption and displaying the most polar interaction with hydrogen. These findings align closely with the observed hydrogen production rates, where UV/Vis-driven hydrogen production is governed by the coupling of hydrogen radicals on the co-catalyst surface, while visible-light-driven production is limited by charge carrier lifetimes.

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5 Control strategy for hydrogen production system using HTO-based hybrid electrolyzers

Y. Guo et al., Energy Reports, vol. 13, pp. 2354-2364, 2025. **Link**

Abstract Renewable energy-based water electrolysis for hydrogen production is an effective pathway to achieve green energy transition. However, the intermittency and randomness of renewable energy pose numerous challenges to the safe and stable operation of hydrogen production systems, with the wide power fluctuation adaptability and economic efficiency of electrolyzers being prominent issues. Hybrid electrolyzers combine the operational characteristics of proton exchange membrane (PEM) and alkaline electrolyzers, leveraging the advantages of both to improve adaptability to wide power fluctuations and economic efficiency, thereby enhancing the overall system efficiency. To ensure coordinated operation of hybrid electrolyzers, it is essential to consider their start- stop characteristics and the impact of hydrogen to oxygen (HTO) concentration on the hydrogen production system. To achieve this, we first discuss the operating characteristics of both types of electrolyzers and the in f luence of system parameters on HTO concentration. A control scheme for hybrid electrolyzer systems consid ering HTO content is proposed. By analyzing the electrolyzer efficiency curve, the optimal efficiency point under low power operation is identified, enabling the electrolyzers to operate at this optimal efficiency, thus enhancing the efficiency of the hybrid electrolyzer system. The implementation of a dual-layer rotation control strategy effectively balances the lifecycle loss of the electrolyzers. Additionally, reducing the pressure during startup broadens the startup range of the hybrid electrolyzer.

6 Hydrogen production from renewable sources: Bridging the gap to sustainable energy and economic viability

Z Wang and G. Lao, International Journal of Hydrogen Energy, vol. 117, pp. 121-134, 2025. **Link**

Abstract Hydrogen energy presents a fascinating possibility for reaching the goal of zero-carbon energy use in urban areas. The correlation between urban regions' electricity usage and the trends of hydrogen energy production is quantitatively examined in this research. It examines hydrogen energy development, green hydrogen generation, and energy consumption globally. This study uses a panel vector autoregressive (PVAR) method and a coupling coordination degree (CCD) method to investigate the dynamic relations between renewable energy transition and urban hydrogen energy utilization. A hypothetical assessment of green hydrogen generation by 2030 is also included in the report, which is in accordance with Chinese government initiatives. It suggests a consumption plan that incorporates both economic growth and sustainable development. The main findings are as follows: (1) the areas with the highest potential for environmentally friendly hydrogen generation are not always the same ones wherein hydrogen energy continues to be developed. There is a stronger correlation between the integrated growth of hydrogen and renewable energy in cities with greater energy usage. (2) The progress in hydrogen energy speeds up the move to using green energy in cities much more than the increase in utilization capacity alone. (3) Developing renewable hydrogen initiatives in regions with high production capacity is crucial, as hydrogen output is substantially higher in the optimistic Scenario compared to the Pessimistic Scenario.

7 Hydrogen production from biomass: A review combined with bibliometric analysis

Z. Wang et al., International Journal of Hydrogen Energy, vol. 117, pp. 271-291, 2025. **Link**

Abstract Biomass represents a highly promising source for generating hydrogen, offering significant advantages in increasing the sustainability of hydrogen energy technologies. To understand the development status, research hotspots and development trends in hydrogen production from biomass, the publications in Web of Science (WoS) database from 2000 to 2023 in terms of annual number, institutions, countries/regions and keywords were analyzed by bibliometric analysis. The hot-spot methods for hydrogen production identified were gasifi cation, pyrolysis, steam reforming, chemical looping reforming, aqueous phase reforming and fermentation. The principles of these hydrogen production processes were comprehensively reviewed, as well as the factors affecting production efficiency. Additionally, the advantages and disadvantages of the six discussed methods were also examined. Currently, the cost of biomass-derived hydrogen has been estimated to be comparable to that of hydrogen produced from fossil fuels (<2 USD/kg), while achieving a reduction in carbon emissions of over 90 %. Low pollutant emission, low cost and high hydrogen production efficiency are the future development trends of hydrogen production from biomass. This review provides a reference for the preparation and utilization of hydrogen.

8 Comparative analysis of hydrogen production methods: Environmental impact and efficiency of electrochemical and thermochemical processes

X. Zuo et al., International Journal of Hydrogen Energy, vol. 118, pp. 426-440, 2025. **Link**

Abstract The generation of hydrogen is a vital part of the world's shift to sustainable energy. However, the efficiency and environmental trade-offs between various production techniques are poorly understood. The ecological effects, efficiency, and technological innovation trends of thermochemical biomass conversion, alkaline water elec trolysis (AWE), and electrochemical hydrogen production are compared in this paper. This study evaluates global market positions and innovation patterns in these technologies over the last 20 years using patent data from major economies, such as the US, China, Japan, and Germany. A bibliometric technique using data from the European Patent Office was used to measure patenting activity and provide insights into the dynamics of research and development (R&D). The results show that whereas China, Japan, and the United States dominate inno vation across several hydrogen production sectors, Germany lags in bioenergy patenting despite significant breakthroughs in hydrogen and battery technologies. The findings highlight the importance of incorporating sustainability metrics beyond patent analysis to influence industry investments and policy. To promote the development of cleaner hydrogen production pathways—crucial for a sustainable energy future—this study suggests specific innovation incentives, especially in bioenergy technologies.

PUBLICAÇÕES

Células de Combustível

1 Hydrogen and methanol fuel cells: A comprehensive analysis of challenges, advances, and future prospects in clean energy

P. Phogat, B. Chand, Shreya, R. Jha, S. Singh, International Journal of Hydrogen Energy, vol. 109, pp. 465-485, 2025. **Link**

Abstract Fuel cells are potential electrochemical devices capable of directly converting chemical energy into electrical power, providing a clean and efficient alternative to fossil fuel-based systems. Among these, hydrogen and methanol fuel cells represent two significant approaches to address global energy challenges, each with unique advantages and limitations. This study offers an extensive analysis of the operational principles, technological advancements, and applications of hydrogen and methanol fuel cells, emphasizing their relevance in the transition to sustainable energy systems. Hydrogen fuel cells, known for their high efficiency and zero-emission operation, are ideal for automotive and stationary power applications. In contrast, methanol fuel cells, despite producing carbon dioxide (CO_2) as a by-product, are valued for their ease of fuel handling, storage, and portability, making them suitable for niche applications such as portable power and remote operations. By comparing a cell that produces CO_2 with one that does not, this study highlights the trade-offs between environmental impact and practical utility, providing a nuanced perspective on their respective roles in diverse sectors. Key challenges, including the high cost of catalysts, issues related to methanol crossover, hydrogen storage limitations, and the lack of widespread refueling infrastructure, are critically examined. In the present study, relevance of ongoing research in addressing these challenges is discussed, focusing on advancements such as non-precious metal catalysts, novel membrane materials, and the production of green hydrogen through renewable energy sources. The potential of hybrid systems and alternative fuels like ammonia is also explored to expand the versatility of fuel cell technologies. This review justifies the comparative analysis by demonstrating how each fuel cell type fulfils distinct energy needs while identifying areas where their performance and sustainability can be enhanced. The insights presented in this study aim to inform researchers, policymakers, and industry stakeholders, positioning fuel cells as a cornerstone of the renewable energy transition. As hydrogen and methanol fuel cell technologies evolve, they are poised to play complementary roles in reducing carbon emissions and meeting the world's growing energy demands sustainably.

2 Experiments on maximizing hydrogen utilization and efficiency in a PEM fuel cell system

G. Singer et al., International Journal of Hydrogen Energy, vol. 106, pp. 1158-1166, 2025. **Link**

Abstract Maximizing hydrogen utilization is crucial for improving the efficiency of proton exchange membrane (PEM) fuel cell systems. Ideally, all supplied hydrogen reacts within the fuel cell. However, nitrogen and water back-diffusion necessitate periodic purging of the anode recirculation path. Excessive purging leads to hydrogen losses, while insufficient purging increases side reactions, lowering fuel cell voltage and directly reducing effi ciency. This study investigates optimizing both hydrogen utilization and stack efficiency by adjusting purge valve actuation in a PEM fuel cell system. Results show that reducing purging from the reference increases hydrogen utilization by 0.79% points to 98.2%, resulting in efficiency improvement of 0.72% points to 47.21% based on higher heating value. Moreover, adjusting the purge valve actuation is the sole method for controlling the hydrogen stoichiometric ratio in ejector-based anode recirculation systems. Therefore, precise purge valve operation is critical for maximizing both hydrogen utilization and PEM fuel cell efficiency.

3 Experimental study on the operating state of high-power vehicular fuel cell system hydrogen supply subsystem with an in-situ ultrasonic-based gas component monitoring equipment

N. Yao et al., Applied Energy, vol. 388, 2025. **Link**

Abstract High-power fuel cell systems represent a critical pathway toward large-scale hydrogen technology commer cialization. These systems feature high-power stacks with larger active areas and more cells, which exacerbate issues such as local fuel starvation and voltage consistency deterioration, caused by nitrogen accumulation at the anode, flooding, and uneven gas flow distribution. While existing experimental studies on anode management have focused on low-power stacks, there remains a distinct lack of rapid, sensitive in-situ monitoring methods for internal state assessment of anode. To address these gaps, this paper introduces a novel ultrasonic-based sensor designed to monitor the concentration and flow rate of mixed gases simultaneously in the anode of the fuel cell system. Detailed observations and analyses were conducted on the variations in gas mixture concentration and f low rates within a 130 kW fuel cell system's hydrogen supply subsystem, examining their impacts on system output stability, hydrogen utilization rate, and energy conversion efficiency under various operational settings. The results reveal that increasing the nitrogen concentration from 1 % to 49 % has a minimal effect on the overall stack performance, as the average voltage decreases by only 1.53 %. However, the voltage fluctuation rate in creases by 260 %, indicating a significant deterioration in voltage consistency. The voltage fluctuation rate proves to be an effective indicator for purge management in high-power systems. This study uniquely identifies a functional relationship between voltage fluctuation rate and hydrogen stoichiometric ratio. These insights will significantly contribute to advancing anode management strategies for high-power fuel cell systems in the future.

4 Performance analysis of a polymer electrolyte fuel cell supplied with bio-hydrogen from methane or syngas reforming

V.S. Bethapudi, M. Materazzi, V.F. Valdés-López and D.J.L. Brett, Fuel, vol. 394, 2025. **Link**

Abstract Hydrogen fuel cells are increasingly being used as power sources for a range of applications in the domestic, automotive, and industrial sectors and the polymer electrolyte fuel cell (PEFC) has the broadest applicability. This calls for a commensurate supply of hydrogen fuel. Promising ways to produce sustainable, low carbon hydrogen is through the reforming of biogas or gasification of biomass or waste feedstock, followed by gas conditioning and CO 2 separation. However, the produced bio-hydrogen can still contain impurities from the original gas feedstock, like methane (CH 4), nitrogen (N 2), carbon monoxide (CO), and carbon dioxide (CO) carried from the thermochemical process. In this study, a low-temperature PEFC is operated with a simulated bio-hydrogen stream consisting of pure hydrogen, doped with different volume percentages of syngas contaminants. The corresponding electrochemical cell performance is reported. Polarisations indicate CO 2 contami nation in hydrogen results in irreversible and reversible impacts, respectively, on the cell performance. CH 2 been identified to be more of a dilution agent, while CO 2 and CH 4 4 has poisoning has resulted in a chemical reaction inside the cell. Specifically, a 6 % reduction in cell performance was observed at 0.1 vol% of CO 2 , which increases to 18 % at 5 vol% of CO 2 . Besides, when pure hydrogen conditions are restored, the PEFC performance did not recover, indicating an irreversible impact on the cell. Electrochemical impedance spectroscopy measurements and durability studies corroborate the findings from polarisation analysis. Current density cycling is performed to highlight the effect of CO 2 contamination on successive polarisation cycles. Finally, acoustic emission (AE) based hydration diagnostics are performed for the first time on PEFCs, evaluating the impact of level of CO 2 contamination on the cell performance acoustically. This niche technique has been used to assess the water content in the cell, which is influenced by the contamination conditions and vice versa.

5 Effect of humidity on the sensitivity and stability of proton exchange membrane fuel cells under ultra-low hydrogen pressure

K. Hu et al., International Journal of Hydrogen Energy, vol. 113, pp. 293-304, 2025. **Link**

Abstract Thermal-electric co-generation, especially the application of small-scale combined heat and power for household use, is an effective pathway to promote hydrogen energy entering ordinary family life. Gas pipeline supply ensures effective hydrogen provision, utilizing existing natural gas pipelines. However, this method limits the hydrogen inlet pressures for fuel cell stacks (~2 kPa). In environments with ultra-low hydrogen pressure, effective water management is crucial to ensuring the long-term stable operation of fuel cells and should be given significant consideration. The study focuses on the design of key components (such as the bipolar plates) and the selection of operational conditions. In this study, bipolar plates are designed with smaller active areas and a parallel multi-channel flow field configuration, complemented by appropriate distribution area structures and shared channel arrangements. This design aims to achieve low flow resistance and effective water drainage. Additionally, the study compares the performance and stability of fuel cells under different cathode and anode humidification conditions at 600 and 1000 mA/cm 2 current densities in low hydrogen pressure environments. The results indicate that, at lower operating currents in low hydrogen pressure environments, the amount of water carried in humidified gas has a greater impact than the amount of water generated. Furthermore, the humidity of the cathode has a more significant effect compared to the anode humidity. When cathode humidity is low(≤48% RH), increasing anode humidity improves cell performance and has little effect on voltage fluctua tions. But cathode humidity above 79%RH, increasing anode humidity has less effect on performance but more effect on voltage fluctuations.

6 Incremental fuzzy with PSO optimization for improving the pressure stability of hydrogen and oxygen recovery 5 kW PEM fuel cell system under variable load conditions

S. Kabache et al., International Journal of Hydrogen Energy, vol. 120, pp. 54-66, 2025. **Link**

Abstract The longevity and efficiency of the proton exchange membrane fuel cell (PEMFC) is related to the stability of the hydrogen (H2) and Oxygen (O2) pressures within. Variations in these pressures may cause detrimental me chanical limitations. Controlling the difference between the pressures is essential to preventing reactant insuf f iciency or fuel waste. Conventional control techniques like PID controller often struggle with dynamic system variations and load fluctuations. This paper introduces two advanced control strategies to enhance pressure stability: an improved incremental fuzzy logic controller (IFLC) utilizing a (7 × 7) membership function scaling and a PID controller optimized by particle swarm optimization (PSO). Unlike previous studies that focused on smaller PEMFC systems (3 kW and 500 W) and relied primarily on conventional PID controllers, this work evaluates a larger 5-kW PEMFC system, providing a more comprehensive assessment of H2/O2 pressures regulation. Simulation results, conducted in MATLAB/Simulink, demonstrate that the IFLC and PSO-optimized PID significantly enhance H2/O2 pressures stability under varying load demands. The IFLC, in particular, ach ieves superior robustness, quick response time, and zero overshoot, minimizing performance indices such as integral absolute error (IAE) (0.0067, 0.0165), integral square error (ISE) (0.0016, 0.0035), mean absolute error (MAE) (0.0007, 0.002). These results confirm the effectiveness of the IFLC in ensuring long-term PEMFC reli ability and efficiency.

7 Towards a fully sustainable UPQC-DG system: Combining PV, fuel cells, BESS, water Electrolyzer and green hydrogen storage through a novel power management approach

Y. A. Mohamed et al., Journal of Energy Storage, vol. 113, 2025. **Link**

Abstract In the pursuit of sustainable energy solutions, the integration of renewable energy sources into power systems has received substantial attention. The enhancement of power quality metrics by utilizing sustainable solutions reducing environmental impact and carbon emissions is a current challenge in literature with ongoing research perspectives. This article proposes a unique holistic approach that integrates fuel cells, Photo Voltaic (PV) panels, Battery Energy Storage Systems (BESS), water electrolyzers, and green hydrogen storage to improve the per formance of Unified Power Quality Conditioner-Distributed Generation (UPQC-DG) systems. The regulation of the DC link capacitor voltage of the UPQC-DG is also addressed in this article. In addition to, a novel power management strategy is proposed to ensure the optimal scheduling and operation of renewable energy sources. The proposed strategy addresses the intermittent nature of the renewable resources ensuring grid stability and power quality enhancement. The proposed framework aims to achieve a fully sustainable UPQC-DG holistic setup ensuring efficient utilization of renewable energy resources. It also includes a proposed enhanced wild horse optimizer technique which is applied to the formulated multi-objective function with the purpose of reducing numerous power quality indices. This guarantees a decrease in carbon emissions and lessens reliance on tradi tional backup sources that utilize fossil fuels. Green hydrogen storage, coupled with an electrolyzer, functions as a long-term energy buffer, capturing surplus power generated from the PV array and dispatching it to the fuel cell during periods of low generation or high demand through a power-to-hydrogen-to-power conversion. The proposed power management strategy ensures optimal coordination between the PV panels, fuel cells, BESS, and green hydrogen storage, enabling efficient power conversion and hydrogen storage for re-electrification. Fuel cells are utilized to convert the stored hydrogen into electrical power which is utilized into regulating the common DC-link capacitor voltage, further enhancing the overall system's performance. Extensive simulations validate the effectiveness of the proposed framework in enhancing power quality. The total harmonic distortion of the supply current is consistently maintained below 1 % across various non-linear load profiles. This dem onstrates the system's capability to improve power quality, ensure efficient utilization of energy resources, and provide a stable and resilient power supply. The findings suggest that the proposed fully renewable UPQC-DG system, combined with the proposed power management strategy, can significantly contribute to the transi tion towards a green and sustainable energy future.

PUBLICAÇÕES

Tecnologia de Armazenamento de Hidrogénio

1 Challenges and innovations in green hydrogen storage technologies

V. R. Zavala et al., International Journal of Hydrogen Energy, vol. 113, pp. 322-339, 2025. **Link**

Abstract Over the years, green hydrogen has proven to be promising in storing and producing clean energy, in addition to meeting the demands of various sectors through promising technologies. For its use to become viable, techno logical advances in its storage process are necessary to ensure the safe use of this resource. Hydrogen storage includes liquid hydrogen, hydrogen adsorbed in 25 metal hydrides, geological storage, and compressed gas (CGH2). The bibliometric analysis conducted on more than 42,218 articles published between 2014 and 2024 using Citespace and VOSviewer reveals the growth in research involving green hydrogen, which boosts policies focused on the environment and the advancement of technologies related to this theme. The study highlights collaboration between countries, authors, and institutions, with countries like China and the United States leading the publications and the International Journal of Hydrogen Energy being very influential. The surveys reveal that green hydrogen is crucial for a low-carbon scenario, being a viable substitute for fossil fuels. The storage technologies were listed, highlighting their advantages and disadvantages, as well as the use of nano materials in overcoming existing challenges in the sustainable use of this resource in the energy sector. This study emphasizes the importance of green hydrogen storage, considering the need for a sustainable energy matrix that requires incentives and long-term investments to develop new research.

2 Research on the optimal scheduling of a multi-storage combined integrated energy system based on an energy supply grading strategy

N. Zhang et al., scientific reports, vol.15, no. 1, 2025. **Link**

Abstract As an important supporting technology for carbon neutrality strategy, the combination of an integrated energy system and hydrogen storage is expected to become a key research direction. To address the insufficient flexibility of multi-energy coupling in the integrated energy system and the overall strategic demand of low-carbon development, a multi-storage integrated energy system architecture that includes electric storage, heat storage and hydrogen storage is established. Then, according to the system status factors, such as energy cost, response characteristics and energy storage status, a hierarchical energy supply control strategy focusing on the energy supply priority of energy storage units is proposed. NSGA-II-MOABC is created as the optimization algorithm to meet the demand of multi-energy coupling energy supply in the integrated energy system. Next, considering the system operational cost and carbon emission cost as the optimization goal, a comprehensive energy optimization scheduling model of multi-storage combined hierarchical energy supply is constructed. Based on the simulation example, the scheduling results of the multi-storage combined system are obtained, through comparative analysis, the addition of hydrogen storage can effectively improve the flexibility of system scheduling. Then, taking several scenarios as simulation examples, the hierarchical energy supply strategy can effectively reduce the system operation cost and carbon emission cost, and it also has a certain role in realizing the local consumption of renewable energy.

3 Two-stage robust optimization of hydrogen microgrid in plateau tourist cities — taking Yunnan Lijiang as an example

R. Xu et al., Carbon Neutrality, vol.4, no. 7, 2025. **Link**

Abstract Hydrogen energy, as a vital supplement to renewable energy, contributes significantly to the system's energy storage benefits. In this work, we build and optimize a hydrogen energy microgrid for the plateau tourist city of Lijiang, taking into account the city's unique geographic and climatic circumstances, with the goal of investigating the potential role of hydrogen energy in the regional energy structure and its economics. The study uses a two-stage robust optimiza tion method to change the microgrid's configuration and operation strategy. The system uses a set of alkaline (ALK) electrolyzers, prioritizes wind turbine (WT) and photovoltaic (PV) production, as well as considers three hydrogen use pathways: hydrogen peaking, hydrogen transportation (HEV), hydrogen sales. The oxygen produced by the P2G technology can be used to refill portable oxygen cylinders, which will provide additional cash for highland attrac tions. The performance of this microgrid system was experimentally evaluated under different operating scenarios through simulation. The results show that the system is able to meet the daily power demand of about 920 residents in the ancient city area, supply 16 hydrogen-energy buses in a single day, and provide 694 kg oxygen. Furthermore, the single-day operational cost analysis reveals that using hydrogen energy saves the microgrid 25.72% in run ning expenses compared to a traditional microgrid. The use of data-driven uncertainty sets reduces operating costs by 20.82% compared to standard microgrids. This paper presents an innovative hydrogen microgrid design strategy for highland tourist communities, proving the benefits of hydrogen energy in facilitating a regional low-carbon transition.

4 Biowaste-derived activated carbon from spent coffee grounds for volumetric hydrogen storage

A. K. Gillespie et al., Cleaner Chemical Engineering, vol. 11, 2025. **Link**

Abstract Nanoporous activated carbon materials were prepared from biowaste (spent coffee grounds) as a renewable and practical system for enhanced hydrogen storage at room temperature. Chemical charring and activation with potassium hydroxide (KOH) were performed to expand the pore network, increase the specific surface area, and improve the volumetric storage capacity. These materials were characterized using helium pycnometry, nitrogen adsorption, hydrogen adsorption, and scanning electron microscopy. The activation procedure resulted in a bimodal pore size distribution and a large fraction of nanopores of 7 Å pore widths that are optimal for hydrogen storage. Specific surface areas of 2595 m 2 /g were achieved with a crystalline volumetric storage capacity of 9.84 g/L at room temperature and 100 bar. This corresponds to an energy density around 1.18 MJ/L, which is a 28% improvement over compressed gas alone. This biowaste-derived material has the same volumetric storage ca pacity as the commercially available, petroleum-derived adsorbent, Maxsorb (MSC-30) produced by Kansai Coke. This demonstrates that reversible, physical adsorption of hydrogen on materials produced from biowaste may be used as a more ecologically friendly improvement for renewable energy storage. A similar performance can be achieved by engineering a range of biowaste-based adsorbent materials that involve cleaner precursors compared to the petroleum-based adsorbent materials currently offered on the market.

5 Configuration optimization of offshore energy islands coupled with ammonia refueling station and submarine salt cavern hydrogen storage

W. Zhang et al., International Journal of Hydrogen Energy, vol. 113, pp. 669-684, 2025. **Link**

Abstract The current wind power industry is gradually developing towards deep-sea areas. Utilizing offshore islands for hydrogen and ammonia production can solve the problems of power transmission and consumption in offshore areas. Ammonia, as a hydrogen vector, can replace heavy oil in marine transportation. With the increased de mand for offshore ammonia refueling for ships, and considering the large-scale, long-term, and well-sealing characteristics of submarine salt cavern hydrogen storage (SSCHS) for stabilizing ammonia production, this study elaborates on a novel energy island coupled system including offshore ammonia refueling stations and SSCHS. An optimization model is established for capacity configuration and operation optimization. Sensitivity analysis is conducted on wind speed, electrolyzer efficiency, and ammonia demand. The results show that the energy island incorporating SSCHS can reduce the power curtailment rate from 11.042% to 1.903% and reduce the LCOA from CNY 5.376/kg to CNY 4.906/kg. The offshore ammonia refueling station can decarbonize the marine transportation sector by reducing 40000 tons of carbon emissions annually. Wind speed significantly impacts LCOA, with an increase of 1 m/s in average wind speed resulting in a CNY 1.76/kg decrease in LCOA. The novel coupled system can offer insights into the future development of offshore energy islands, promote the development and utilization of offshore green energy, and support the transition to a carbon-neutral society.

6 Molecular-level elucidation of residual hydrocarbon effects on hydrogen adsorption and distribution in geological minerals

T. Muther and A. K. Dahaghi, Journal of Molecular Liquids, vol. 427, 2025. **Link**

Abstract The presence of hydrogen within depleted geological formations is gaining significant interest due to its enor mous capacity to hold hydrogen underground for storage and withdrawal. However, the adsorption and distri bution of hydrogen in depleted geological pores concentrated with residual hydrocarbons remain unclear. To evaluate these physical characteristics under different geological minerals and varying thermodynamic conditions, we conducted a series of Grand Canonical Monte Carlo (GCMC) simulations. In this study, decane was introduced as a residual hydrocarbon component to represent long-chain heavy alkanes commonly found in depleted hydrocarbon formations. Furthermore, in our analysis, we considered minerals, including hydroxylated quartz, calcite, kaolinite, K-illite, and Na-montmorillonite, representative of common rock types found in geological formations, such as sandstones, shales, and carbonates, relevant to hydrogen geo-storage and production. Initially, we examined pure hydrogen adsorption on these minerals to understand the fundamental interactions. Decane was then incrementally introduced to the system, enabling a study of hydrogen interactions in the presence of residual hydrocarbons. To increase the system's complexity, CO 2 was introduced, allowing a detailed analysis of hydrogen distribution and interaction potentials within this multi-component environment. The findings revealed that hydrogen uptake showed negligible variation among the selected minerals in the absence of decane and CO 2 . However, incrementally introducing decane led to a linear reduction in hydrogen uptakes, ranging from 3% to 51%, depending on the mineral type. Additionally, the presence of ions caused significant shifts in the hydrogen surface adsorption peaks. The introduction of CO 2 further decreased hydrogen uptake by 56 to 92% compared to the pure hydrogen uptakes by occupying the mineral surfaces, thereby reducing the availability of hydrogen near the surface. These results contribute to our understanding of hydrogen distribution in multi-component systems within depleted geological formations.

PUBLICAÇÕES — Tecnologia de Armazenamento de Hidrogénio

7 Techno-economic and life-cycle assessment of subsurface hydrogen and synthetic geothermal storage technologies

D. M. Tayyib et al., Journal of Energy Storage, vol. 118, 2025. **Link**

Abstract The objective of this study is to provide an integrated techno-economic and life-cycle assessment of two emerging storage technologies using porous media: (1) subsurface hydrogen (H 2) storage, and (2) synthetic geothermal storage, that can be integrated into the grid to minimize wind and solar energy curtailments. This study quan tifies the technical and economic feasibility through the different phases of each technology to determine the optimal storing option in terms of estimated efficiency, levelized cost of storage, and GHG emissions. Data from the Energy Reliability Council of Texas (ERCOT) was used to demonstrate the applicability of these energy storage technologies. The monthly average (from 2017 to 2021) of ERCOT-curtailed energy was considered. In addition, reservoir simulation was used to determine the withdrawal efficiencies of the different geological energy storage methods. Results showed that around 14-57 % of the curtailed energy can be recovered through subsurface H 2 storage at a levelized cost between $102-115/MWh, representing a range of 0.13-0.50 % energy recovery per dollar. On the other hand, around 6-17 % of the curtailed energy can be recovered through synthetic geothermal storage at a levelized cost range of $19-73/MWh, representing 0.23-0.32 % energy recovery per dollar. Synthetic geothermal storage showed higher annual emissions and higher amounts of energy consump tion, mainly from the condensation process, whereas subsurface H 2 storage showed lower emissions and lower amounts of energy consumption. The analysis suggests that subsurface H 2 storage in porous media can be a more promising technology for complementing renewable energy if large withdrawal efficiencies are achieved.

PUBLICAÇÕES — Distribuição de Hidrogénio

1 Hydrogen fuel cell technology development in China: Technology evolution, city-cluster network and industry chain distribution

X. Wang, L. Fan, H. Zhang and P. Zhou, Energy, vol. 322, 2025. **Link**

Abstract Identifying the evolution trajectory and cross-regional knowledge flow of hydrogen fuel cell technology con tributes to leveraging the industry chain advantages for technological deployment. Based on hydrogen fuel cell patents from 2000 to 2022 in China, this study employs a dynamic topic model to explore the evolution of fuel cell technological topics and paths. We adopt network analysis to identify the knowledge flow in the city-cluster innovation cooperation network, and estimate the city-cluster policy effect on fuel cell innovation collaboration. We further examine the fuel cell technological distribution on the industrial chain and identify the division advantage in city clusters. Our findings reveal that upstream and midstream technologies in the fuel cell in dustrial chain emerge as prominent technology hotspots, with eastern cities assuming vital roles in the fuel cell knowledge network. The identified diverse technological focus and advantages of city clusters provide a promising way for industrial chain division optimization.

2 Optimizing hydrogen transportation infrastructure and supply chain under uncertainty: An integrated mixed integer linear programming and real options analysis

S. Timalsina et al., International Journal of Hydrogen Energy, vol. 111, pp. 635-647, 2025. **Link**

Abstract The development of hydrogen transportation networks faces challenges from uncertain market demand and evolving technologies. This study utilizes a combination of Mixed Integer Linear Programming and Real Options Analysis to determine the optimal transportation mix, considering new hydrogen pipelines, repurposed natural gas pipelines, and trucks. This model offers cost-effectiveness in addition to flexibility for system expansion, delay, or abandonment under fluctuating demand scenarios and market volatility. A Wyoming-based case study illustrates that large-diameter pipelines prove best for long-distance hydrogen transport, and trucks for short distances, while repurposed gas pipelines offer the most cost-effective option. The analysis recommends starting with a small new hydrogen pipeline (36-inch) and then upgrading to repurposed gas pipelines or trucks based on the demand and distance of hydrogen transport. This phased strategy minimizes initial capital expenditures while ensuring scalability and resilience to fluctuating demand, making it an effective approach to hydrogen infrastructure development.

3 A methodology for integrating hydrogen refueling stations in multi-microgrids and coordination of distribution systems and transmission system

G. Han et al., Energy, vol. 322, 2025. **Link**

Abstract The crucial role of hydrogen refueling stations (HRSs) is to feed hydrogen demands of transportation sector. Although the future power and energy systems must be 100 % renewable, the integration of 100 % renewable HRSs in 100 % renewable multi-microgrids with coordination of distribution system operator (DSO) and transmission system operator (TSO) has not been addressed in the literature, so, the main objective of this research is to develop a framework for integration of 100 % renewable HRSs in 100 % renewable multi- microgrids considering DSO-TSO coordination. The first layer of the developed four-layer framework is devoted to HRSs; the second and third layers are respectively devoted to multi-microgrids and DSO and the final layer includes the TSO model. The results approve the efficacy of the proposed hierarchical framework for the integration of 100 % renewable HRSs in 100 % renewable multi-microgrids with DSO-TSO coordination. The results indicate that batteries increase the expected profit of all microgrids (MGs), but decrease the expected profit of DSOs. The results confirm that the responsiveness of hydrogen demands increases the expected profit of all HRSs.

4 A techno-economic evaluation and SWOT analysis of various hydrogen energy carriers: Production to distribution

L. Kumar et al., International Journal of Hydrogen Energy, 2025. **Link**

Abstract The transition from fossil fuel dependency to low-carbon pathways is dependent on efficient energy transportation methods. Hydrogen (H2) stands as a key player in achieving carbon-neutral targets by 2050. However, large-scale H2 transport presents technological and economic challenges. This study provides a techno-economic evaluation (TEE) and SWOT analysis of hydrogen energy carriers (HECs) for export from natural gas-rich countries, comparing four different pathways: liquid hydrogen (LH2), ammonia (NH3), methanol (MeOH), and dimethyl ether (DME). NH3 emerges as the most cost-effective option, with the lowest specific energy consumption (SEC) of 7.67 kWh/kg-H2 and a levelized cost of hydrogen (LCOH) at US$4.76/kg-H2. SWOT analysis reveals strong infrastructure and regulatory support for NH3, while LH2 is ranked higher on specific factors. Although NH3 faces safety challenges, it remains favorable for sustainable transportation. However, significant research is needed to ensure the technological and economic feasibility of these pathways for large-scale implementation.

5 Hydrogen blending in gas pipelines: Fluid-dynamic insights, risks, and recommendations

G. Guzzo et al., International Journal of Hydrogen Energy, vol. 120, pp. 67-77, 2025. **Link**

Abstract Massive theoretical and applied research is underway worldwide to assess the viability of transporting natural gas-hydrogen blends in pipelines. For the first time, this work derives simplified but closed-form equations that describe how changes in gas properties due to hydrogen blending at different volumes map to specific changes in pressure drop, compressor power, and linepack. These first-of-their-kind equations, which are extensively vali dated against transient gas flow models, enabled three unprecedented and unique findings. The first finding, which quantifies how a change in demand maps to a change in delay and swing on the supply side, reveals that pressure swings increase monotonically with an increase in hydrogen blending volume, translating into an in crease in pipeline fatigue and risk of failure. The second finding crucially shows that pressure drop does not monotonically increase with an increase in hydrogen blending volume; in fact, it is highest at around 85 % hydrogen volume, not at 100 %. The third finding shows that the decrease in linepack, as a result of an increase in hydrogen volume, is not only related to the gross calorific value of the gas mixture, but also to the pressure-to-compressibility factor ratio, suggesting that smaller parallel pipelines can offset this linepack reduction compared to a single larger pipeline.

6 An interpretable machine learning model for failure pressure prediction of blended hydrogen natural gas pipelines containing a crack-in-dent defect

G. Qin et al., Energy, vol. 130, 2025. **Link**

Abstract The present study developed an interpretable hybrid machine learning-based model to predict the failure pressure of blended hydrogen-natural gas (BHNG) pipelines with crack-in-dent (CID) defects. With extreme gradient boosting (XGBoost) as the fundamental predictor, the whale optimization algorithm (WOA) was used to optimize its hyperparameters. The developed model, WOA-XGBoost, was used to train the machine learning- based prediction model with finite element modeling data. Three benchmark models were trained for compar ative reasons to predict the failure pressure. The developed WOA-XGBoost model demonstrated superior pre dictive performance with a coefficient of determination (R 2) of 0.986. The sensitivity analysis showed that when n_estimators is 200, the mean values of R 2 , RMSE, and MAE are 0.986, 0.275, and 0.203, respectively. Model interpretability was enhanced through SHapley Additive exPlanations (SHAP), which visualized global and local feature contributions. Results indicated that H atom concentration significantly affected failure pressure pre dictions, with a mean absolute SHAP value of 0.91. The proposed model provides a robust and innovative so lution for the integrity management of BHNG pipelines with complex defect configurations.

PUBLICAÇÕES

Mobilidade Terrestre com Hidrogénio

1 Hydrogen fuel cell technology: A sustainable solution for revolutionizing aviation and achieving significant carbon reduction in the industry

H. Wu et al., International Journal of Hydrogen Energy, vol. 111, pp. 711-722, 2025. **Link**

Abstract As the hydrogen economy grows and nations like Germany and China aim for carbon-neutral aviation, the aviation industry is preparing for a radical transformation. Fuel cells driven by hydrogen are rapidly developing into a competitive alternative to fossil fuels. Recent advances in fuel cell technology, such as higher energy density, better efficiency, and lighter weight, are making hydrogen-powered aircraft a more realistic possibility. Fuel cells that use hydrogen are becoming a viable substitute for fossil fuels in the aviation industry, which is moving towards sustainability. Research in this area focuses on the effects of hydrogen fuel cell technology on aviation from both a technical and environmental perspective. We examine the HY4 hydrogen-powered aircraft's storage concerns, efficiency advantages, and energy density advantages (up to 33.4 kWh/kg in comparison to 12.15 kWh/kg for traditional aviation fuel) using this aircraft as our case study. Based on our research, it is possible to decrease aviation-related carbon dioxide emissions by 50% by 2040 using hydrogen-fueled aircraft, but only if the challenges associated with infrastructure and hydrogen production is overcome. The HY4, a hydrogen-powered aircraft developed by the German Aerospace Center (DLR), serves as an illustration of the potential of this technology to transform both regional and commercial aviation. Given the increasing pressure to reduce carbon emissions, hydrogen fuel cells offer a compelling solution to the issue of sustainability. This abstract investigates the most recent advancements in hydrogen fuel cell technology, its integration into current and future aircraft models, and the technological obstacles that must be overcome to implement hydrogen-powered aviation on a large scale. Our research indicates that between 2024 and 2040, aircraft fueled by hydrogen might help achieve global sustainability targets by cutting carbon emissions. This paper maps out a sustainable future for the aerospace industry and emphasizes the technological and infrastructural advances necessary for hydrogen-powered aircraft to become widely used.

2 Environmental analyses and sustainability performance evaluations of AVGAS and hydrogen-powered piston-prop engines for aircraft f light Envelope

I. Yazar, H. Y. Akdeniz and O. Balli, International Journal of Hydrogen Energy, 2025. **Link**

Abstract In this study, the comprehensively measured, and compared aviation, exergetic, thermodynamic-based envi ronmental, and thermodynamic-based sustainability performances of two different piston-prop aviation engines which are fueled with AVGAS (aviation gasoline) and Hydrogen separately in the Landing and Take Off (LTO) f light phases. The highest exergy efficiency values are measured in the approach phase of LTO when the engines are fueled with either AVGAS or hydrogen. When the engines are fueled with the AVGAS, the take-off phase has the maximum waste exergy is take-off. When the aviation piston-prop engine 1 (APE1) is fueled with the AVGAS, the minimum fuel exergy ratio value is obtained by a value of 72.08% at the approach phase. When the aviation piston-prop engine 1 (APE2) is fueled with hydrogen, the maximum fuel exergy ratio value is obtained with a value of 78.399% at the approach phase. The lowest specific fuel consumption value is computed as 0.101 kg/kWh when the APE1 is fueled with hydrogen during the approach phase. When the APE1 is fueled with the AVGAS, the environmental effect factor, the ecological effect factor, the ecological objective function, the exergetic sustainability index, and the sustainable efficiency factor results are observed with values of 7.337, 8.337, 64.666 kW, 0.136, and 1.136, respectively for the taxi phase. The environmental effect factor, ecological effect factor, ecological objective function, energetic sustainability index, and sustainable efficiency factor results for the climb-out phase of the APE2, while fueled with hydrogen are 3.190, 4.190, 277.752 kW, 0.313, and 1.313, respectively. Based on all the analyses, findings, and comparative performance evaluations, it is deter mined that the APE1 is the best engine in terms of exergetic efficiency, specific fuel consumption, thermody namic efficiency, environmental friendliness, and sustainability.

3 Analysis of the effects of ambient wind and vehicle opening conditions on the hydrogen leakage hazard of hydrogen fuel cell buses

Q. Ma and F. Guo, Fuel, vol. 392, 2025. **Link**

Abstract In this paper, hydrogen leakage accidents of hydrogen fuel cell vehicles under different leakage scenarios are numerically simulated. The effects of ambient winds and vehicle opening conditions on the dispersion of hydrogen leakage are considered. Relevant safety parameters such as combustible area distribution, hydrogen concentration, combustible gas cloud volume and opening velocity variations are analyzed. Based on the results of the analyses of the different spill scenarios, serious accident situations are derived. Finally, the TNO multi- energy method is used to estimate the extent of damage in the event of an explosive accident at different mo ments. The results of the study show that windows are the most effective in diluting hydrogen in vehicles, fol lowed by doors and finally sunroofs. But the opening of the doors increases the build-up of hydrogen outside the vehicle. Smaller ambient wind speeds can also increase the risk following a hydrogen leak. When the ambient wind direction is from the front to the back of the vehicle, the ambient wind speed is 30 km/h, and only the door is opened, the gas cloud is the most widely distributed and combustible gas cloud volume is the largest, so this leak scenario is the most dangerous. Analyzing the severe accident scenario, the combustible gas cloud volume peaks at about 65 s and enters a steady state after 82.3 s. If an explosion occurs at the moment of peak volume, it will cause irreversible effects on people within 78.45 m from the center of the explosion and 90 % of deaths within 4.82 m from the center of the explosion. The results of the study can provide a reference for emergency response to hydrogen fuel cell vehicle leakage accidents and explosion accident prediction. It is therefore crucial for hydrogen safety and the application of hydrogen in the energy sector.

4 An Improved MPC-based energy management strategy for hydrogen fuel cell EVs featuring dual-motor coupling powertrain

X. Luo and H. S. Chung, Energy Conversion and Management: X, 2025. **Link**

Abstract Hydrogen fuel cell electric vehicles (HFCEVs) provide significant environ mental benefits. Integrating dual-motor coupling powertrains (DMCPs) fur ther enhances efficiency and dynamic performance. This article proposes an energy management strategy (EMS) for the hydrogen fuel cell/battery/super capacitor system in an HFCEV with DMCP. Model predictive control (MPC) is adopted as the framework to optimize economic performance, defined in this study as the hydrogen consumption cost and fuel cell degradation cost. To improve the prediction horizon and accuracy, the torque split ratio for two varying permanent magnet synchronous motors (PMSMs) and the corre sponding mode switching rules of the vehicle are initially established. Subse quently, a combination of Dynamic Programming (DP) and MPC is selected as the framework, utilizing a Dung Beetle Optimizer (DBO)-optimized Bidi rectional Long Short-Term Memory (BiLSTM) network to refine the predic tive model. Finally, comparisons with other predictive models and commonly used control strategies demonstrate that the proposed EMS notably improves economic performance.

5 Toward sustainable transport: Evaluating the economic feasibility of hydrogen fuel cell taxis

J. Xu et al., International Journal of Hydrogen Energy, vol. 105, pp. 1133-1142, 2025. **Link**

Abstract The transportation sector's dependence on fossil fuels substantially adds to greenhouse gas emissions, leading governments and manufacturers to investigate sustainable alternatives such as electric cars, hydrogen fuel, and biofuels. This study examines the economic viability of upgrading taxi fleets in the West bank with hydrogen fuel cell technology to decrease fuel expenses and emissions. Through forecasting future fuel use, expenses, and fleet expansion, we created a forecasting model to evaluate the financial effects of hydrogen adoption in the local taxi industry. Data reveals a modest annual rise in taxi numbers attributed to government-mandated permit limits, resulting in regulated sector development that aids in stabilizing fuel consumption. Forecasts indicate a probable increase in oil prices concurrent with a significant decrease in hydrogen costs, propelled by advancements in hydrogen production and management technology. These patterns indicate that hydrogen fuel cells may emerge as a financially viable and sustainable alternative for West bank's taxi fleets in the near future. This transition, by diminishing reliance on traditional fuels, may yield economic and environmental advantages, establishing hydrogen as a crucial element in forthcoming sustainable transportation initiatives.

6 Sustainable hydrogen energy fuel cell electric vehicles: A critical review of system components and innovative development recommendations

T.M. Navinkumar and C. Bharatiraja, Renewable and Sustainable Energy Reviews, vol. 215, 2025. **Link**

Abstract Hydrogen-powered Fuel Cell Electric vehicles (FCEVs) harness hydrogen gas to generate clean electrical energy using fuel cells, to power the vehicle thus offering a more efficient alternative to traditional internal combustion engines. FCEVs convert chemical energy to electrical energy emitting only water as by-product thus complying with UN SDGs 7 and 13. This study provides a comprehensive and critical analysis of FCEV, covering all the major components present in the system. The study begins with the analysis of diverse FC technologies available and focuses on Proton Exchange Membrane FC for EV applications. Further, the study concentrates on the application of the FC in EV technology and the drive train components of an FCEV. The comprehensive study of the drive train comprises the DC-DC Power Converter, the MPPT algorithms used in optimizing the energy conversion, the different types of inverters used for power conversion to motor drives, and various EV motor types utilized in FCEVs. The significant challenges and technical issues faced by the FCEV in the current scenario are also presented thus offering a balanced perspective on the current state of this technology. A thermodynamic-economic trade-off is presented for a better selection of the components for an FCEV. A case study is presented with the optimized components selected. The analysis further supports the notion that the FCEVs present a suitable and efficient transportation solution, contributing to the global transition towards clean energy and aiding in the fight against climate change.

7 Comparative life cycle assessment of hydrogen internal combustion engine and fuel cells in shipping

A. A. Ventayol et al., International Journal of Hydrogen Energy, vol. 109, pp. 774-788, 2025. **Link**

Abstract The vital role of the maritime sector in supporting global trade highlights the need for sustainable progress. The success of decarbonization depends on new technologies and using alternative fuels, with hydrogen showing great potential. Despite the prevalent focus on hydrogen fuel cells (H 2 FC) in shipping applications, the potential of onboard hydrogen internal combustion engine (H 2 ICE) applications remains relatively unexplored. This study endeavors to conduct a comparative life cycle assessment of the H 2 ICE, H 2 FC, and diesel engines of a passenger vessel. The findings demonstrate both hydrogen-powered systems exhibit notable environmental superiority compared to diesel engines, yielding 84–87% reductions in Global Warming Potential (GWP), 58%–73% re ductions in eutrophication, 34%–52% reductions in acidification, etc. Furthermore, H 2 ICE presents advantages over H 2 FC regarding GWP and Abiotic Depletion Potential (elements and fossil). This study emphasizes the importance of extensively exploring hydrogen-powered systems for ships and their potential use in the shipping industry, highlighting the promise of H 2 ICE as a key contribution.

8 Electric-thermal collaborative system and control for hydrogen-fuel cell passenger trains in the UK's winter

Z. Xu et al., Energy Conversion and Management, vol. 328, 2025. **Link**

Abstract This paper presents a quantitative study on electric-thermal collaborative system for hydrogen-powered train, reutilising the waste heat from fuel cell system for Heating, Ventilation and Air Conditioning (HVAC). Firstly, a hybrid train simulator is developed to simulate the train's motion state. Heat generation from fuel cell is esti mated using a fuel cell model, while a detailed thermodynamic model for railway passenger coach is established to predict the heat demand. Furthermore, an electric-thermal collaborative energy management strategy (ETC- EMS) is proposed for the system to comprehensively optimise the on-train power distribution considering traction and auxiliary power. Finally, comparative analysis is performed among the train with electric heater (EH), heat pump (HP) and heat pump-heat reuse (HP-HR). The results demonstrate that, over a round trip, the proposed HP-HR with ETC-EMS recovers over 22.88% residual heat and saves 16.17% of hydrogen consumption. For the daily operation, it reduces hydrogen and energy consumption by 12.06% and 12.82 %, respectively. The f indings indicate that collaborative optimisation brings significant improvements on the global energy uti lisation. The proposed design with ETC-EMS is potential to further enhance the economic viability of hydrail and contributes to the rail decarbonisation.

PUBLICAÇÕES

Corredores de Hidrogénio: Aspetos Normativos e de Promoção

1 Hydrogen energy industry in China: The current status, safety problems, and pathways for future safe and healthy development

Y. Yao et al., Safety Science, vol. 186, 2025. **Link**

Abstract Hydrogen has become one of the most fruitful programs to promote the transformation of the energy system. However, there are still many unresolved issues in the prevention and control of hydrogen safety risks, which restricts the safe and healthy development of the hydrogen energy industry. This study analyzes the safety risks of hydrogen energy industry and discusses the problems and future needs for the safe and healthy development of hydrogen energy industry in China. First, the current status of hydrogen energy industry in China is briefly reviewed, and the challenges of safety risks prevention and control in China are analyzed. Second, a thorough hydrogen incidents investigation is conducted based on hydrogen incidents from hydrogen energy industry chain. Third, the current status and problems of China's hydrogen energy industry safety support system are discussed systematically. Finally, based on research findings and the experience of hydrogen energy industry safety development of other countries, pathways for future safe and healthy development are presented. This study provides reference significance for understanding the safety risks of hydrogen energy industry and guiding the safe and healthy development of industry in China and even in different countries.

2 Preparedness of Vietnam's regulatory framework for the development of hydrogen fuel cell vehicles

H. T. Le et al., International Journal of Hydrogen Energy, vol. 115, pp. 379-399, 2025. **Link**

Abstract In the global efforts to combat climate change, Vietnam has committed to net zero emissions by 2050 and un dertaken steps to realize such goal, including energy transition in the transport sector. Despite the nonexistence of hydrogen fuel cell vehicles (HFCVs) in the country, the Government of Vietnam has issued some national standards for HFCVs, using the United Nations Economic Commission for Europe (UNECE) regulations for guidance. This paper aims to examine the preparedness of Vietnam's regulatory framework for the development of HFCVs. It particularly compares Vietnam's national standards and UNECE regulations on HFCVs to investigate how the latter were integrated into the former. The comparison shows the harmonization between such Viet namese standards and UNECE regulations, though it was noticed that some paragraphs from the UNECE regu lations were omitted in the Vietnamese standards. Those omitted paragraphs should be added to Vietnamese standards or national technical regulations to facilitate the development of HFCVs in a safe manner.

3 Is the promotion policy for hydrogen fuel cell vehicles effective? Evidence from Chinese cities

Z. Jiang, Energy, vol. 320, 2025. **Link**

Abstract China has emerged as a global leader in promoting new energy vehicles; however, the impact of these efforts on the commercial vehicle sector remains limited. Hydrogen fuel cell vehicles are crucial for improving the envi ronmental performance of commercial vehicles in China. This study evaluates the effectiveness of China's hydrogen fuel cell vehicle policies. Firstly, an evaluation index system for hydrogen fuel cell vehicle policies is established, quantifying the policy through two key metrics: policy comprehensiveness and policy synergy. Subsequently, city-level data from 84 cities (2018–2022) are analyzed to assess policy impacts on hydrogen fuel cell vehicles adoption. The results show that both policy comprehensiveness and synergy significantly drive hydrogen fuel cell vehicle sales growth. Early sales figures also strongly influence current trends. Therefore, promoting growth in hydrogen fuel cell vehicle sales can further enhance policy efforts while also accounting for the cumulative effects of initial promotional activities.

4 Navigating stakeholder perspectives on hydrogen generation technologies: A Q-methodology study of current hydrogen production policy in South Korea

Y. Lee et al., International Journal of Hydrogen Energy, vol. 113, pp. 777-786, 2025. **Link**

Abstract This study examines perceptions of hydrogen power generation technologies, particularly gray hydrogen, which is currently prevalent in South Korea. Given the international emphasis on reducing greenhouse gas emissions, hydrogen has emerged as a potential solution for achieving carbon neutrality; however, the perspectives on its environmental, economic, technological, and safety implications are varied. Using Q-methodology, we explored f ive expert typologies, each presenting a distinct perspective: environmental advocates favoring fuel cells, co- combustion technology proponents, safety-oriented skeptics, economic efficiency advocates, and policy- oriented supporters. Consequently, although environmental advocates emphasize the need for green hydrogen, economic and policy-oriented experts recognize the role of gray hydrogen as a transitional solution. Co-combustion power generation has a clear advantage in terms of cost effectiveness. From an environmental perspective, hydrogen fuel cell power generation is superior, and the greatest challenges for both technologies are safety and public acceptance. The findings highlight a complex landscape in which stakeholders must balance environmental goals, safety concerns, economic feasibility, and regulatory requirements. This study provides policy recommendations to guide the strategic direction of hydrogen technology in South Korea, suggesting that a gradual transition from gray to green hydrogen may be feasible with robust policy support and technological development.

5 Modeling critical enablers of hydrogen supply chains for decarbonization: Insights from emerging economies

J. K. Shah et al., Sustainable Futures, vol. 9, 2025. **Link**

Abstract The current global energy environment is experiencing a substantial shift towards minimizing carbon emissions and enhancing sustainability due to persistent problems. Demand for sustainable end-to-end energy solutions has boosted green hydrogen as the solution to decarbonize the world. The current study has identified and evaluated 7 main criteria of 27 sub-criteria for enabling the hydrogen supply Chains for decarbonization using the Fuzzy DEMATEL technique. The results show that the most prominent enablers criteria under causal factors are: cluster- based approach for developing a green hub, Cost and investment decisions, Hydrogen trade policy and regulatory actions and Technology. The effect group factors include: Assessment of ecological concerns-Ecology effect, Availability of Energy sources, and Awareness and public outreach. This study offers insights to understand the dynamics of the hydrogen supply chains and its way ahead towards decarbonization and transition towards a low-carbon economy. This research helps various academic and industrial stakeholders to give pace to green hydrogen uptake as a vital decarbonization tool and act as a base for strategic and collaborative decisions for a resilient and responsible energy landscape.

6 The global yet local nature of energy imaginaries: The cases of Dutch and Spanish hydrogen valleys

P. Upham and Ms. P. C. Maristany, Energy Research & Social Science, vol. 123, 2025. **Link**

Abstract Hydrogen valleys are envisaged (imagined), integrated industrial systems, where hydrogen is produced, stored, and utilized. Here we show how hydrogen valleys as sociotechnical imaginaries are differentiated in terms of their specific configurations, but homogenous in terms of reflecting the interests of large industrial fossil fuel suppliers and consumers. This path dependence is anticipated in sociotechnical transitions theory, which em phasises the power of incumbents with vested interests to maintain basic templates or regimes of production and consumption. The simultaneously heterogeneous and homogenous nature of hydrogen valley imaginaries can be thought of as a form of glocalisation, for which we draw on Roudometof's theory of glocalisation as involving the local refraction of diffusing, global tendencies. To illustrate this, we compare two hydrogen valleys, one in the north of the Netherlands and one in southern Spain. In the north Netherlands, the hydrogen valley imaginary comprises use of offshore windpower to electrolyse hydrogen for transport fuel, and as feedstock to heavy in dustry in proximate regions, including northern Germany and Belgium. This is consistent with existing gas distribution networks connecting industrial consumers. In the southern Spanish case, the imaginary positions Spain as a major exporter of green hydrogen to the rest of Europe via onshore renewable electrolysis, with export including via ocean tankers and chemical refining in existing infrastructure in Rotterdam. Overall the study explores empirically theoretically-informed themes concerning the interrelationship of mutually supportive local and global imaginaries – hence our term glocalised imaginaries.

EVENTOS

10-13 FEB

World Electrolysis Congress 2025

The 4th annual World Electrolysis Congress returns as the THE go-to hydrogen electrolysis event in a new location in Germany: Join us in Cologne from 10 – 13 February 2025! Following the success of the previous editions, event organiser, World Hydrogen Leaders, now a part of S&P Global Commodity Insights, is excited to bring together the entire global renewable hydrogen ecosystem under one roof to accelerate collaboration within the electrolytic hydrogen ecosystem.

Link

11-12 MAR

STOCEXPO

StocExpo 2025

For nearly two decades, StocExpo has been committed to delivering exceptional service and value in the tank storage and energy infrastructure industry. Experience the legacy of exhibitor satisfaction that keeps participants coming back year after year. Position your company as an industry leader by exchanging insights, establishing partnerships, and advancing tank storage solutions. Elevate your brand's visibility and influence within the sector, showcasing your expertise in logistics, storage solutions, cutting-edge technology, safety protocols, and sustainability initiatives.

Link

31-2 MAR

World Hydrogen North America

The 4th annual World Hydrogen North America Congress will return to Houston on March 31st – April 2nd, 2025.
The U.S. Department of Energy announced the Hydrogen Energy Earthshot initiative to reduce the cost of clean hydrogen by 80% within a decade. Canada has also released its Hydrogen Strategy, which aims to make the country a global leader in hydrogen production, use, and exports. With so much opportunity at stake – and 320 billion in investments announced globally up until 2030, North America is leading the way with committed capital of 10 billion – it is imperative that industry leaders collaborate.
That is why events like World Hydrogen North America are so valuable right now. By bringing together key players across the entire hydrogen value chain, we can align on solutions to current obstacles, forge new partnerships, and accelerate the building of a robust hydrogen market.

Link

EVENTOS

8-10 ABR

Central European Hydrogen Technology Forum

The hydrogen economy is one of the promising directions in reducing global climate change. The aim of the new initiative of Grupa MTP is to create a project based on inter-environmental cooperation between business, science, local governments and non-governmental organisations to maximise the share of Polish production and service resources in the supply chain during the implementation of hydrogen investments. These are necessary steps in the pursuit of a modern and climate-neutral economy.

Link

9-10 ABR

Industrial Decarbonisation Europe 2025

Substantial incentives are fuelling decarbonisation momentum across European industries. The challenge now is to seize these opportunities and mitigate hurdles to secure market dominance. Join us for a pivotal event! Reuters Events: Industrial Decarbonisation Europe 2025 (9-10 April, Amsterdam) brings together 250+ senior executives from metals, mining, cement, fuels, chemicals, logistics, and heavy-duty transport. Together, we'll commercialise net zero pathways, redefine standards and safeguard competitiveness.

Link

7-9 MAI

Exhibition Area Green Hydrogen Forum & Expo – Focus Topic of ees Europe

Are you looking for innovative concepts, solutions and products for the hydrogen economy? Are you interested in electrolyzers, fuel cells, hydrogen fueling stations or infrastructural solutions? Or do you buy materials and components, or want to get in touch with experts for power-to-gas projects?

Link

20-22 MAI

WORLD HYDROGEN 2025 SUMMIT & EXHIBITION

The industry's most influential event, World Hydrogen 2025 Summit & Exhibition returns to Rotterdam to deliver its largest edition yet! Brought to you by the Sustainable Energy Council and RX Global, in partnership with the Dutch Government, the Province of South Holland, the City of Rotterdam and the Port of Rotterdam, World Hydrogen 2025 is recognised as the official meeting place where hydrogen deals get done and key partnerships are forged. 2025 marks the midway milestone where progress must be assessed and benchmarked against industry and decarbonisation goals – are we on track? Join 15,000 global industry experts to exchange key insights, build new alliances and sign bold agreements that will kickstart the next wave of hydrogen project developments into the 2030s.

Link

PROJETOS FINANCIADOS

Innovation Fund 2024 Call and Battery calls

Deadline date: 24/04/2025

Link

On 3 December 2024, the European Commission launched the Innovation Fund 2024 Call and Battery calls, with a total budget of €3.4 billion. The general call for net-zero technologies worth €2.4 billion (IF24 Call) supports decarbonisation projects of different scale, as well as projects focusing on the manufacturing of components for renewable energy, energy storage, heat pumps, and hydrogen production, and pilots.For the first time, a €1 billion call for electric vehicle battery cell manufacturing (IF24 Battery) will support projects that can produce innovative electric vehicles battery cells or deploy innovative manufacturing techniques, processes and technologies.

CEF Transport Alternative Fuels Infrastructure Facility (AFIF) call for proposal

Deadline date: 11/06/2025

Link

The objective of the Alternative Fuels Infrastructure Facility (AFIF) call for proposal is to support the deployment of alternative fuels supply infrastructure, contributing to decarbonising transport along the TEN-T network.
This second phase of AFIF (2024-2025) will support the objectives set in the new Regulation for the deployment of alternative fuels infrastructure (AFIR) regarding publicly accessible electric recharging pools and hydrogen refuelling stations across the European Union's main transport corridors and hubs, as well as the objectives set in the ReFuelEU aviation and the FuelEU maritime Regulations.