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COP29
Baku
Azerbaijan

Accelerating Innovation in Clean Hydrogen

Market Assessment Launch Event

Accelerate-to-Demonstrate (A2D) Facility

Saturday, 16 November 2024, 10:45 – 11:45 AZT

Our partners:

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Agenda

Time	Agenda item	Speaker
10:45 – 10:50	Opening remarks	Mr. Ciyong Zou, Deputy to the DG and Managing Director, UNIDO
10:50 – 10:55	UK international climate finance and leadership on clean hydrogen	Dr. Paul Durrant, Head of Sector Strategies and Climate Innovation, UK DESNZ
10:55 – 11:00	UNIDO solution: Accelerate-to-Demonstrate (A2D) Facility	Mr. Peter Warren, A2D Facility Manager, UNIDO
11:00 – 11:20	Market Assessment Presentation	Ms. Maria José Riquelme Zambrano, Senior Consultant, HInicio
11:20 – 11:28	Questions and Answers	All *Moderated by:* Mr. Peter Warren, A2D Facility Manager, UNIDO
11:28 – 11:30	Closing Remarks	Mr. Peter Warren, A2D Facility Manager, UNIDO

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Opening remarks

Mr. Ciyong Zou
Deputy to the Director General and Managing Director
United Nations Industrial Development Organization (UNIDO)

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UK international climate finance and leadership on clean hydrogen

Dr. Paul Durrant

Head of Sector Strategies and Climate Innovation & Joint Head of the Breakthrough Agenda Secretariat

Department for Energy Security and Net Zero, UK Government

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UNIDO's role in advancing clean energy innovation

- UNIDO is the UN Agency for the promotion of inclusive and sustainable industrial development in developing countries.
- UNIDO has three main priorities:

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Supporting sustainable supply chains so that developing country producers get a fair deal and scarce resources are preserved.

Limiting climate breakdown by using renewable energy and energy efficiency to reduce industrial greenhouse gas emissions.

Ending hunger by cutting post-harvest losses and developing agribusiness value chains.

UNIDO's expertise:

- Technical assistance and capacity building
- Investment and innovation funding
- Partnerships and collaboration
- Policy dialogues

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Examples of key UNIDO initiatives in clean hydrogen

Global Programme for Hydrogen in Industry

Aim: Promoting a just transition for industry in developing countries and transition economies (UNIDO flagship programme).

Launched in 2021, supported by the Governments of Germany, Austria and Italy.
(Programme size: USD 14.9m
Total co-financing: USD 141.5m)

GLOBAL PROGRAMME HYDROGEN IN INDUSTRY

Accelerate-to-Demonstrate (A2D) Facility

Aim: Accelerating the commercialization of innovative clean hydrogen solutions in developing countries

Launched on 15 May 2023

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GEF-8 Global Clean Hydrogen Programme (GCHP)

Aim: Focuses on the production and application of hydrogen in industrial and transport sectors in developing economies. (UNIDO is implementing this programme.)

Approved on 9 February 2024
(USD 14.9m from GEF)

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Overview of the Accelerate-to-Demonstrate (A2D) Facility

The Challenge

35% of the emissions reductions needed by 2050 come from technologies that are still in development and have not reached markets at commercial scale (IEA, 2023).

The Solution

The A2D Facility aims to accelerate the commercialization of innovative clean energy solutions in developing countries by supporting catalytic and scalable demonstration projects in:

- **Clean hydrogen**
- **Critical minerals**
- **Smart energy**
- **Industrial decarbonization**

Initial Funding and Timescales

- **Initial contribution of ~USD 80 million** from the UK Government (DESNZ)
- Initially operates from **April 2023 to March 2029**
- Projects supported through calls-for-proposals (first call in July 2024)
- **Grants of USD 1-5 million** per project.
- Main SDGs-of-focus:

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Market assessment on accelerating innovation in clean hydrogen

What: the large-scale, new market assessment presents new evidence and analysis covering the landscape of critical minerals innovations, stakeholders, barriers, initiatives, Sustainable Development Goal (SDG) impacts, financial delivery mechanisms and existing projects.

Purpose: it fills an important gap in the data, evidence and analysis on clean hydrogen in developing country contexts.

Access the report at https://a2dfacility.unido.org / or scanning the QR code.

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Market Assessment Presentation

Ms. Maria José Riquelme Zambrano
Senior Consultant
HINICIO

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CLEAN HYDROGEN MARKET ASSESSMENT IN DEVELOPING COUNTRIES

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ABOUT HINICIO

STRATEGY AND TECHNICAL CONSULTING FIRM SPECIALISED IN HYDROGEN AND ITS DERIVATIVES, SUSTAINABLE MOBILITY AND INDUSTRY DECARBONISATION

With a unique and multidisciplinary team of consultants, we advise governments, companies, and international organizations, including multilateral entities, investment banks, and venture capital firms.

Founded in 2016, our vast experience in strategy development, coupled with our expertise in project and product planning, design, optimisation, and certification, enables us to understand the technical and operational fundamentals that shape energy value chains, including the complexities and opportunities of hard-to-abate sectors.

+800 studies and projects in over 40 countries

We have offices in **Brussels, Paris, Rotterdam, Santiago, Bogota and Washington DC.**

HINICIO IS PART OF VULCAIN GROUP SINCE 2022

- **Business & Strategy**
- **Project Development Assistance**
- **Investment Advisory**
- **Policy & Regulation**
- **Digital Solutions**

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CONTENTS

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Selection criteria

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Key elements of a successful hydrogen development ecosystem

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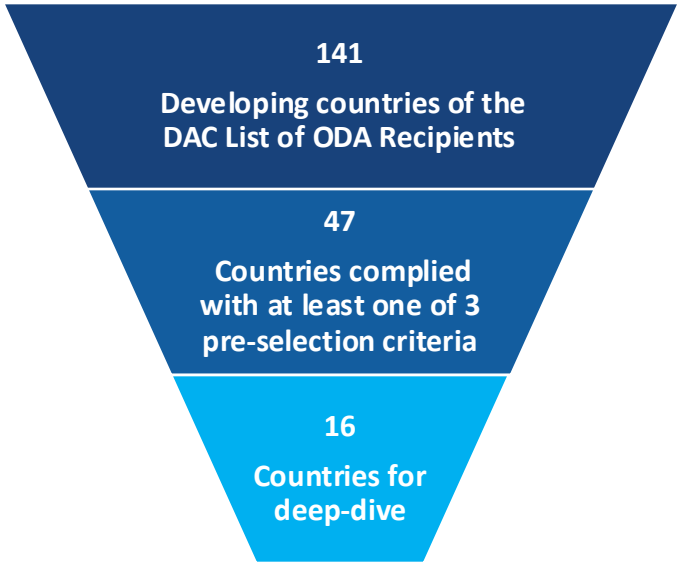
How were the pioneer countries identified?

DESCRIPTION OF THE FUNNEL



Asia	America	Africa	Europe
India	Argentina	Egypt	Türkiye
Indonesia	Brazil	Kenya	Ukraine
Malaysia	Colombia	Morocco	
Vietnam	Costa Rica	Namibia	
	Mexico	South Africa	

Which criteria were analysed and why?

International partnerships	Resources, capabilities, assistance, and collaboration platforms
Financing mechanisms	Overcoming financial barriers securing off-take, pilot projects and new solutions
Projects and innovation	Capabilities and interest on building a clean hydrogen economy
Hydrogen roadmaps	Specific targets and goals to build a robust clean hydrogen ecosystem
Hydrogen associations	Private sector involvement and securing stakeholders across the value chain

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CLEAN HYDROGEN LANDSCAPES

- **Landscape of Technologies**

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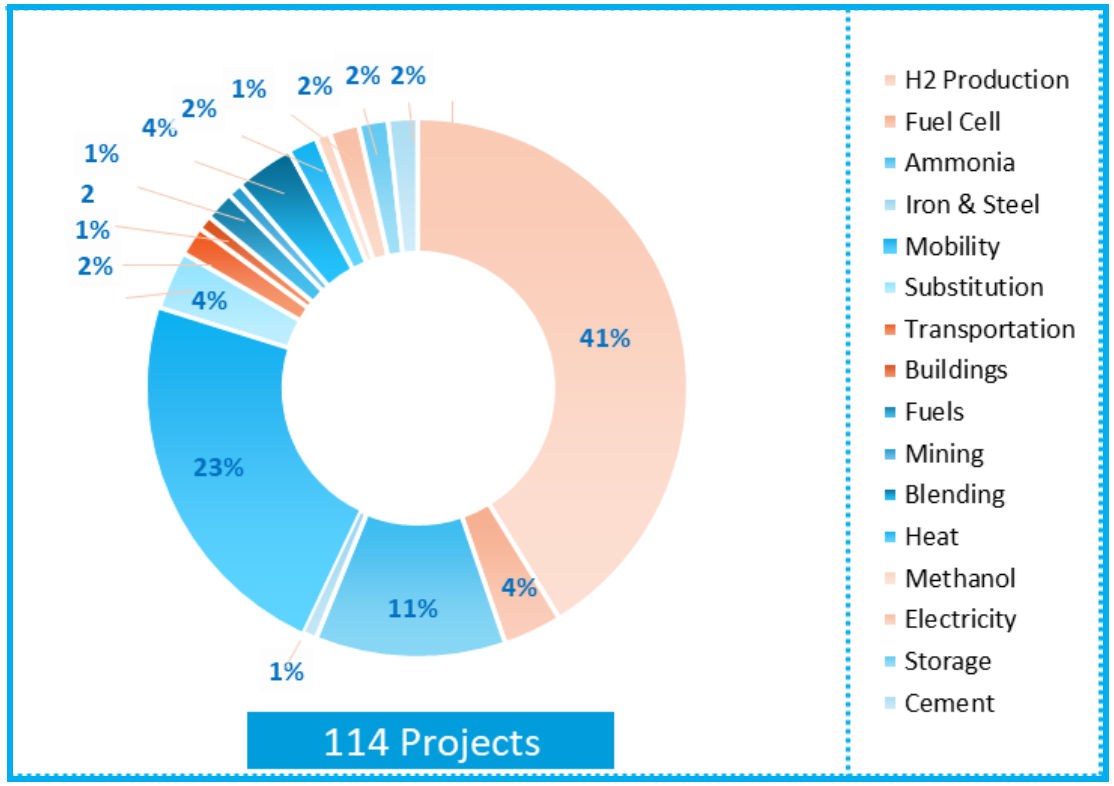
Clean hydrogen technologies are being developed across 35 developing countries, with a particular focus on clean hydrogen production.



- Over 110 hydrogen projects with technologies in TRLs 6 to 9 in late-stage planning in 35 developing countries.
- **41% of the projects focus on hydrogen production,** followed by 23% on mobility, while less than 5% correspond to technologies for hydrogen use in the cement, iron, and steel industry.
- **LAC hosts 36% projects, Asia 29%, and Africa 25%.** The three regions are focusing mostly on clean hydrogen production technologies.

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CLEAN HYDROGEN LANDSCAPES

- **Landscape of Innovators**

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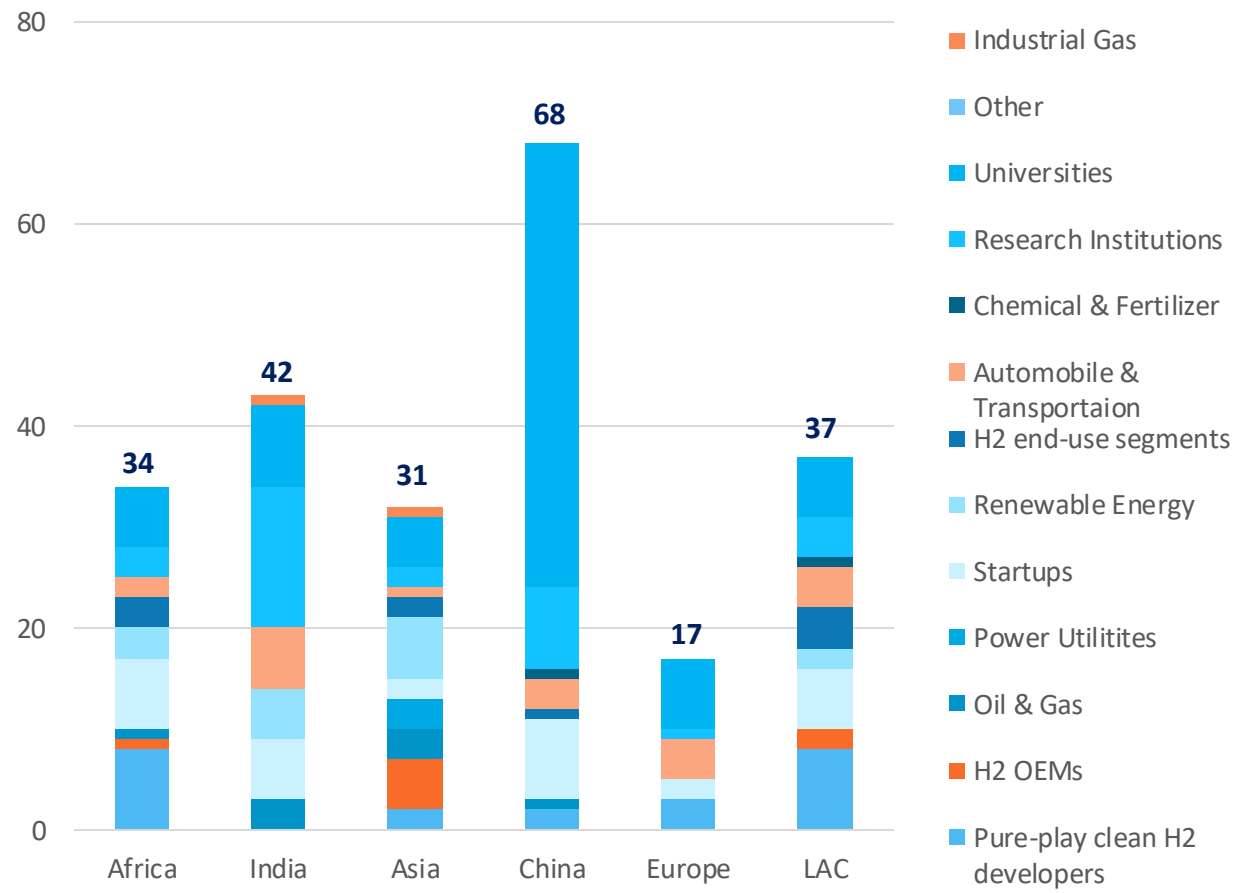
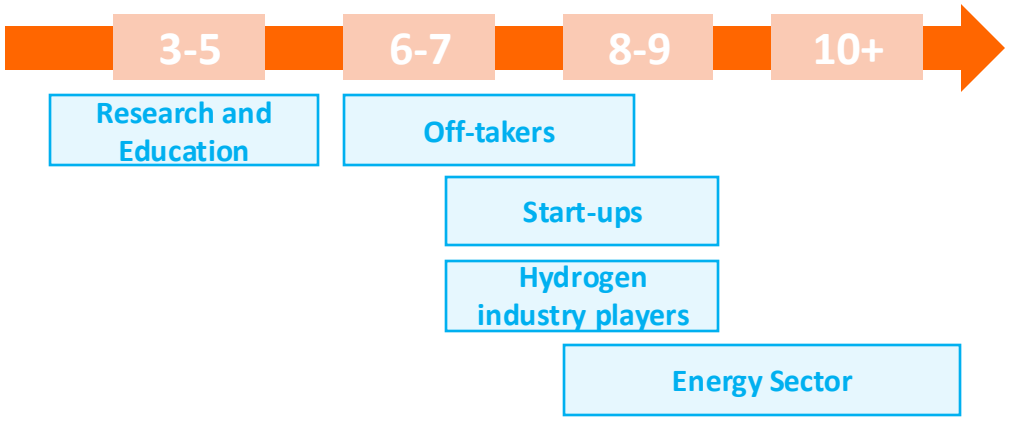
More than 200 innovators were identified in developing countries, most of them from universities and research institutes in Asia

Innovators grouped by category and Region



- **Most innovators belong to universities** (33.9%) and to **research institutes** (13.4%).
- Strong **leadership from China and India,** followed by LAC.
- Despite several projects led by educational centres, **the industry sector is achieving higher TRLs, testing and adopting technologies in TRLs 6-9.**

How are innovators advancing innovation to further stages?



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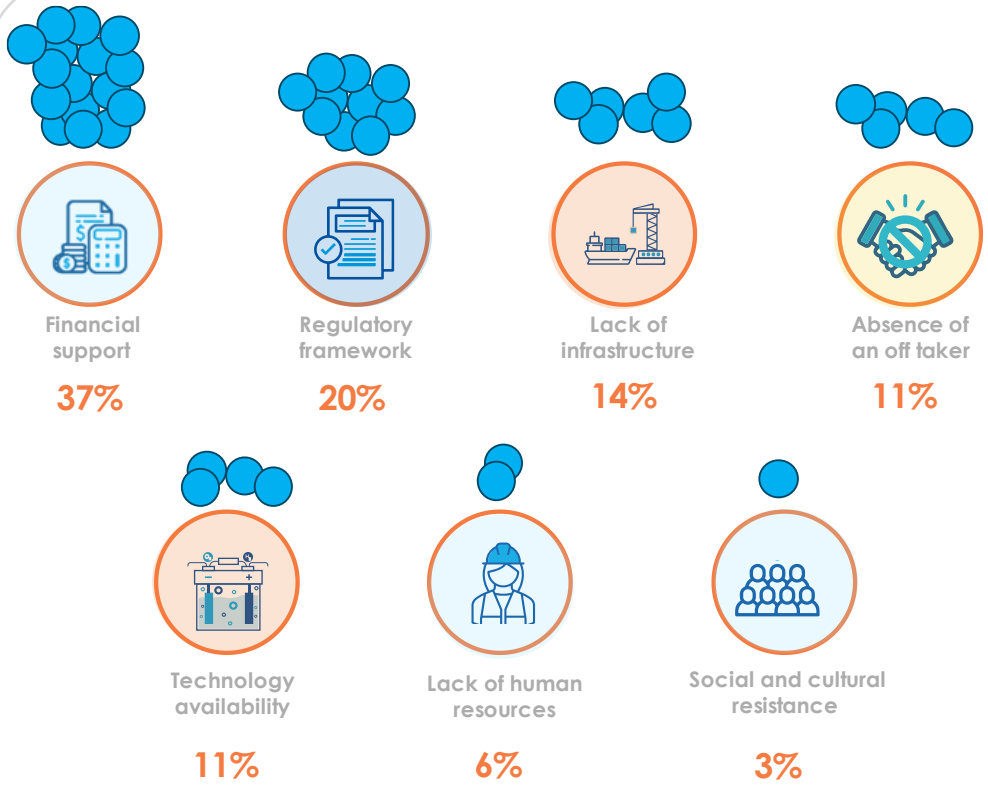
Most of the barriers faced by innovators rely on financial limitations, no binding regulations, and lack of infrastructure



Result from interviews and surveys carried out with more than 70 projects developers from developing countries working on clean hydrogen projects

Macroeconomic Challenges

- Lack delivery mechanisms.
- Required financing to take projects to further stages.

Regulatory barriers

- No binding regulation.
- Roadmaps to translate into policies and laws.

Infrastructure & Technological Barriers

- Necessary laboratory equipment.
- Lack of infrastructure.

Off-Take and Market Risks

- Off-take agreements needed to secure funding.
- Market uncertainty.

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Clean Hydrogen Landscapes

- **Landscape of Stakeholders**

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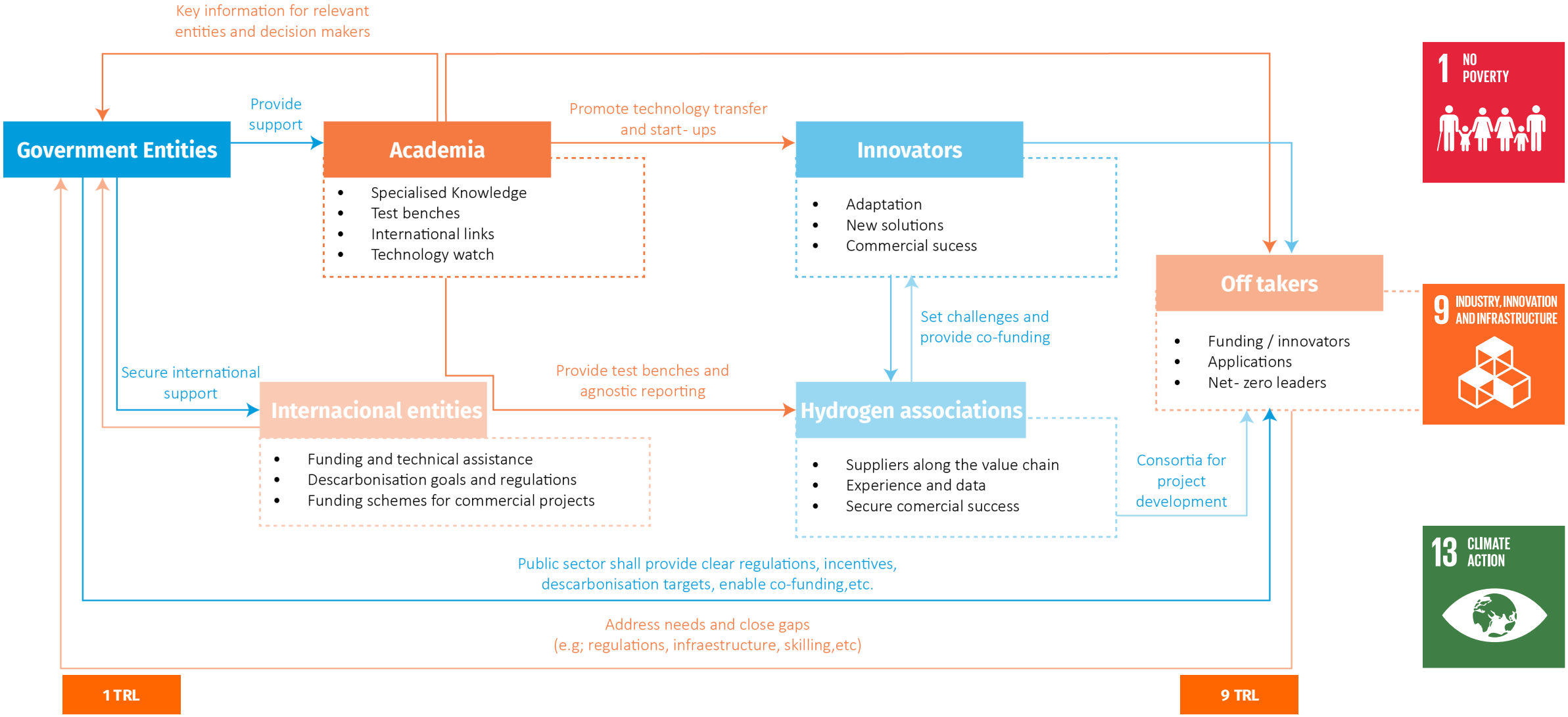
A strong ecosystem can secure successful clean hydrogen projects



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Clean Hydrogen Landscapes

- **Landscape of Initiatives**

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National initiatives: how countries are advancing at a national level towards clean hydrogen

- There is **limited binding regulation** for clean hydrogen use nor for hydrogen-based R&D.
- Introduction of **regulatory sandboxes** allow technologies to be tested in controlled experimental environments, and help governments understand the necessary regulatory requirements.
- There are **few certification schemes** for clean hydrogen in developing countries: China; Brazil's; and 12 LAC countries implementing CertHiLAC.
- **National hydrogen hubs** are being planned in more than 15 developing countries, though China is the only country with a fully operational hub

Developing countries which have mostly introduced policy initiatives and regulatory frameworks to advance on clean hydrogen


Brazil

Egypt


India

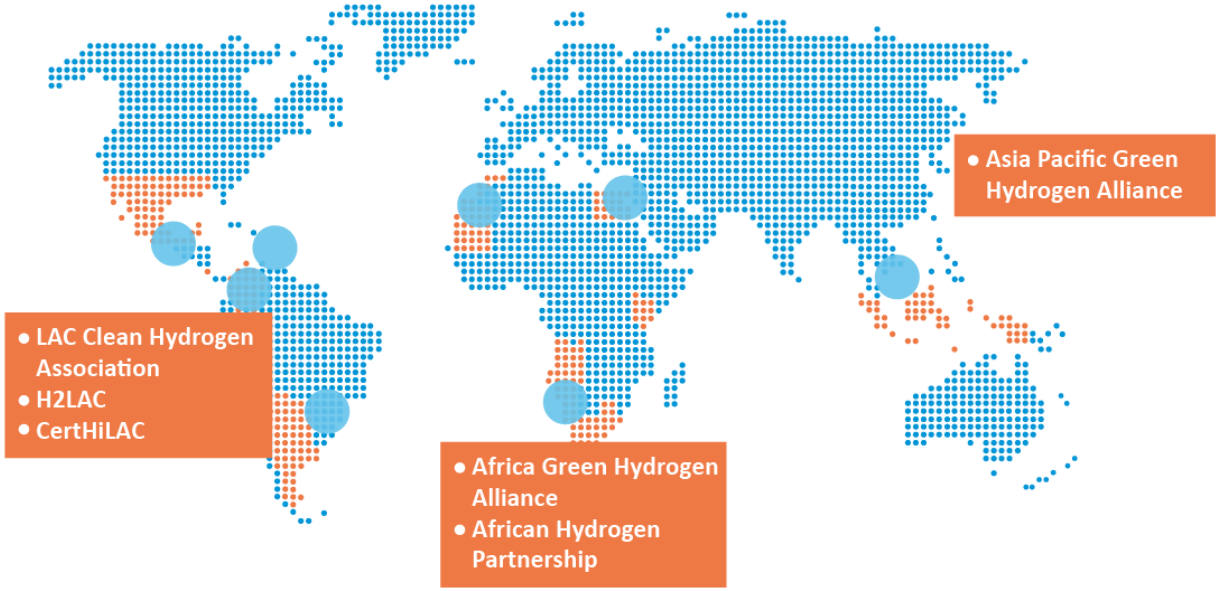

Morocco

How are these countries advancing?

- Certification Schemes
- Tax credits
- Budget allocation
- VAT exemptions
- Laws for clean hydrogen use
- Cash incentives

Regional and international initiatives are key for knowledge sharing and facilitating shared transport, storage, and technology infrastructure

Regional clean hydrogen initiatives



International cooperation and partnerships are crucial for developing countries to build a clean hydrogen market and foster innovation, where resources and capabilities for scaling-up are needed. These initiatives can serve as platforms for cooperation across different regions.

- Regional initiatives serve as platforms for sharing technical expertise and best practices, promoting knowledge exchange and capacity building.
- They enhance regional potential by reducing costs through shared investment and infrastructure.
- Nevertheless, there are not many regional initiatives in place as of today.

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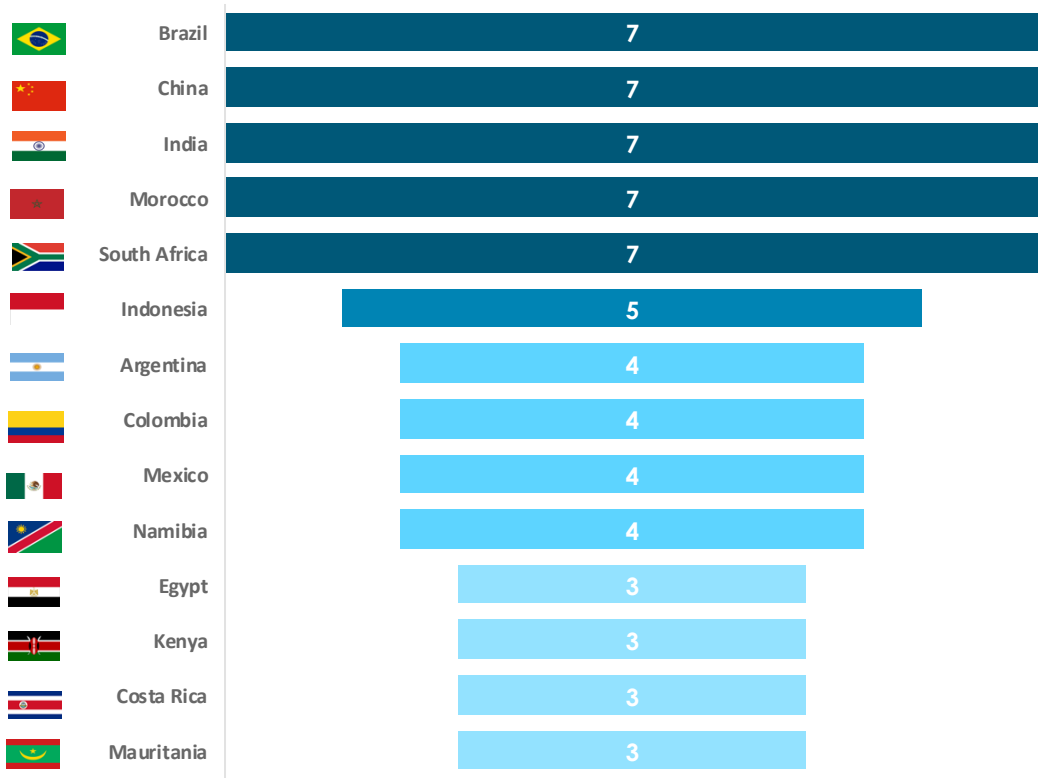
The identified gaps extend beyond specific issues and include the limited number of countries receiving support

Whom are they providing support?



How are they providing support?

International initiatives are concentrated on…

- Supporting Prefeasibility studies
- Development of regulatory frameworks
- Technical and financial assistance
- Global standards not focused on developing countries.

But there are topics that are still unattended….

- Lack of laboratories and materials, capacity and knowledge Hydrogen security protocols
- Infrastructure required for exporting
- Unattended segments of the clean hydrogen value chain as transport and storage
- Coordination between the countries and cross-country technological exchange
- Promotion of dialogue in the Global South to share regional perspectives

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Delivery Mechanisms

Delivery Mechanisms

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RECOMMENDED FINANCIAL INSTRUMENTS TO DE-RISK INVESTMENTS

1	**Supply Risks**	Long term cost-efficient purchase agreements for renewable electricity with technical clauses for price volatility; infrastructure funds and public-private partnerships for renewable energy projects
2	**Market/Off-Take Risks**	Tax benefits, subsidies, quotas and blending mandates to boost local demand. Long-term purchase agreements, contracts for difference, along with guarantees by export credit agency and partial-risk/credit guarantees by DFIs and MDBs are recommended.
3	**Infrastructure Barriers**	Development finance from multilateral banks and DFIs to catalyze the construction of key infrastructure units, higher involvement of the government through public-private partnerships and the development of special economic zones and industrial clusters, such as hydrogen hubs
4	**Macroeconomic Risks**	Foreign exchange swaps, interest rate hedging, and derivatives, along with contracts for fixed-rate loans are encouraged.
5	**Technological Risks**	Define selection criteria to prioritize projects led by credible primary technology developers. Performance, product, and availability guarantees can be considered, though the high cost of coverage can be a deterrent

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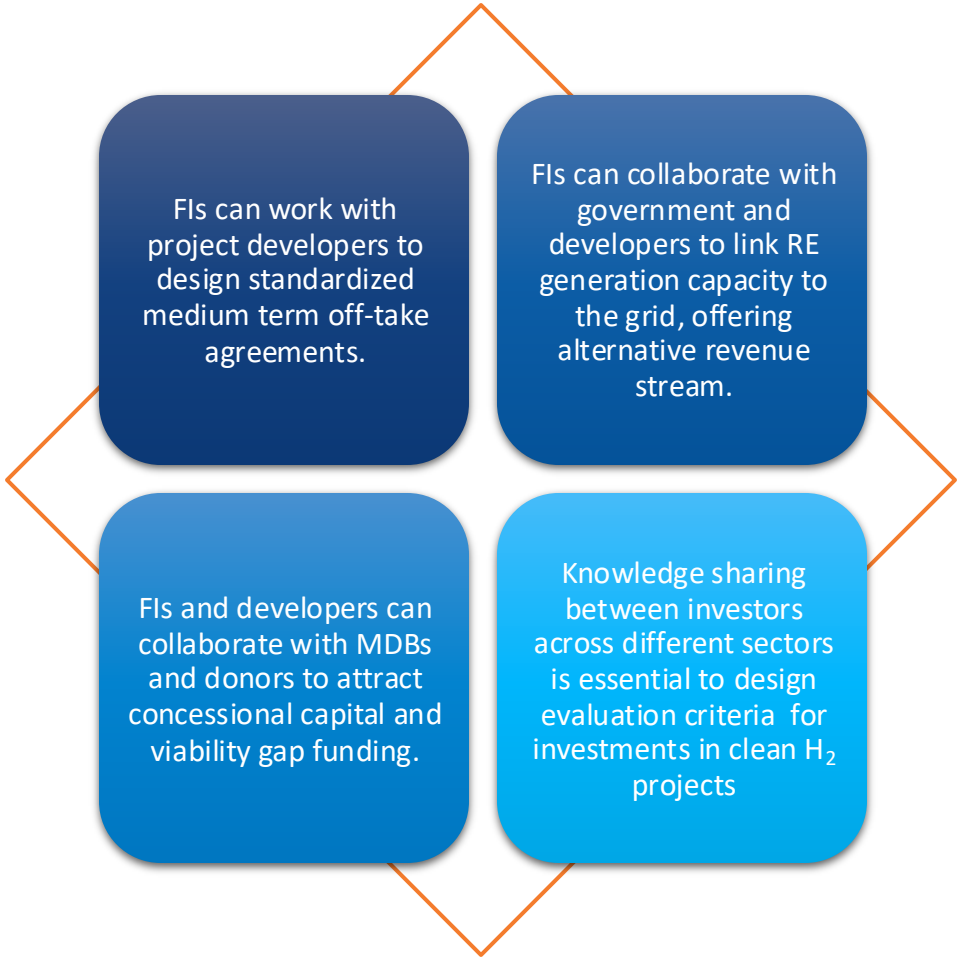
Collaboration between government, key stakeholders & financial institutions is essential to boost investors' confidence

In Namibia, the Government and Hyphen Hydrogen Energy engaged in extensive dialogues to create a 40-year concession agreement. Additionally, the government of Namibia secured an option for a 24% equity stake in the project through SDG One Fund, demonstrating its commitment and further de-risking investments.

In Latin America, DFIs and MDBs are actively working with governments to provide technical assistance in designing hydrogen roadmaps.

In India, the government is offering subsidies to encourage domestic manufacturing of electrolysers and green hydrogen. It has also allocated budgetary support for pilot projects and research initiatives to support this infant industry and attract private players.



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SDGs Assessment

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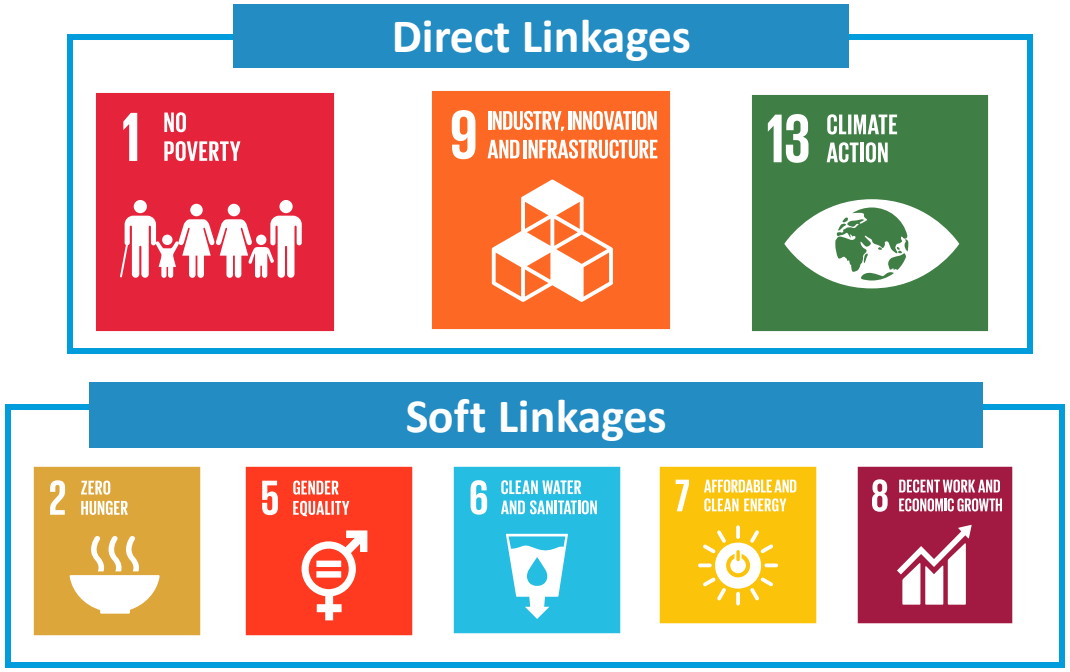
Clean hydrogen has the potential to contribute mainly to SDGs 1, 9 and 13



How are the countries progressing towards SDGs?

- Stimulating infrastructure development
- Fostering research and innovation
- Creating jobs
- Supporting decarbonisation of hard-to-abate sectors

- As the technology matures, drives socio-economic transformation
- Enhancing quality of life
- Contributing to the Net-Zero ambitions

Public and private sectors need to collaborate to address social and environmental risks of large-scale hydrogen projects

Job displacement in traditional sectors

Potential conflicts over water resources

- **Forced resettlement of indigenous communities**
- **Potential land conflicts**

Environmental Risks

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Regional analysis

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Latin America and the Caribbean

The region can leverage its electricity matrix, with already more than 60% renewables, to produce clean hydrogen

41 **Demonstration projects**

Opportunities

- Electricity matrix comprising over 60% renewables
- Exportation of hydrogen and ammonia project developers.
- Applications include sustainable mobility and existing industries
- Local clean ammonia production to reduce dependence on imports
- Potential to export to Europe and the US

Barriers

- Lack of regulatory frameworks.
- Lack of technical expertise.
- Limitations in enabling infrastructure for hydrogen or derivatives.
- Potential resistance with local communities.

Potential Hubs

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Asia

Asian target markets and domestic industrial demand will ensure the off-take of premium products

33 **Demonstration projects**

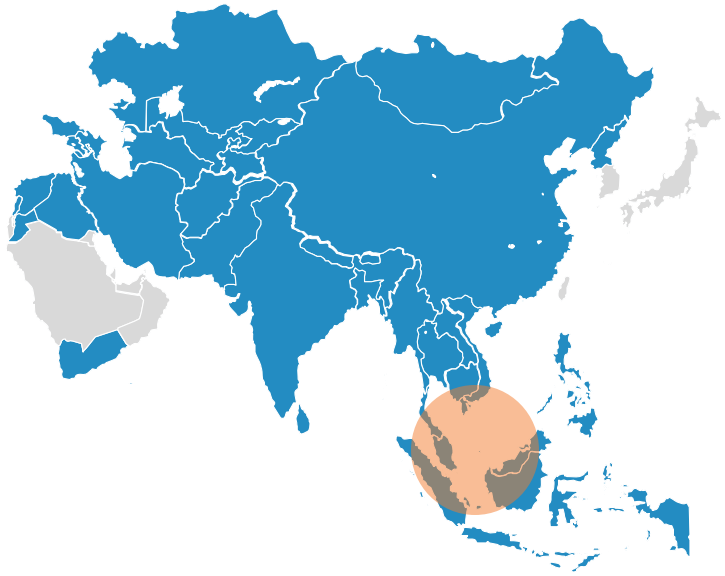
Opportunities

- Significant industry for clean hydrogen applications.
- Energy storage, clean hydrogen production, and mobility projects are found in all stages of development.
- Clean hydrogen production projects are currently in the late-stage planning phase.
- Proximity to potential off-takers as Japan, South Korea, and Singapore.

Barriers

- Regulatory diversity and varying levels of infrastructure development.
- Regional differences regarding access to technology and foreign or internal financial support.
- High dependence on fossil fuels.

Potential Hubs



Southeast Asian countries as Indonesia, Viet Nam and Malaysia. Singapore can be part of this hub to act as off taker and export point of developing countries hydrogen-based solutions.

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Africa[1]

Despite the many barriers faced by African countries, the region has the potential for clean hydrogen projects

28 **Demonstration projects**

Opportunities

- Clean hydrogen projects primarily focus on clean hydrogen production and mobility applications.
- Hydrogen-based microgrids can be a solution to provide clean electricity to rural areas and isolated communities.

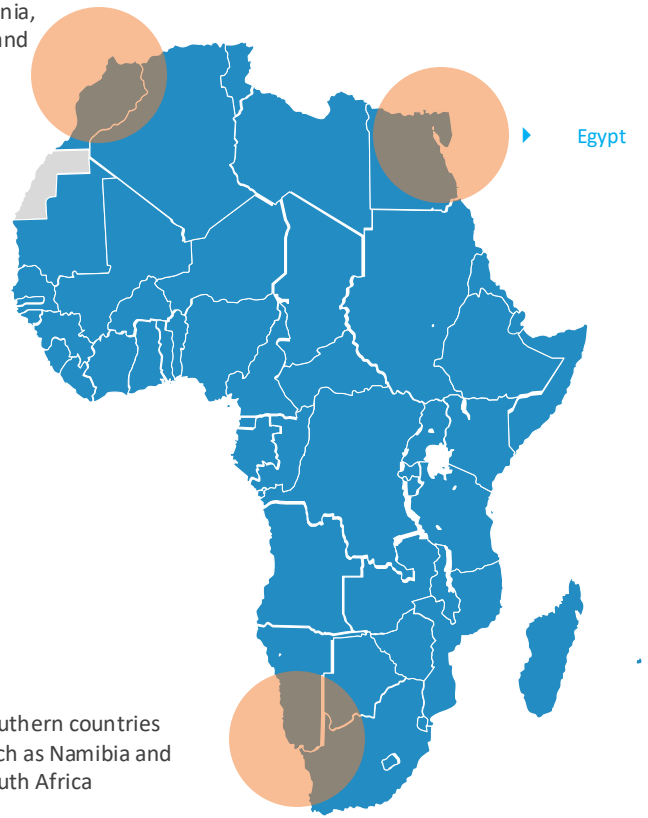
Barriers

- Non-industrialised countries
- Less than 25% of the population has energy access
- Limited number of innovators.
- High dependence on fossil fuels.
- Limited access to advanced technology and financial resources.
- Deficits in infrastructure for hydrogen or derivatives exportation and logistical challenges.
- Political and economic instability.

Potential Hubs

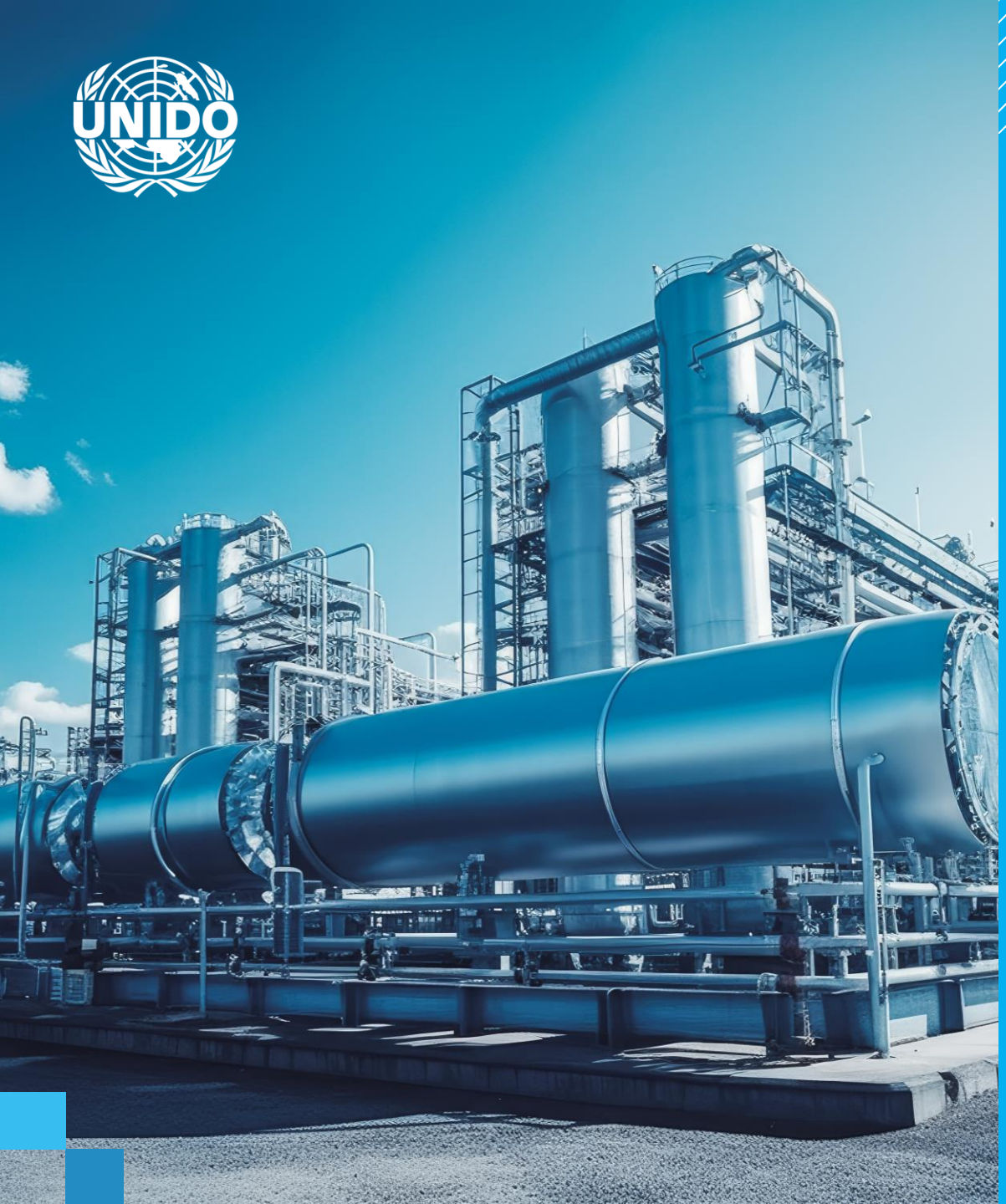
Northwestern African countries, including Morocco, Mauritania, Senegal, Tunisia, and Argelia

Egypt



Southern countries such as Namibia and South Africa

1. MENA countries as Morocco and Egypt are considered within this regional analysis.



Key takeaways

- Private sector involvement is key
- Public and private sector need to collaborate more
- Fostering a healthy innovation ecosystem is crucial
- Adaptation and research are necessary
- Most projects concentrate on hydrogen production and end-use applications.
- Other value chain segments, such as hydrogen storage, transport, and alternative carriers, have made limited progress in developing countries.
- We need to strengthen regional cooperation
- Still many challenges and barriers need to be address

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Join our Market Assessment Webinars

Critical Minerals
Tuesday, 26 Nov
2.00 – 3.00 p.m. (CET)

Clean Hydrogen
Wednesday, 27 Nov
2.00 – 3.00 p.m. (CET)

Smart Energy and Industrial Decarbonization
Thursday, 28 Nov
2.00 – 3.00 p.m. (CET)

Further information on the A2D Facility:

- A2D Facility Website: Visit the website here
- A2D Facility LinkedIn Account: Follow the LinkedIn page here
- A2D Facility Mailing List: Join the mailing list here
- A2D Facility Year 1 Annual Report: Access the Annual Report here