

H4D Review



Photo credit: Hyllon Namibia

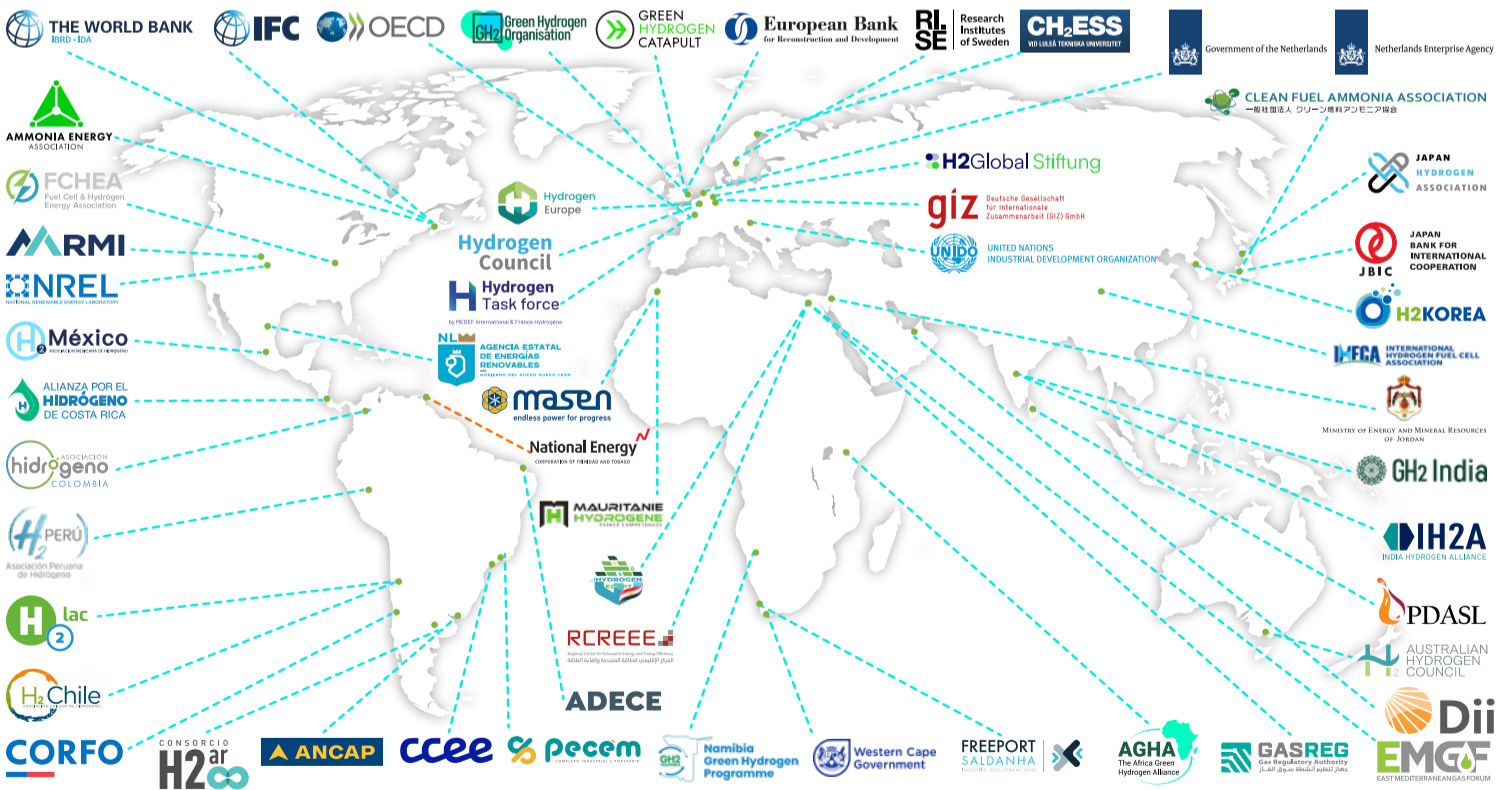
Dear H4D Partners and Stakeholders:

The World Bank is pleased to announce the publication of the eighth edition of the *H4D Review*, the quarterly newsletter dedicated to advancing clean and low-carbon hydrogen.

This edition aims to keep Hydrogen for Development (H4D) partners, stakeholders, and observers fully informed about the latest developments within the initiative. It provides comprehensive updates on ongoing activities, key findings from recent analytical work, and details on forthcoming events and opportunities for engagement in the global clean hydrogen sector.

H4D Partners

The H4D initiative currently counts 55 partners, encompassing a diverse range of organizations, including industry associations, business entities, hydrogen clusters, research and knowledge institutions, laboratories, public agencies, and development organizations (as of December 15, 2025).



The H4D team is pleased to announce the addition of two distinguished partners to the initiative: the **European Bank for Reconstruction and Development (EBRD)** and the **East Mediterranean Gas Forum (EMGF)**. These esteemed institutions joined H4D during the last two quarters of 2025, further strengthening our collective efforts to advance clean and low-carbon hydrogen globally.

H4D Partnership Milestones

H4D IN FACTS

5
Work streams in operation

Current activities include

- Navigator on Policies and Regulations Governing Imports and Contracts for Difference (CfDs) of Hydrogen and Derivatives in Japan.
- Short paper on global best practices for defining off-take agreements, focusing on volume, price, duration, and quality.
- Paper on the cost of capital for clean hydrogen projects in EMDCs, in collaboration with the OECD, focusing on WACC estimates for different countries, identifying key drivers of the cost of capital, and strategies to reduce it.
- Clean Ammonia Analysis: Chile's exports to Japan (in collaboration with CFAA and CORFO).
- Infographic: Green ammonia for low-carbon fertilizer production in Africa (in collaboration with UNIDO).

3 **1**
REPORTS
Three reports & One Navigator (Eng and Spa) published in collaboration with partners

55
Growth in number of members from 12 to 55

4
In-person events held in India, Chile, Colombia and Japan

26
Webinars organized with partners

Operationalizing H4D Partnership

H4D workstreams

WS1. Clean hydrogen technologies, infrastructure, and systems integration.

Facilitated by:


Herman Jonker
Co-chair
Western Cape Government


Jens Burgtorf
Co-chair
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH


Toshiaki Nagata
Facilitator
THE WORLD BANK IBRD - IDA


Rafael Ben
Facilitator
THE WORLD BANK IBRD - IDA

WS2. Enabling frameworks (policies, laws, regulations, and institutional capacities).

Facilitated by:


Mikaa Blugeon-Mered
Co-chair
Hydrogen Task force by H2020 International & France Hydrogen


Ricardo Gedra
Co-chair
ccee


Carolina Lopez Rocha
Facilitator
THE WORLD BANK IBRD - IDA


Michelle Carvalho Metanias Hallack
Facilitator
THE WORLD BANK IBRD - IDA

WS3. Investments, financing, business models and procurement.

Facilitated by:


Deger Saygin
Co-chair
OECD


Tomas Olejniczak
Co-chair
Netherlands Enterprise Agency


Dolf Gielen
Facilitator
THE WORLD BANK IBRD - IDA


Jesús Herrera C.
Facilitator
THE WORLD BANK IBRD - IDA

WS4. Socioeconomics and sustainability.

Facilitated by:


Simran Sinha
Co-chair
GH2 Green Hydrogen Organisation


Carolina Lopez Rocha
Facilitator
THE WORLD BANK IBRD - IDA


Ignacio Berreta Sartini
Facilitator
THE WORLD BANK IBRD - IDA

WS5. Hydrogen use in industry.

Facilitated by:


Ana María Ruz
Co-chair
CORFO


Petra Schwager
Co-chair
UNIDO UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION


Dolf Gielen
Facilitator
THE WORLD BANK IBRD - IDA


Megan Meyer
Facilitator
THE WORLD BANK IBRD - IDA

Key Highlights

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AHC | Australia's second round of the Hydrogen Headstart Program is underway

ARENA launched the second round of its Hydrogen Headstart Program with AU\$2 billion in grants to boost large-scale renewable hydrogen projects. Expressions of Interest closed on 8 December 2025, with final selections expected in Q4 2026. This round followed earlier announcements of first-round winners: Copenhagen Infrastructure Partners (AU\$814 million) for the Murchison Green Hydrogen Project and Orica (AU\$432 million) for the Hunter Valley Hydrogen Project.



CORFO | Nehuenco Project delivers Chile's first off-grid green hydrogen system

Colbún inaugurated a new green hydrogen plant to power the cooling systems at its Nehuenco facility. The project was certified under Chile's R&D Law. During the event, Ana María Ruz, Executive Director of Corfo's Green Hydrogen Committee, highlighted that the initiative replaced gray hydrogen previously used at Nehuenco, delivering positive economic results for Colbún and encouraging other industrial projects to adopt green hydrogen for similar benefits.



GH2 | Geen Hydrogen Organisation launched the Green Iron Principles at COP30

At COP30 in Belém, GH2 launched the Green Iron Principles to define and promote truly clean iron production. The Principles described green iron as produced entirely with renewable energy and green hydrogen, without fossil fuels at any stage. They also set high ESG standards to align climate and sustainability goals. This initiative advanced GH2's global work on green iron and steel in Asia-Pacific and MENA, with further actions planned for 2026.



GH2 India | Green Hydrogen India and the International Hydrogen Fuel Cell Association (IHFC)

Green Hydrogen India signed an MoU with Gujarat Power Corporation to accelerate green hydrogen production. The partnership aimed to boost capacity building, innovation, and energy security, targeting over 3 million tonnes by 2030—showcasing global-local synergy in sustainable energy transformation.



GIZ | Piloting Industrial Decarbonisation in the Global South

Early pilot projects demonstrated the viability of green hydrogen while creating market signals for large-scale deployment. In partnership with the private sector, GIZ implemented six projects to bring green hydrogen applications into practical use.



H2COLOMBIA | Colombia advances in its regulatory framework: Hydrogen Law passes third debate in Congress

Colombia's Congress approved the Hydrogen Law Project in its third debate, expanding tax incentives to hydrogen derivatives such as ammonia, methanol, SAF, and fertilizers. According to Hidrógeno Colombia, the legislation could cover 15–65% of upfront CAPEX for current projects, boosting financial viability and bankability in the country.



H2Perú | Signing of the MoU to Develop the First Hydrogen & Derivatives Hub in Southern Peru

Arequipa advanced its energy transition with a landmark cooperation agreement between the Regional Government and H2 Perú to develop the first Hydrogen and Derivatives Hub in Southern Peru. The agreement aimed to foster knowledge transfer, technology exchange, and collaboration among government, industry, academia, and international partners to position Arequipa as a key hub for industrial decarbonization and clean fuels. During the signing ceremony, UK Ambassador Gavin Cook announced support through a five-phase study on governance and early actions, laying the groundwork for investment, pilots, and regional leadership in green hydrogen.



MEMR Joran | Cabinet Approves JFA Tax Breaks, Green Hydrogen Incentives, Strategic Agreements

Jordan's Cabinet approved a comprehensive package of economic and energy measures, including major incentives for green hydrogen projects. The package offered tax exemptions, reduced income tax rates, and customs relief to boost investment in clean energy and green ammonia production, positioning Jordan as a regional hub for sustainable energy. Additional decisions included tax exemptions for the Jordan Football Association, a €500 million EU financing agreement under a strategic partnership, and infrastructure upgrades such as the Ain Ghazal wastewater plant expansion. These measures aim to strengthen competitiveness, create jobs, and advance Jordan's Economic Modernization Vision.



RVO | RVO and GH2 Join Forces to Coordinate Green Hydrogen Financing in North Africa

RVO and GH2 partnered with the Cairo Centre of Excellence to coordinate financing for green hydrogen in North Africa, focusing on Egypt and Morocco. Building on the Cairo Regional Forum, the initiative mapped financiers and instruments, identified measures to cut capital costs, and prepared a Finance Coordination Dialogue in Cairo. Insights from OECD and H4D analyses on de-risking tools shaped actions to address fragmented risk mitigation and shared infrastructure gaps. The work will feed into a 2026 roadmap for blended-finance models, clear institutional roles, and steps toward bankable green hydrogen and ammonia projects.



From Ambition to Action: Coordinating 10GW Hydrogen Across North Africa

On 20 November, the Netherlands Ministry of Foreign Affairs, RVO, and ESMAP moved the North Africa Working Group into gear, focusing on Egypt and Morocco. A new Scope of Work locks in clear roles and timelines, sharpening delivery over the next year and aligning partners around concrete hydrogen outcomes. Building on existing collaboration, this operational agreement empowers RVO to provide targeted technical assistance, while the World Bank/ESMAP Secretariat steers coordination. The result will be a faster, clearer path to scalable green hydrogen initiatives in North Africa, turning ambition into action.

ESMAP Report Launch



Key Insights from Social Licensing to Operate (SLO) in Renewable Energy Projects: Applying Lessons to Clean Hydrogen Development

IN COLLABORATION WITH

THE WORLD BANK | ESMAP | AMMONIA ENERGY | Green Hydrogen |

Key Insights from Social Licensing to Operate (SLO) in Renewable Energy Projects: Applying Lessons to Clean Hydrogen Development

This report examines the critical role of Social License to Operate (SLO) in the successful deployment of renewable hydrogen projects in Emerging Markets and Developing Countries (EMDCs). While technical and financial feasibility are often prioritized, social acceptance and community engagement remain decisive factors for project viability and long-term sustainability. Drawing lessons from large-scale renewable energy projects—including hydropower and wind—the study identifies key challenges such as socioeconomic disparities, regulatory gaps, cultural sensitivities, and environmental concerns that can hinder project implementation.

Through different case studies, the report highlights best practices for securing SLO, including early and inclusive stakeholder engagement, transparent communication, equitable benefit-sharing, and capacity-building initiatives. It emphasizes that trust and co-ownership are essential for mitigating risks, reducing delays, and fostering community support. The document proposes a comprehensive framework for renewable hydrogen projects, outlining strategies for culturally sensitive engagement, participatory planning, and integration of local development priorities.

Ultimately, the report concludes that embedding social, cultural, and environmental considerations into project design is fundamental to achieving a just and sustainable energy transition. By prioritizing community partnerships and inclusive governance, renewable hydrogen projects can deliver climate benefits while promoting socioeconomic development and resilience in EMDCs.

WS2 Webinar Infographics

All webinar infographics from February to June 2025 have been successfully delivered. Each infographic provides a concise, visual summary of its respective webinar, highlighting the key topics and insights discussed. Every session achieved its objectives and offered participants valuable knowledge.

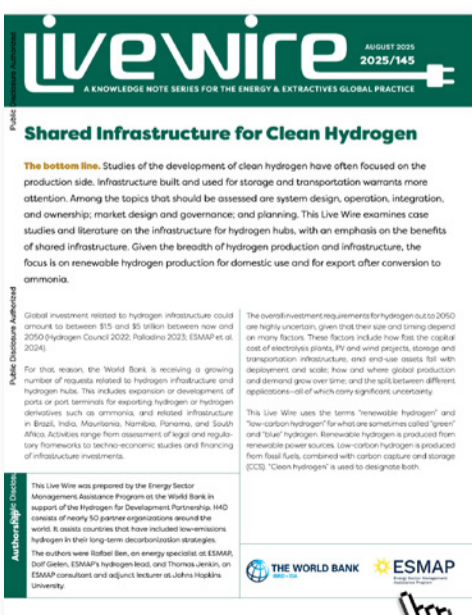
To explore more details about each session, simply scan the QR code included in each infographic.

Thank you to everyone who contributed to ensuring smooth execution and maintaining the high quality of these events. Looking forward to building on this momentum in the months ahead!



Download here

WS1 Live wire: Shared Infrastructure for Clean Hydrogen



This Live wire explores the critical role of shared infrastructure in scaling renewable and low-carbon hydrogen production and export, particularly after conversion to ammonia. While most studies emphasize production technologies, this paper highlights the importance of infrastructure for storage, transportation, and port facilities. Global investment in hydrogen infrastructure is projected to reach \$1.5–\$5 trillion by 2050, underscoring the need for strategic planning and governance.

The document reviews technical considerations for system design, location, and integration, and presents five case studies from Brazil, South Africa, Egypt, Mauritania, and Chile. These examples illustrate how shared infrastructure—such as pipelines, desalination plants, storage tanks, and port terminals—can reduce costs, mitigate risks, and accelerate deployment. Key findings include the benefits of co-locating hydrogen producers and users in hubs, leveraging existing assets, and fostering public-private partnerships to finance large-scale projects.

Emerging best practices emphasize flexible development pathways, shared-use models, and regulatory frameworks that enable investment and innovation. The paper concludes that shared infrastructure is essential to achieve economies of scale, lower levelized costs, and support global decarbonization goals through hydrogen and its derivatives.

MEDIA

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UNIDO Webinar: Financing for Hydrogen Innovation



UNIDO's 16 October webinar explored strategies to finance hydrogen projects and foster innovation ecosystems. Experts discussed hydrogen technology trends, challenges, and opportunities, highlighting development finance institutions' role, innovative business models, and promising technologies to accelerate global hydrogen adoption.

GH2 Inida Webinar: India-Belgium Hydrogen Dialogue series with Belgian Hydrogen Council



The India-Belgium Hydrogen Dialogue highlighted India's roadmap to meet EU green hydrogen demand. With a \$2.3B mission, 5MT annual target by 2030, and competitive costs, India is scaling electrolyser capacity, projects, and port readiness—unlocking major export and investment opportunities.

H2LAC Webinar: Mobilizing investment for the renewable hydrogen and derivatives industry in Chile: lessons learned from the FSA mechanism



A webinar under the Team Europe Initiative gathered 100+ stakeholders to discuss strengthening Chile's green hydrogen industry. Experts emphasized innovation, certification, and financing, sharing lessons from the FSA mechanism to overcome early-stage challenges and build sustainable, reliable hydrogen markets.

H2LAC Webinrar: II Regional Exchange Cycle on Green Hydrogen: Strategies and Roadmaps - Bolivia



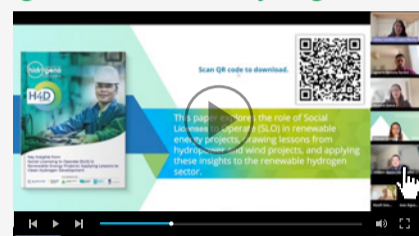
Bolivia unveiled its National Green Hydrogen Strategy during a regional webinar with 200 participants. Backed by EU and IDB support, the plan targets blending hydrogen into fuels by 2030, pilot projects, and long-term decarbonization—positioning Bolivia as an emerging hydrogen producer.

ESMAP - H4D Webinar Series: Clean Hydrogen for Road Transportation in Developing Countries | August 2025



A new report, Clean Hydrogen for Road Transportation in Developing Countries, assesses hydrogen fuel cell vehicle feasibility in Brazil, Chile, India, South Africa, and Korea. The webinar explored cost trends, policy drivers, and hydrogen's role in cleaner, inclusive urban mobility.

ESMAP - H4D Webinar Series: Key Insights from Social Licensing to Operate (SLO) in Renewable Energy Projects: Applying Lessons to Clean Hydrogen Development



An ESMAP webinar launched the report on Social License to Operate (SLO) in renewable energy, applying lessons to clean hydrogen. Experts explored trust, community engagement, and benefit-sharing as critical factors for scaling sustainable hydrogen projects in emerging markets.

ESMAP - H4D Webinar Series: From Bids to Breakthroughs: India's Green Hydrogen and Ammonia Auctions | October 2025



An H4D webinar explored India's green hydrogen and ammonia auctions under the National Green Hydrogen Mission. Experts from SECI, JBIC, and Japan discussed lessons from recent bids, global implications, and strategies to scale clean fuels—unlocking investment and collaboration opportunities.

H4D Webinar Series: Mauritania Hydrogen Infrastructure Study-Key Premises and Results | November 2025



The webinar outlines infrastructure needs, phased development, and the importance of public-private partnerships. It highlights economic, social, and environmental benefits, emphasizing integrated planning and strong regulation to unlock long-term value for the country.

ESMAP - H4D Webinar Series: From Potential to Projects: Namibia's Experience in Green Industrialization | December 2025



A World Bank-backed webinar reviewed Namibia's progress in green hydrogen development, highlighting milestones, challenges, and investment opportunities. Discussions focused on enabling policies, financing, and partnerships to accelerate projects and position Namibia as a leading player in Africa's clean energy landscape.

EVENTS RECAP



Global African Hydrogen Summit
[9-11 Sep 2025. Windhoek International Conventional Centre, Windhoek, Namibia]

The World Bank team participated in the Global African Hydrogen Summit, held from September 9-11. The team moderated the session "Unlocking Global Investments and Financing by Lowering the Cost of Capital for Africa's Green Energy Projects," and served as speakers in the following sessions: "Policies and Regulations: Pragmatic Market Design Creation to Spurr Trade and Competitiveness," and "Fertilizers And Chemicals Spotlight: Harvesting Food Security And Building Climate Resilience." Additionally, the team contributed as speakers in the master class "Market Design and Financing Tools for a Sustainable Deployment of Green Hydrogen."



Cairo Forum 2025
[17-18 Sep 2025. Nile University, Cairo]

The Green Hydrogen Organisation (GH2) hosted the Cairo Forum 2025, bringing together global leaders, policymakers, and industry experts to accelerate green hydrogen development in Africa and the Middle East. The event focused on investment strategies, regulatory frameworks, and technology partnerships to scale up production and drive decarbonization across hard-to-abate sectors. Key discussions highlighted regional opportunities for green hydrogen exports, local job creation, and collaboration to meet global climate targets. The forum reinforced GH2's commitment to fostering sustainable energy transitions and positioning emerging markets as pivotal players in the green hydrogen economy.



LAC H2 SUMMIT
[15-16 July 2025. Gran Hyatt - Sao Paulo, Brazil]

The H2LAC Summit 2025 showcased Brazil's leadership in hydrogen with new demand quotas and highlighted projects like Paraguay's green fertilizer initiative (Atome-Yara). Discussions addressed financing, infrastructure, and regulatory challenges amid a slowdown in projects, emphasizing tailored tools such as CfDs, regional certification alignment, and boosting local demand to unlock investment. The event reinforced the role of public-private collaboration in driving Latin America's energy transition.



15th Dii Desert Energy Leadership Summit
[6-7 Nov 2025. The W Dubai - The Palm, Dubai, UAE]

The Summit took place under the Official Patronage of the UAE's Ministry of Energy and Infrastructure (MoEI). It brought together over 250 partners and friends, including over 50 CEOs, the real 'doers' of the energy transition and provided the opportunity for bold discussions to shape the future of energy in MENA and beyond. Participants shared exclusive insights and knowledge from across the energy transition value chain on lighthouse project development and common objectives to make our economies climate neutral.



3rd International Conference on Green Hydrogen
[11-12 Nov 2025. Bharat Manadapam, New Delhi, India]

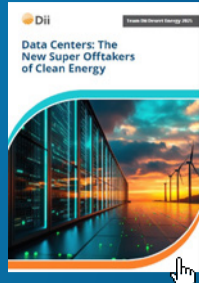
GH2 India served as Knowledge Partner at the 3rd International Conference on Green Hydrogen, supporting the CEO Roundtable, the UK Country Roundtable, and a session on India-EU certification alignment. Shri Santosh Kumar Sarangi, Secretary MNRE & Chairman SECI, noted that "India now expects to produce about 3 MMTPA of green hydrogen by 2030 and reach its original 5 MMTPA target by 2032." He highlighted that delays in Europe's renewable energy decisions have introduced uncertainty for export markets. However, India remains focused on strengthening domestic demand, particularly through uptake in the shipping sector and methanol production.

Selected publications and articles on clean hydrogen from H4D Partners

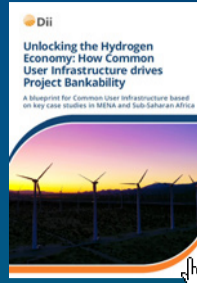
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CCEE: "Renewable Energy Share by Bidding Zone in Brazil"



Dii Energy: "Data Centers: The New Super Offtakers of Clean Energy"



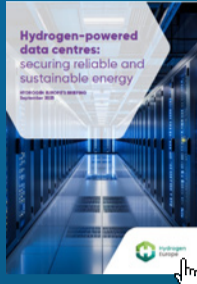
Dii Energy: "Unlocking the Hydrogen Economy: How Common User Infrastructure drives Project Bankability"



GIZ: "Powering clean shipping: Kenya in the global power-to-x economy"



GIZ: "CBAM Readiness Toolkit: Preparing for the Definitive EU CBAM Period"



Hydrogen Europe: "Hydrogen-powered data centres: securing reliable and sustainable energy"



Hydrogen Council: "Global Hydrogen Compass 2025"



Hydrogen Europe: "Hydrogen lead markets framework study"



H2 Global Fundation: "From ports to offtakers: Scaling last-mile hydrogen infrastructure"



OECD: "Implementing the OECD Framework for Industry's Net-Zero Transition in South Africa"



The World Bank: "Decarbonizing Ammonia and Nitrogen Fertilizers with Clean Hydrogen"



The World Bank: "Safety aspects of hydrogen and its main derivatives: A literature review for policy makers"

Major hydrogen project financing updates in the news



The AfDB has granted a \$10 million loan to Hyphen Hydrogen Energy, advancing Namibia's ambition to lead in green hydrogen and ammonia. Funded by the Bank's Sustainable Energy Fund for Africa (SEFA), the financing supports a project poised to reshape Africa's role in the global energy transition.

[LINK](#)



IFC will invest \$20 million in Kahirós, Uruguay's first integrated green hydrogen freight transport project. The project, sponsored by Banco Santander, combines solar power, hydrogen production, and fuel-cell trucks, and aims to cut CO₂ emissions, and lay the foundations for Uruguay as a regional leader in scalable clean-energy solutions.

[LINK](#)



The European Commission has launched the 3rd European Hydrogen Bank (EHB) auction with €1.3 billion, plus €1.7 billion from national budgets, totaling €3 billion. Combined with the €2.9 billion Innovation Fund call for clean tech and decarbonisation, up to €6 billion is available for hydrogen.

[LINK](#)



The Netherlands has awarded €700 million (\$820.5 million) to 11 companies in its second subsidy round, supporting large-scale hydrogen projects with a combined electrolyzer capacity of about 602 MW.

[LINK](#)



Electric Hydrogen has partnered with Generate Capital to provide up to \$400 million in global hydrogen project financing. This collaboration combines Electric Hydrogen's advanced electrolyzer technology with funding solutions to deliver the lowest levelized cost of hydrogen (LCOH) for customers.

[LINK](#)



FDN secured US\$138.5 million from IDB to finance Colombia's energy transition. Funds will support renewables, green hydrogen, smart metering, transmission, and e-mobility. Initial projects include Kai's rural solar electrification and Puerta del Sol, Colombia's largest 300 MW solar plant.

[LINK](#)



IFC board has agreed to invest 100 mln in \$100 million in ATOME Paraguay's Villeta green hydrogen fertilizer plant. The 145MW facility will produce 260,000 tpa low-carbon CAN electrolysis and renewable power, marking Paraguay's first project and driving sustainable agriculture and regional decarbonization.

[LINK](#)

Upcoming WB and H4D Partners activities

Click to open for more information



3rd Green Hydrogen India Symposium
January 23, 2025 | Le meridiem, Nuew Delhi, Inida, in-person.

Jan



ACWA Power Innovation Days 2026
January 26-28, 2025 | Tiyadh, Saudi Arabia, in-person.

Jan



Hyvolution
January 27-29, 2026, Paris, France, in-person.

Jan



World Hydrogen and Carbon Americas
March 10-12, 2026, Texas, USA, in-person.

March



European Hydrogen Energy Conference
March 11-13, 2026, Seville, Spain, in-person.

March



5th Hydrogen International Congress
May 13-14, 2026, Hotel Grant Hyatt, Bogota, Colombia, in-person.

May



Upcoming H4D Webinars:

- ESMAP – H4D Webinar Series: Implementing the OECD Framework for Industry's Net Zero Transition in South Africa Report, January 22nd, 9:00 am (ET).