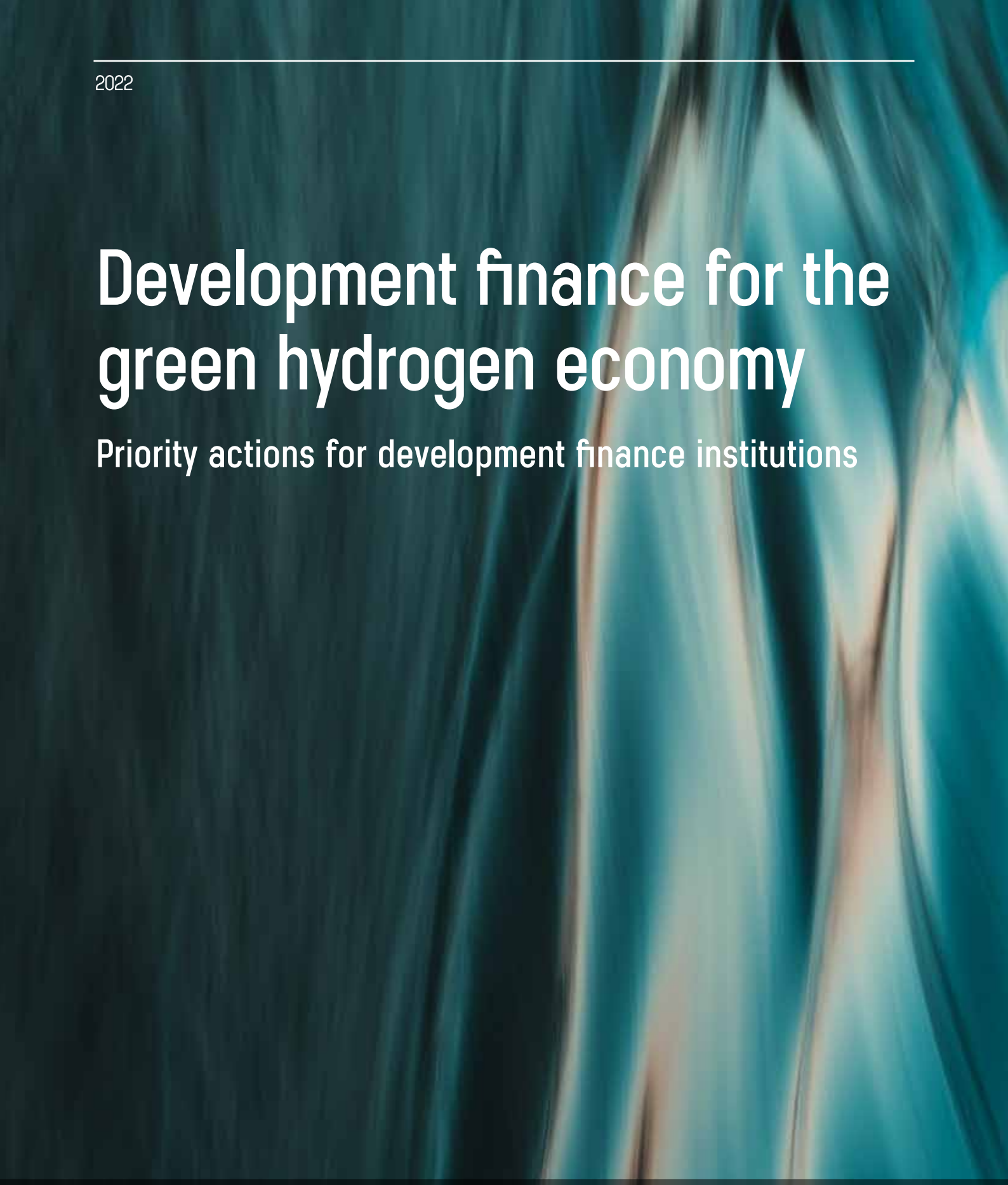
2022

Development finance for the green hydrogen economy

Priority actions for development finance institutions



This paper has been developed by the Green Hydrogen Organisation with inputs from participants of the Roundtable of Development Finance Iinstitutions for Green Hydrogen.[1] The paper does not represent the views, policies, or practices of any individual institution or participant of the Roundtable, and does not represent any commitment on the part of any institution or participant.

GH2 Green Hydrogen Organisation

Foreword

The international community is falling far short of the Paris goals, with no credible pathway to 1.5°C in place. Only an urgent system-wide transformation can avoid climate disaster." This was the stark warning from the UN Environment Programme's 2022 Emissions Gap Report published in October 2022.

We must replace fossil fuels through an unprecedented expansion of renewable energy and green hydrogen. For this to happen quickly in developing and emerging economies, public development finance institutions (DFIs) hold the key. This report identifies four areas where the efforts of DFIs can make a difference: policy support; innovative financing; bridging the price gap between green and fossil hydrogen; and promoting global standards.

For the first time this report also brings together the plans for scaling up green hydrogen investments among leading DFIs working in developing and emerging markets.

We must not underestimate the scale of what is needed. In Africa, McKinsey and the Africa Green Hydrogen Alliance estimate in a report prepared for COP27 that by 2030, USD 450-950 billion is required for its six founding members (Egypt, Kenya, Mauritania, Morocco, Namibia, and South Africa). DFIs are uniquely placed to catalyse this investment and to ensure developing and emerging economies – many with vast solar and wind resources that are ideal for producing green hydrogen – remain competitive in the global green hydrogen economy.

The Green Hydrogen Organisation coordinates the Roundtable of Development Finance Institutions for Green Hydrogen, bringing together 15+ financial institutions, where many of the ideas and recommendations in this report were discussed. We are immensely grateful to these DFIs for participating in the Roundtable and for providing inputs to this report. In their emerging work on green hydrogen, they are showing what climate finance is about.

Jonas Moberg
CEO, Green Hydrogen Organisation

Key messages

The development finance institutions are ready to work with industry as well as host and donor governments to finance and enable large scale green hydrogen projects based on renewable energy.

To scale up green hydrogen investments in emerging and developing economies, development finance institutions will seek to pursue efforts in the following areas:

1. Create an enabling environment for green hydrogen investments

- Support the formulation and implementation of government policies as well as medium- to long-term plans to develop green industry clusters with a view to put in place strong market signals (including supply and demand targets).
- Provide technical assistance and support for regulatory, contractual, and policy frameworks for government and civil society stakeholders in emerging and developing economies.

2. Scale up innovative financing instruments to catalyse green hydrogen investment, including:

- A combination of concessionary, blended, and innovative climate financing mechanisms to allow for a faster roll-out of emerging green hydrogen technologies. Financiers, bilateral donors, and philanthropists will need to increase their financial contributions.
- Guarantees, insurances, and risk alleviation tools to de-risk renewable energy and green hydrogen projects.
- Risk capital to reduce technology costs along the green hydrogen value chain.

3. Bridge the price gap between green and fossil fuel hydrogen and mitigate offtake risks

- Support efforts to create a level playing field by reducing fossil fuel subsidies and pricing carbon emissions.
- Facilitate trade, public auctions, contracts for difference, and a global transparent green hydrogen body to underwrite initial market risks.
- Promote standardised pricing mechanisms and sales and purchase terms for green hydrogen.

4. Promote consistent global standards

- Support a common procurement framework and a standard set of bidding documents for public sector green hydrogen projects, to reduce the administrative burden for client countries.
- Agree on good practices and standards for environmental and social procedures.
- Promote globally applicable green hydrogen standards and definitions with clear emissions thresholds and sustainable development requirements.

The moment is now for first movers in the public, private, and development finance sectors to join forces, drive the shift to a net zero economy, and achieve sustainable development with green hydrogen.

"We cannot avoid climate disaster without a massive step up by the DFIs to support large-scale renewables and a green hydrogen economy throughout developing nations and emerging economies. But time is running out. This is a unique opportunity for development which cannot be missed."

Malcolm Turnbull
Chair of the Green Hydrogen Organisatio and Former Prime Minister of Australia

Background

Green hydrogen: key to a net zero economy

Only about 50 percent of the world's energy and fuels used for industrial purposes can be supplied by electricity connected to renewable energy or storage systems.[2] Due to the energy intensity of these industries, the remaining energy demand will require other renewable energy sources that are readily available without local constraint. Industries like steel, cement, and fertilizer production and heavy-duty transport such as shipping, long-haul and off-road trucking, and aviation, together account for nearly one-third of global CO2 emissions and are difficult to electrify. Unless a major shift takes place with the adoption of green hydrogen and other emerging clean technologies, their share of emissions is expected to double under some business-as-usual scenarios. The continuing drop in the cost of green hydrogen technologies and the volatility of fossil fuel prices therefore makes green hydrogen an attractive solution for energy security and storage capacity.

There has been considerable success in building awareness about the role of green hydrogen in meeting our climate, energy security, and sustainable development goals. Emerging and developing economies with strong renewable energy potential and access to land are particularly well placed to benefit from green hydrogen investments and project development. Half of hydrogen production capacity announced in 2021 came from developing countries[3], providing a unique opportunity to address climate change, generate employment and economic growth, and increase energy security in emerging and developing markets.

The scale of investments needed

COP26 urged development banks to scale up investments for climate action and explore innovative approaches and instruments for mobilising climate finance.[4] The multilateral development banks will continue to play a critical role in scaling up climate financing to help keep the 1.5°C target within reach.[5]

Globally, governments have committed more than USD 37 billion in public funding to hydrogen development, while the private sector has announced investments of around USD 300 billion. However, this is still only a small part of the USD 1.2 trillion of investment in hydrogen supply and use that is needed between now and 2030.[6] According to a study undertaken by McKinsey for the Africa Green Hydrogen Alliance (AGHA), meeting the green hydrogen ambitions by leading African countries would require up to USD 55 billion in investment by 2030 and USD 900 billion by 2050.

Key bottlenecks for producers include: the current financing model, which requires guaranteed offtake agreements to secure funds; inadequate infrastructure; the lack of carbon pricing; and disproportionate subsidies for the fossil fuel industry, causing an uneven playing field. A recent World Bank report (2020) further identifies specific financial constraints inhibiting development of green hydrogen in developing countries, including "the insufficient scale or track record of some hydrogen system components, investors' lack of awareness of green hydrogen's potential role in the energy transition in developed countries, and the lack of clear national strategies and regulatory frameworks for some hydrogen applications, coupled with a perception that new technologies deployed in developing countries may pose higher risks".[7]

> "To enable emerging and developing economies to accelerate the energy transition, donors should step up their financing of the multilateral concessional funds and the multilateral development banks must be prepared to triple their level of financing by 2025 from their 2018 levels."
>
> Amar Bhattacharya and Nicholas Stern, LSE Grantham Research Institute on Climate Change and the Environment.

Opportunities for development finance

Multilateral development banks are at an early stage of formulating and implementing their support for renewable and green hydrogen. Some pioneering projects have been announced by early movers, particularly in Europe, but are being considered in other regions as well. There are also some technical assistance projects and seed funding for pre-feasibility studies being launched, primarily in Latin America and Africa.

For multiple reasons, the development finance institutions—and in particular the multilateral development banks—are uniquely well positioned to help realise the economic and climate potential of the green hydrogen industry for emerging and developing economies. These include:

- **Climate finance commitments.** Various development finance institutions have committed to align their operations with the mitigation and the adaptation goals of the Paris Agreement.[8] Supporting investments in the green hydrogen industry would be a critical climate mitigation measure that could help align climate, energy, and industry programmes and facilities with net zero scenarios.
- **Risk reduction capacity.** The development finance institutions are uniquely placed to increase the flow and reduce the cost of capital by reducing, managing, and sharing risk to help mobilise investments. This will be critical for some emerging and developing economies to be able to benefit from the projected green hydrogen investments and project developments.
- **Knowledge and expertise.** The development finance institutions have significant experience with successfully scaling up investments in renewable energy development. This experience will be critical in ensuring that effective climate financing strategies and instruments are deployed in the green hydrogen industry.

"The DFIs and multi-lateral development banks like the AIIB have been key enablers of solar and wind adoption in the past. I believe we can play a similar enabling role to support green hydrogen, utilising the variety of tools we have at hand."

Sir Danny Alexander, Vice President Asian Infrastructure Investment Bank.

"The transition to a net-zero future will not be stress-free: it calls for an overhaul of the energy sector—its policies, structure, governance, financing, and technologies. We must strive to transition to clean, secure, and resilient energy that can also support just and inclusive growth for the region."

Masatsugu Asakawa, President Asian Development Bank (ADB).

Possible actions and instruments

The development finance institutions have a critical role to play in catalysing public and private investments for first-mover green hydrogen projects, accelerating the uptake of green hydrogen in developing countries, and supporting the required enabling environment.[9] Amongst actions the development finance community can take, development finance institutions have identified the following priorities:

1. Creating an enabling environment for green hydrogen investments

There is an urgent need to support the **regulatory, contractual, and policy regime** for green hydrogen and to build capacity of governments hosting green hydrogen projects in developing countries. Clear supply and demand targets are needed to incentivise hard-to-abate sectors such as steel, cement, fertilisers, shipping, and aviation to switch to zero-carbon energy sources.

> "Coordination among all energy sector stakeholders, including the public sector to develop these strategies into a favorable regulatory environment, and with development finance institutions working in tandem to provide concessional financing that mobilizes private capital, will be essential to ensuring a successful initial rollout of green hydrogen."
>
> World Bank (2020), p. xxi.

Technical assistance is seen by both the public and private sectors as a key opportunity for development finance institutions to help create the enabling environment necessary for responsible hosting of green hydrogen projects and investment. Through technical assistance, development partners and development finance institutions can support governments in integrating green hydrogen into their national energy planning, making regulatory changes, developing relevant strategies and policies, and considering economic incentives to decarbonise industries and supply chains. Technical assistance can also help governments identify policy instruments that will increase green hydrogen demand, including carbon taxes, quotas etc.

Examples: The German development agency (GIZ) has for the last decade played a pioneering role in providing technical assistance and capacity building to government officials in emerging and developing economies to promote the development of a sustainable green hydrogen industry. A variety of projects across all continents, including the International Hydrogen Ramp-Up Programme, have supported governments to develop a market for green hydrogen technologies through industry partnerships and public-private pilot projects.

The Inter-American Development Bank (IDB) is working with 14 Latin American countries on different forms of technical cooperation on green hydrogen, including pre-feasibility studies, legal advice, and support through the different steps to regulate and facilitate markets.

Project preparation facilities can play a key role in supporting early project development by supporting scoping and feasibility studies for green hydrogen projects. A dedicated global facility or fund with a simplified and rapid approval procedure could help tackle specific bottlenecks in the renewable energy and green hydrogen industry.

Examples: The International Finance Corporation (IFC) and IDB Invest are working with Hydrogène de France (HDF) and Rubis to support the development of Renewstable Barbados, a 50 MW solar generation facility with green hydrogen and lithium-ion battery storage that will provide firm and clean electricity to the Barbadian grid. In addition, Renewstable Barbados will be able to host the largest sheep farm on the island. To strengthen bankability of the project, the support will include a solar resource assessment, geotechnical and hydrological studies, an environmental life-cycle assessment, as well as advisory services to ensure the Environmental and Social Impact Assessment will comply with IFC's standards.[10]

The Asian Development Bank's (ADB's) Clean Energy Financing Partnership Facility and Asia Pacific Project Preparation Facility, European Bank for Reconstruction and Development's (EBRD's) Infrastructure Project Preparation Facility and African Development Bank's (AfDB's) Sustainable Energy Fund for Africa are dedicated funds or facilities aimed at facilitating energy project development.

Pilot projects are also key to demonstrating the bankability of a project with potential for upscaling or introducing modern technologies and supporting innovation in new markets. By identifying and financing catalytic projects with a potential to be scaled up and replicated, development finance institutions can help get projects with multiplier or spill-over effects off the ground.

Examples: A green hydrogen power plant in French Guiana is operated by HDF Energy and supported by the European Investment Bank (EIB) through its InnovFin Energy Demonstration Projects facility. This project is being replicated in about 20 countries (including Mexico, Caribbean island nations, Southern Africa, Indonesia, and Australia), where green hydrogen can help stabilise electricity grids and complement renewable energy capacity.[11]

ADB's project on Marine Aquaculture, Renewable Energy, Reefs & Ecotourism for Ecosystem Services (MARES) considers opportunities to promote investment in projects that use marine renewable energy to make hydrogen and alternative fuels to reduce emissions from the maritime industry.

To promote awareness of the potential and risks of green hydrogen and build trust amongst citizens, technical assistance programmes and facilities will benefit from including and involving civil society and actors representing local and affected communities.

2. Scale up innovative financing instruments to catalyse green hydrogen investment

Concessional finance (low-interest investment loans) and grants have an important catalytic role in emerging and developing economies. There is generally a low proportion of grants provided relative to loans in climate finance, meaning the poorest countries struggle to de-risk key projects to mobilise private capital.[12] Grant funding can support new business models that can reduce the costs of green hydrogen production or transportation depending on project location.

> "When we choose to support Scatec's commitment to green hydrogen in Africa, it is because this can trigger significant private investments in green hydrogen and contribute to the green transition in the industry during a phase that still involves risk for project developers."
>
> Bård Vegar Solhjell, Director General, Norwegian Agency for Development Cooperation.

To provide required support for an initial wave of green hydrogen projects in a wider set of countries, the International Energy Agency (IEA) recommends both donor governments and multilateral development banks to increase concessional financing for "well-targeted, catalytic uses that can mobilise large-scale private investment in hydrogen production, distribution, and end-use projects in developing countries".[13] For this to become a reality, financiers, bilateral donors, and philanthropists will need to considerably increase climate finance commitments and disbursements to multilateral climate funds and development banks.

Examples: The IDB is joining forces with the United Nations' Green Climate Fund (GCF) to create the first regional fund to promote electric mobility and green hydrogen in Latin America and the Caribbean. The fund is expected to provide USD 450 million in concessional loans and grants to nine countries (Barbados, Chile, Colombia, Costa Rica, the Dominican Republic, Jamaica, Panama, Paraguay, and Uruguay). The funding would help accelerate the use of electric and hydrogen-based public transportation in the region's cities.[14]

Through the Norwegian Agency for Development Cooperation (Norad), Scatec has been granted funding totaling NOK 85 million for the development of hydrogen projects in Egypt, Tunisia, Morocco, and South Africa. The hydrogen will be used to produce green ammonia.

Through the development finance institution KfW, the German government supports green hydrogen project development in South Africa with grant funds and concessional loans.

Blended and innovative finance mechanisms use public funds to de-risk and crowd in private investment through co-financing. This provides the opportunity to leverage larger climate investments and allows for scale up in new and emerging markets.

In view of the importance to increase the cost competitiveness of green hydrogen, risk capital deployed by development finance institutions can play a crucial role in reducing technology costs along the green hydrogen value chain, thereby facilitating long-term commercialisation.

> "Emerging and developing markets need a coordinated effort to address climate change, matched by significant resources. Blended finance will be key in our climate adaptation financing effort."
>
> Makhtar Diop, Managing Director, International Finance Corporation.

Guarantees have played a critical role in helping de-risk renewable energy projects and could significantly contribute to scaling up investments in green hydrogen. Although guarantees represent only 5 percent of climate finance commitments, they are responsible for 45 percent of private finance mobilised through development finance.[15] Public finance and credit institutions also have a key role in ensuring that political and economic risks are managed.

While development finance can help mitigate first mover risks, it is the private sector that will ultimately finance green hydrogen project development. Investments by large private sector players and multinational companies with strong balance sheets will need to be leveraged to get first mover projects to financial close.

Examples: The World Bank's Multilateral Investment Guarantee Agency (MIGA) has helped mobilise equity investments by Scatec in six solar energy plants in Egypt, covering cover 90 percent of investments for up to 15 years to manage risks of Transfer Restrictions and Convertibility, and Breach of Contract.[16]

3. Bridge the price gap between green and fossil fuel hydrogen and mitigate offtake risks

Making renewable energy price competitive with fossil fuel alternatives and mitigating offtake risks are considered the most significant obstacles to getting to bankable green hydrogen projects. It will be necessary to bridge the price gap between green and fossil fuel hydrogen and create a level playing field by reducing fossil fuel subsidies and pricing carbon emissions.

> "There is a need to activate innovative financing methods within the framework of updated strategies and policies such as debt swaps for investment in climate projects. In this regard, it will be important to promote blended finance through public and private sectors, as well as strengthen the role of non-state actors."
>
> **Dr. Mahmoud Mohieldin**
> UN Climate Change High Level Champion for Egypt and the UN Special Envoy on Financing 2030 Sustainable Development Agenda.

The lack of a global price benchmark for green hydrogen is one of the major bottlenecks to getting to bankable offtake agreements. A global and transparent body acting as a central clearing house for the emerging green hydrogen projects could be a market enabler. The body could underwrite initial market risks and catalyse risk capital for project development.[17]

An agreed **industry price benchmark** and standardised pricing mechanisms with a balanced distribution of price uncertainty risks between the seller and the buyer could help market players in reaching offtake agreements faster.

The development finance community can support the creation and financing of a market infrastructure and standardised pricing mechanisms and sales terms to help manage initial pricing and performance risks.

4. Promote consistent global standards

Further consistency in standards applied by public, private, and development actors can reduce costs, increase efficiency, and safeguard the positive climate impact of green hydrogen.

A common **procurement framework** and standard set of bidding documents for public sector projects financed by development finance institutions can help reduce the administrative burden for client countries.

Good practices and standards for **environmental and social procedures** would provide clarity to project developers and client countries preparing and assessing green hydrogen project proposals.

Globally applicable green hydrogen standards and definitions with clear emissions thresholds and sustainable development requirements will be needed.

Development finance institutions can work together and coordinate to apply consistent standards in their programmes and projects.

Looking ahead

Collaboration between governments, industry, civil society, and the development finance community will be critical to catalyse green hydrogen investments and ensure emerging and developing economies are not left behind in the forthcoming green energy transition.

Development finance institutions are prepared to enable large scale green hydrogen projects and are proactively addressing how to ensure green hydrogen investments also benefit emerging and developing economies and their citizens.

"Green hydrogen might represent a shift of paradigm. If we succeed in increasing investments in green hydrogen, it could be a turning point in our efforts to achieve the global climate goals. It will also make a significant contribution to increased food security in Africa."

Bård Vegar Solhjell
Director General, Norwegian Agency for Development Cooperation

"We need to urgently scale up private finance for green hydrogen projects in developing countries. In particular in Africa, with our fantastic renewable energy potential, there is a lot to gain and too much to lose. We must take this opportunity to create an enabling environment for renewable energy."

Frannie Leautier
CEO of SouthBridge Investments

Projects and plans by leading development finance institutions

African Development Bank (AfDB)

"Green hydrogen offers a game-changing opportunity for African countries to fast track to industrialization - we have a lot of experience from the natural resources industry, and we don't want to make the same mistake again."

"Many African countries are working on hydrogen strategies. They are working on certification, on policies, on financing environment. The message to these countries is that you are not alone, there are places to go to get the technical assistance in order to do this work."

Wale Shonibare, Director, Energy Financial Solutions, Policy and Regulations, AfDB

Summary of overall support	The AfDB has a range of different financing, technical, policy, regulation and knowledge support programmes and facilities that can contribute to create an enabling environment for green hydrogen development in African countries. The Energy Financial Solutions, Policy and Regulation Department (PESR) sits within AfDB's Power Energy, Climate Change and Green Growth Complex. PESR is mandated to assist African countries across the energy sector value chain, including through policy and regulatory support, knowledge resources, data and statistics, technical assistance, and tailored financial solutions.
Financing	The Sustainable Energy Fund for Africa (SEFA) is a large multi-donor facility managed by the AfDB, providing catalytic finance instruments to scale up private sector investments in renewable energy on the African continent. SEFA has a comprehensive set of instruments that can target the entire value chain from the enabling environment (working primarily with public sector counterparts) to project preparation, working primarily with private sector counterparts. SEFA brings either equity or debt on flexible concessional terms, to improve the commercial viability of a project. SEFA also contributes to an enabling environment by providing grants to government counterparties, for use such as certification of green hydrogen, contracting and legal frameworks, skill development across the value chain etc. A regional facility is being designed for the Africa Green Hydrogen Alliance (AGHA) countries with high potential to help develop the upstream policy and regulatory pieces that are required to get the projects going. The African Energy Transition Catalyst Fund is a newly established fund to support Africa's Energy Transition by providing financial support to member countries in promoting initiatives under their energy transition plans. These activities include capacity building, regional harmonization, regulatory frameworks, and project preparation activities. In some countries, this will include activities focused on creating an enabling environment for green hydrogen project development.

African Development Bank (AfDB) (cont.)

Legal support

The African Legal Support Facility (ALSF) is an international organisation established by the AfDB with the mandate to provide legal capacity to African countries to undertake fair and equitable and sustainable transactions, including in the energy sector. ALSF is establishing a sustainable legal facility that will assist in signing green hydrogen project framework agreements, closing financial and commercial clauses on green hydrogen projects, and ensuring that countries sign such agreements on terms that are equitable, and can be replicated over time.

Technical assistance

Through its various facilities and instruments, the AfDB plans to support AGHA member countries (Egypt, Kenya, Namibia, Mauritania, Morocco, and South Africa) in five main areas: regulatory frameworks, local procurement requirements, knowledge dissemination of best practices and standards for green hydrogen, and baselines studies for new countries. These will be in the form of technical assistance and capacity building on legal and regulatory frameworks, fiscal regimes, certification, and standards, and generation of knowledge.

Regions and projects

AfDB works with 54 African member countries. Initially, AfDB intends to support AGHA member countries, including new and upcoming members: Egypt, Kenya, Namibia, Mauritania, Morocco, South Africa, Ethiopia, and Cameroon.

Future plans

The AfDB is looking at a pipeline of green hydrogen projects in the AGHA member countries where it could provide financial solutions to support implementation (concessional finance, blended financing, and partial risk guarantee).

The AfDB plans to offer technical, financial and capacity building support to AGHA member countries to build the necessary regulatory frameworks, consider local procurement requirements, disseminate knowledge of best practices and standards for green hydrogen, and undertake baselines studies for new AGHA countries.

Under regional harmonization and coordination, the AfDB will explore ways to further engage stakeholders in ensuring continuous collaboration in countries with green hydrogen potentials (AGHA and non-AGHA).

Asian Development Bank (ADB)

Financing

Currently ADB is focusing on enabling works in the hydrogen economy including:

- Knowledge sharing (workshop, handbook and other knowledge products) - Policy makers and industry players awareness of trends and technologies, capacity building and safety.
- Support government policy development - Strategy, roadmaps and regulatory framework for H2 energy development.
- Enhance the hydrogen trading platforms - Promote international H2 supply chain with competitive market/trading hubs.
- Engage with industry and associations – Engage industry and associations on standards and knowledge sharing.
- Support pilot - Pilot H2 technologies and business models for demonstration and potential for scaling up.

Technical assistance

A 6966-GEO: Preparing Energy Storage and Green Hydrogen Sector Development Program – creating the conditions for green H2 to be generated from abundant renewable energy resources through: policy and regulatory framework to allow sustainable battery energy storage system (BESS) deployment approved; policy, strategy, and regulatory framework to encourage development of green hydrogen with private sector participation developed; and sustainable battery energy storage system (BESS) to be installed.

TA 6619-REG: Marine Aquaculture, Reefs, Renewable Energy, & Ecotourism for Ecosystem Services - facilitating future investment in sustainable ocean economy development through two main activities: Assessment of marine resource commercialization prospects (including energy generation, green hydrogen production, alternative hydrogen derived fuels, use in regenerative aquaculture, use in integrated coastal protection, use in seafood production/ logistics, and use in tourism) and identification of investment projects in selected developing member countries (DMCs); and review and recommendations on policy and regulatory frameworks to facilitate large-scale investment and on mechanisms to accelerate financing of selected projects.

Regions and projects

Have undertaken a number of studies in a range of countries on the viability of aspects of hydrogen supply chains in Pakistan, Nepal, The Maldives, Indonesia and Palau.

Future plans

Scaling up of piloted activities - This includes Transaction Support Technical Assistance (TRTA).

Further developments - Hydrogen energy projects, including production, transportation and distribution infrastructure, as well as market applications are being monitored for potental sovereign and non-soveriegn operations.

Asian Infrastructure Investment Bank (AIIB)

Financing

AIIB uses a range of financial products to support infrastructure projects which are not theme/sector specific. These main products are equity capital, debt capital, and guarantees, as well as other products provided through the Special Funds, such as technical assistance grants, interest rate buy-down, corporate loans, mezzanine, and as an anchor investor in an initial public offering (IPO).

Equity capital

AIIB provides both direct and indirect equity at various stages of the project cycle:

- Direct equity investments can be made to private and public sector companies. The investment may take the form of subscriptions to ordinary or preference shares (or a combination of both), or a loan convertible to equity.
- Indirect equity investments through funds, including venture capital funds.
- Debt capital

AIIB has two main debt products available, which are sovereign-backed financing and nonsovereign-backed financing.

- Sovereign-backed financing includes a loan to, or guaranteed by, a member, and a guarantee (discussed in more detail below).
- Nonsovereign-backed financing includes any financing to or for a private enterprise or sub-sovereign entity that is not backed by a guarantee, counter-guarantee, or Member Indemnity. Nonsovereign-backed debt financing can take various forms such as a project loan, bridge loan, portfolio loan and corporate loan.

Guarantees

AIIB has developed guarantee products, but these have not yet been rolled out. The products will provide guarantees on loans as either a primary or secondary obligor, in whole or in part. A guarantee covers debt service defaults under a loan that are caused by a government's failure to meet a specific obligation in relation to the project or by a borrower's failure to make a payment under the loan and is accompanied by a Member Indemnity.

Other products

AIIB also has Special Funds, which support identification and preparation of bankable projects through providing financial support, capacity building, and information sharing. Through its Project Preparation Special Funds, AIIB provides technical assistance grants to prepare projects for bankability and high standards. Through its Special Fund Window, AIIB provides blended finance to less developed member countries. The Special funds are predominantly used for sovereign projects and to support low-income countries.

AIIB also has other forms of financing determined by the board of governors. For example, AIIB may mobilize its partners' grants to private sector projects, such as from the Global Infrastructure Fund (GIF), Multilateral Cooperation Center for Development Finance (MCDF), and the Green Climate Fund (GCF).

In its corporate strategy announced in September 2020, AIIB has set a target to achieve at least a 50% share of climate finance in actual financing approvals by 2025.

Asian Infrastructure Investment Bank (AIIB) (cont.)

Regions and projects

AIIB can provide financing to all its 105 members as listed on its official website: Members of the Bank - AIIB with a primary focus on developing countries and regional members. For non-regional members, it's financing policy is governed by the Strategy on Financing Operations in Non-regional Members where a focus is stipulated on climate mitigation and connectivity: Strategy on Financing Operations in Non-Regional Members - Policies and Strategies - AIIB.

Future plans

AIIB has embarked on an internal initiative to develop an approach for supporting the development and commercialization of clean hydrogen. So far, we are taking a very practical approach and climbing the learning curve by devoting resources to projects proposed.

In addition to supporting the adoption of hydrogen, AIIB will seek to support the development of technology. Therefore, apart from financing hydrogen projects, we will also be looking to deploy risk capital with a view to remove technological bottlenecks and reduce costs along the hydrogen value chain. As an example, AIIB recently approved a USD 50 million financing to the Nio venture capital fund which focuses on decarbonization and digitalization technologies in the transport and energy value chains (not specific to hydrogen).

Banco Nacional de Desenvolvimento Econômico e Social (BNDES) - The Brazilian Development Bank

Summary of overall support

BNDES is the main financing provider for renewable energy in Brazil and among the top three worldwide according to BloombergNEF. For the last 20 years, BNDES has supported around 70 percent of the expansion of national power generation capacity, with focus on renewables. BNDES financed, for example, around 75 percent of the wind power installed capacity in the country.

Brazil's electric power mix is already 84 percent renewable. Solar photovoltaic (PV) and wind energy have increased by 225 percent over the last four years, and there is still a huge potential for more clean energies: wind (onshore and offshore), solar and biomass (most already with lower cost than fossil alternatives). Considering only wind and solar PV, Brazil has the potential to add around 1.600 GW in new installed capacity.

BNDES is developing advocacy and credit solutions to foster the green hydrogen value chain in Brazil. The country has a great opportunity to become a key player in the green hydrogen industry due to its huge renewable energy generation availability as well as hydrogen low cost projections.

According to BloombergNEF, Brazil has the potential to produce hydrogen with the lowest cost of the world, around USD 1/kg in 2030. MacKinsey projects over USD 200 billion of investments in the hydrogen industry in Brazil until 2040

Financing

No support to green hydrogen projects has been committed so far. However, in July 2022, BNDES publicized a blended finance solution for green hydrogen projects, providing the lowest interest rates of the bank through the Fundo Clima funding. This solution aims to support the first projects of MW scale electrolysers announced in the country.

BNDES also has solutions for R&D projects, including grants, directed to hydrogen technology development, with our technology fund (FUNTEC).

BNDES can support investors to deploy projects by providing long-term credit, helping to make the investments financially feasible.

Regions and projects

BNDES finances projects only in Brazil. Some project sponsors have shown interest in BNDES loan, but it did not result in credit approvals yet. However, there are some projects already in initial discussions to be financed in 2023. These are mid-scale projects that aimed at the internal market, focused on green products for the fertilizers and steel industries.

Future plans

BNDES is already working on studies to develop finance tools for large-scale (GW) green hydrogen projects. The idea is to provide competitive funding, including in foreign currency, for projects directed to export green hydrogen or its derivative products, like green steel.

British International Investment (BII)

Financing

British International Investment is the UK's development finance institution. We have a mandate to back private-sector projects and companies that contribute to economic productivity, sustainability, and inclusion in emerging and developing economies in Africa, South and Southeast Asia, and the Caribbean. We provide patient, long-term capital across the capital structure; on a direct basis via equity, debt, mezzanine finance, and guarantees; and on an indirect basis via funds and partner financial institutions such as local banks in our target markets.

Green hydrogen is one of the key themes we are exploring as part of our overall climate finance commitments. Our Infrastructure Equity and Project Finance teams will look to support green hydrogen projects for a variety of use cases, including green ammonia for fertiliser or energy transport; green ammonia or methanol for transport fuel, green hydrogen for energy storage and dispatchable power, and green steel and other hard-to-abate industrial sectors. Via our Manufacturing Equity and Corporate Debt teams, we are open to supporting manufacturers of critical components in the green hydrogen value chain such as electrolysers.

British International Investment has established a target that at least 30 percent of its investments in the current 2022-2026 strategy period will qualify as Climate Finance. While we do not establish sub-sector targets, we expect that green hydrogen will be one of the key themes explored in pursuit of our Climate Finance target.

Regions and projects

We are evaluating green hydrogen opportunities across our primary markets of Africa and South & Southeast Asia, with a specific focus at present on North and Southern Africa and with a view to concluding our first green hydrogen transactions in early 2023.

BII is the majority owner of Globeleq, Africa's largest IPP developer. Globeleq has recently signed a Memorandum of Understanding with the Egyptian government to develop more than 3GW of green hydrogen and green ammonia projects in the Suez Canal Economic Zone. As majority-owner of Globeleq, we look forward to supporting any equity investment by Globeleq in these projects.

BII is also a significant minority owner of Ayana Renewable Power, an Indian IPP developer which we founded in 2018. Ayana has signed an MoU with Norwegian green hydrogen developer Greenstat Hydrogen India for the development of green hydrogen projects in India and we look forward to supporting the development of these projects in the coming years.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Summary of overall support

Power-to-X (PtX) offers a tremendous potential for developing countries and emerging economies. Due to their favourable conditions for renewable energy, not only can countries accelerate their economic development with PtX and become less dependent on fossil fuel, but they can decrease their CO2 emissions and earn carbon credits at the same time.

We at the international PtX Hub work with our partners in the public and private sector to leverage these potentials as a catalyst towards defossilisation of the hard-to-abate industries. Funding and investment for such projects will be supported by our financial experts and our network with the private and public sector.

The international PtX Hub is implemented by the GIZ GmbH on behalf of the German Federal Ministry for Economic Affairs and Climate Action (BMWK). Financed by the International Climate Initiative (Internationale Klimaschutzinitiative, IKI), the PtX Hub is a contribution to the German National Hydrogen Strategy of 2020 and represents one of the four pillars of the Federal Ministry for Environment, Nature Conversation, Nuclear Safety and Consumer Protection's (BMUV's) PtX action programme initiated in 2019.

Financing

PtX Hub catalyses funding and investment for small and large projects. This includes, but is not limited to, support in business case calculation and bankability. PtX Hub also provides risk detection, mitigation, and management support for PtX projects, including support in mitigation through public funding.

Regions and projects

We support PtX projects around the globe with a particular focus on Africa. Among other countries, the international PtX Hub is active in Algeria, Egypt, Kenya, Morocco, Namibia, South Africa, Tunisia, Argentina, Brazil, Chile, Colombia, and Uruguay.

Future plans

We are currently working on specific services to accelerate the hydrogen market. This includes, but is not limited to, identifying take off gaps in finance.

European Bank for Reconstruction and Development (EBRD)

"I think we need to step up our investments to strengthen mobilization of the private sector and to support innovation in the countries in which we operate, in particular Morocco where green hydrogen is a great opportunity and a large part of the solution for the future."

Odile Renaud-Basso, EBRD President

Financing

EBRD provides support via different instruments to all segments of the hydrogen value chain:

- Senior, subordinated, mezzanine or convertible debt.
- Equity investment.
- Blended finance using concessional financing (debt or grant) from our donors.
- First-loss guarantees.

Technical assistance

EBRD has been running a hydrogen acceleration program covering: the Southern and Eastern Mediterranean region (SEMED), Turkey, Caucasus, Moldova, Western Balkans, Uzbekistan, Kazakhstan, Ukraine, and Moldova.

The program is divided in three main work streams:

- Country market assessment and diagnostics: production and demand forecast, hydrogen production, regulatory and policy review and recommendations.
- Investment case studies: working with EBRD clients to conduct a technical and financial pre-feasibility assessment of potential projects related to low-carbon hydrogen.
- National Hydrogen Strategy: development of full national strategies for selected countries.

European Clean Hydrogen Alliance: The EBRD is actively supporting its Countries of Operation and its clients accelerate investment towards the deep decarbonisation of economies and operations. Notably, the EBRD is keen to support the early uptake of investment across the entire value chain of clean hydrogen within the Alliance.

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Regions and projects

All Countries of Operation of the Bank. Focus on projects across the full value chain, with private sector developers and public sector operators.

Future plans

EBRD will continue to be active in Countries of Operation and will be following-up on the different opportunities that have arisen from our hydrogen programmes and strategic engagement. Particularly, EBRD will continue to support on the regulatory and policy angles with the national stakeholders, incl. but not limited to certification and access to infrastructure, creation of effective market frameworks.

EBRD is planning to support countries and clients in the origination and aggregation of demand, particularly from the hard-to-decarbonise sectors, as well as the development of hydrogen hubs through technical assistance, policy dialogue and finance.

EBRD is also exploring additional sources of concessional financing that will support early movers into the hydrogen economy.

World Bank and International Finance Corporation (IFC)

Summary of overall support

The World Bank Group is actively engaging in supporting low-carbon hydrogen deployment in emerging markets:

- Through the Energy Sector Management Assistance Program (ESMAP) and the Energy and Extractives Global Practice, the World Bank is already supporting low and middle-income countries to develop their nascent low-carbon hydrogen industry. The World Bank is assisting recipient countries with the identification of near-term and long-term low-carbon hydrogen opportunities. Technical teams are addressing the challenges associated with the deployment of hydrogen projects, including technology risks, capacity building, regulatory needs, economic analyses, and other implementation requirements to make low-carbon hydrogen and fuel cell technologies bankable.
- IFC – International Financial Corporation – works closely with the World Bank to leverage the private sector's role in developing a global low-carbon economy, where hydrogen will play a significant role in decarbonizing hard-to-abate sectors alongside other technologies. IFC is actively engaged in a variety of pre-investment studies, pilot projects, and mainstream investments across sectors and regions with both current and prospective clients. IFC is committed to supporting the public and private sector to understand where and when low-carbon hydrogen is the most effective decarbonization solution.

Financing

The World Bank Group is designing financing mechanisms to provide funding for low-carbon hydrogen pilots and demonstration projects aimed at accelerating scalability and technology maturity. This assistance is currently provided to the Government of Chile, where the World Bank is designing a Green Hydrogen Facility that will boost the deployment of the green hydrogen industry in the country. IFC is exploring opportunities for blended finance as well as mainstream commitments.

Regions and projects

In the past two years, the geographical footprint of the World Bank Group on hydrogen has extended across Latin America; Europe and Central Asia; Middle East and North Africa; East Asia Pacific and South Asia. Governments from over 20 emerging and developing countries have received support from the WBG in four essential areas:

- Strategy and policy development for the hydrogen sector. Developed strategies, pathways, and policies needed for creating low-carbon hydrogen economies. This included the identification of production capacities, potential off-takers, and critical required infrastructure for low-carbon hydrogen, with consideration for private sector needs. For example, Mauritania's Low Carbon Hydrogen Strategy or India's Update of the National Hydrogen Strategy.
- Legal and regulatory framework build-up. Drafted laws and regulations aiming to advance safety standards, secure the industry's sustainability, and promote economic mechanisms to incentivize hydrogen demand. For instance, in Colombia, the World Bank designed a certificate of origin scheme for low-carbon hydrogen, and in Chile, the World Bank provided inputs to draft a safety code to use green hydrogen in the mining industry.
- Capacity building. Supported governments from low and middle-income countries to improve and enhance their ability to evaluate low-carbon hydrogen projects. For example, in Morocco, the WB designed a tool to assess scenarios for the development of green hydrogen projects.
- Market assessment: The World Bank and IFC are collaborating on a global market study seeking to evaluate the opportunity for low-carbon hydrogen deployment in emerging markets and better understand the contributing factors towards a strong investment opportunity. IFC is also leading several feasibility studies through its pre-investment department assessing factors such as solar resource assessments, water availability analysis, and life-cycle environmental impacts.

World Bank and International Finance Corporation (IFC)

Future plans

The World Bank Group will continue providing comprehensive support to emerging and developing countries and private sector partners by targeting investments, policy interventions, and knowledge coordination to accelerate the deployment of low-carbon hydrogen solutions.

Endnotes

1. The Roundtable of Development Finance Institutions for Green Hydrogen, coordinated by the Green Hydrogen Organisation, describes an informal exchange between international financial institutions, multilateral development banks, and development actors to consider how to rapidly increase support of renewable energy and green hydrogen production in developing and emerging economies. Participants include the African Development Bank, the Asian Development Bank, the Asian Infrastructure Investment Bank, British International Investment, BNDES, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), European Bank for Reconstruction and Development, European Investment Bank, KfW, Inter-American Development Bank, Industrial Development Corporation of South Africa, International Finance Corporation (IFC), Norad, Norfund and the World Bank.
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