UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Partners: UK Government

Deployment of Innovative Financing Schemes in Emerging Sectors and Technologies

Asia Clean Energy Forum 2025

Wednesday 4 June 2025, 16:00 – 17:30 (PHT)

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Session focuses on:

- **Solutions:** innovative approaches gaining traction in developing countries and potential solutions for mobilizing private investments.
- **Areas:** thematic areas with the greatest potential to accelerate clean energy transitions in developing countries across clean energy sectors.
- **Opportunities and challenges:** compared with established clean energy technologies, and key technological, regulatory and market challenges limiting growth.

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Presentation reflects these through a deep dive focus on:

- **Key cross-cutting areas:** important role of innovative solutions for critical minerals, clean hydrogen, smart energy/digitalization and industrial/manufacturing decarbonization in developing countries.

- **Market assessments:** innovations, existing projects and financial delivery mechanisms for above areas in developing countries.

- **Solutions:** necessity of demonstration projects to showcase viability and scalability, and innovative financing mechanisms to facilitate them. Importance of environmental and social safeguards, and gender quality and social inclusion, to de-risk investments.

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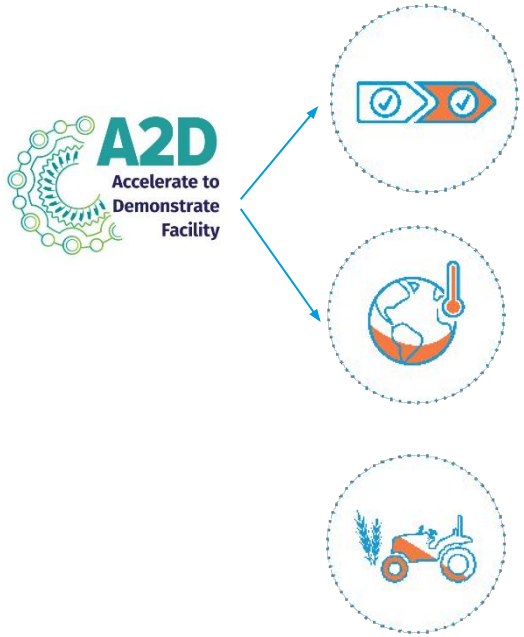
UNIDO Overview

- UNIDO is the UN Agency for the promotion of inclusive and sustainable industrial development in developing countries.

- UNIDO focuses on three main priorities:



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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New Market Assessments

- x3 market assessments commissioned by UNIDO and completed in 2024 and published at COP29: Clean Hydrogen, Critical Minerals, and Smart Energy and Industrial Decarbonization. Funded under the Accelerate-to-Demonstrate (A2D) Facility (see slides 23-28).

- Focused on the landscape of technologies, stakeholders, innovators, initiatives, existing projects and delivery mechanisms in developing countries.

A2D Facility Market Assessments: Access the reports here

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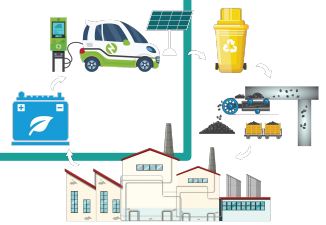
Summary of Current Markets

Critical Minerals

13 Innovators
100 Projects / Technologies

30 Phase 1 Countries
9 Phase 2 Countries
(ASP: India, Indonesia, Türkiye)



Clean Hydrogen

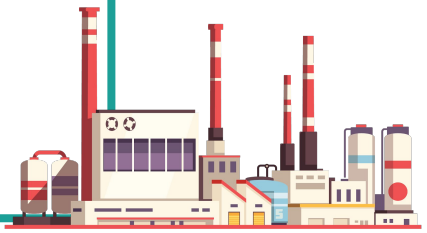
229 Innovators
114 Project s/ Technologies

47 Phase 1 Countries
16 Phase 2 Countries
(ASP: India, Indonesia, Malaysia, Vietnam)

Smart Energy & Industrial Decarbonization

6 groups of Innovators
246 Projects / Technologies

141 Phase 1 Countries
28 Phase 2 Countries
(ASP: Cambodia, India, Jordan, Kazakhstan, Indonesia, Malaysia, Thailand)



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Thematic Area: Critical Minerals

Challenge:

- Critical minerals, vital for the clean energy transition across different sectors, such as industry, transport, power and buildings, face limited supply and availability concerns, and escalating demand.

Solution:

- Supporting the preparation and implementation of demonstration projects of innovative and transformational solutions to decarbonize re-fining, processing, manufacturing, recycling and re-use of critical minerals (e.g. policies, incentives, skills development).

Market Assessment on Accelerating Innovation in Critical Minerals

UNIDO's activities in critical minerals

Programmes, Projects and Initiatives:

- A2D Facility
- Global Alliance and Partnership for Responsible and Green Minerals
- UN Framework on Just Transitions for Critical Energy Transition Minerals
- Artisanal Small-scale Gold Mining
- Global Electronics Management (GEM) Programme

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Critical Minerals Market Assessment Findings

Phase 1: Market Assessment of 30 Developing Countries

TABLE. Landscape of financial delivery mechanisms (Phase 1)

Public Sources	Private Sources
• Multilateral Development Banks (MDBs)	• Venture Capital
• Multilateral Climate Finance Funds	• Corporate Venture Capital
• National Development Banks	• Private Equity
• Bilateral Development Agencies	• Accelerators and Incubators
• Government Grants and Subsidies	• Private Banks
• Sovereign Wealth Funds (SWFs)	• Impact Investment Funds

Public Sources:
Development finance institutions feature prominently as providers of financial resources that enable and de-risk private investment

- Directly financing private entities
- Indirectly lending of grants and concessional finance to governments
    - Multilateral Development Banks (MDBs): International Bank for Reconstruction and Development (IBRD), International Finance Corporation (IFC), and the New Development Bank (NDB)
    - Regionally: Asian Development Bank (ADB) and Asian Infrastructure Investment Bank (AIIB)

Private Sources:

- For early-stage companies, accelerators and incubators support sustainability-focused startups with funding, mentoring and networking
    - Case studies: Prospect Innovation's Accelerator Program and Techstars Sustainability Accelerator
- For larger companies, corporate venture capital is used to invest in technological innovation and private equity is promising for commercialization or scaling of innovations

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Critical Minerals Market Assessment Findings

Phase 2: Deep-Dive Market Assessment – 9 Developing Countries

Enabling environment strengths:

- Tax incentives for technology development
  - In Turkey: tax incentives for EVs (2023) benefitting their first entirely domestically produced EV - TOGG
- Special Economic Zones (SEZs) for industrialization and downstream activities
- Cooperation with developed countries
  - Mineral Security Partnership
- National financial mechanisms
  - Make in India
  - Indonesia Battery Corporation
  - Turkish Growth and Innovation Fund
- Policies advancing SDGs 9 and 12

TABLE. Selected financial delivery mechanisms for technological innovations in the mid- and downstream segments of critical minerals value chains in India, Indonesia, and Türkiye

Country / Region	Financial Delivery Mechanism	Description	Amount	Date
ASP	Asian Development Bank (ADB) and potential facility for critical minerals value addition	Loans, grants, guarantees for downstream projects in EV battery manufacturing	Not specified	Not applicable
	Asian Infrastructure Investment Bank's (AIIB) Venture Capital (VC) Investment Programme for Green and Technology-Enabled Infrastructure	Small-scale VC funds to early-stage companies to support sustainable green technological innovation and innovative business models	USD 130 million	Est. December 2022, "three-year captive VC investment programme
India	Australia–India Strategic Research Fund (AISRF)	Grants for collaborative R&D projects, including in downstream processing, recycling, and tailings reclamation of critical minerals	Between USD 0.3 and 0.7 million	Round 15 application window: Jan–Mar 2023
	CSIR-National Institute for Interdisciplinary Science and Technology (NIIST)	Support for projects advancing critical minerals extraction and beneficiation techniques	USD 50 million	Announced Aug 2024
	Government initiatives Digital India and Startup India	Support for entrepreneurs with seed funding for research and innovation in multiple sectors, including critical minerals	Not specified	Digital India: July 2015 Startup India: January 2016
India and Türkiye	Minerals Security Partnership (MSP) Finance Network	Co-financing from development finance institutions and export credit agencies for projects in critical minerals value chains	Not specified	Announced 2022, no end date
Indonesia	China's Belt and Road Initiative	Investments in infrastructure, including for critical minerals value chains	USD 7.3 billion	Announced 2013, could last until 2049
India	World Bank's Accelerating the Market Transition for Distributed Energy programme	Grants and loans for solar energy and battery storage projects, including by supporting SMEs to adopt new technologies	USD 1.01 billion	Launched March 2024
	Turkish Growth and Innovation Fund (TGIF), backed by an EUR 60 million commitment from the European Investment Fund (EIF)	Equity investment in innovative and technology-oriented businesses with high growth potential	USD 218 million	Est. 2016
	High Technology Investment Programme (HIT-30)	Incentives for battery production, semiconductor manufacturing, and other EV-specific technology.	USD 30 billion	2024–2030

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Critical Minerals Market Assessment Findings

Noteworthy global financial mechanisms

UNIDO's A2D Facility	GBP 65 million
World Bank	
• Resilient and Inclusive Supply-Chain Enhancement (RISE) Partnership	USD 75 million
• Climate-Smart Mining Initiative	USD 50 million
• Energy Sector Management Assistance Program (ESMAP)'s Energy Storage Partnership (ESP)	Broader USD 1 billion battery storage programme
European Union (EU)'s Horizon Europe	Broader EUR 95.5 billion innovation programme

Gaps in financing mechanisms and other initiatives that seek to finance innovation projects or build up the enabling environment for mi- and downstream activities:

- The need for greater scale
- Finer coordination within policy interventions, minerals, and segment prioritization in different markets
- Increased sharing of knowledge and data on technologies and their drivers and barriers

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Critical Minerals Market Assessment Findings

Key takeaways:

- At the core of enabling innovation in developing countries is **domestic financial delivery mechanisms** through grants and loans provided by national governments and development banks
    - These are supported by incubators and complemented by private sources like venture capital and impact funds
- **International funders and partnerships** are integral to success of innovative projects in critical minerals
- Special financing and collaborative programmes should **target small and medium enterprises (SMEs)** involved in technological innovation in developing countries to bridge the gap in accessible funding
- Enabling financial conditions need to be put in place to facilitate **technology transfer** of existing mid- and downstream critical minerals technologies from companies based in developed countries and China

Market Assessment on Accelerating Innovation in Critical Minerals

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Thematic Area: Clean Hydrogen

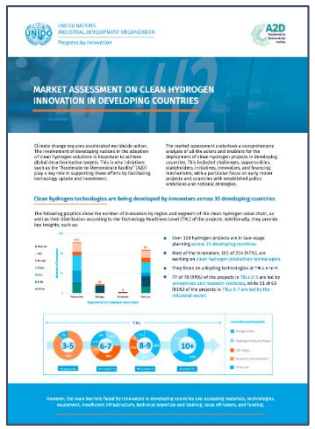
Challenge:

Whilst an increasing number of countries are developing clean hydrogen strategies and projects, the urgency to tackle emissions necessitates a diffusion of support and capabilities, especially countries with abundant low-cost clean resources.

Solution:

Supporting the preparation and implementation of demonstration projects of innovative and transformational solutions to decarbonize across the clean hydrogen value chain across different sectors, such as industry, power, buildings and transport, alongside support to building the enabling environment (e.g. policies, incentives, skills development).

Market Assessment on Accelerating Innovation in Clean Hydrogen



Programmes, Projects and Initiatives:

- A2D Facility
- Global Programme for Hydrogen in Industry
- GEF-8 Global Clean Hydrogen Programme (GCHP)
- Net Zero Partnership

The focus areas for UNIDO's interventions are:

- Policies
- Standards
- Financial instruments
- Skills and knowledge
- Innovation
- Coordination & convening

UNIDO's activities in clean hydrogen

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Clean Hydrogen Market Assessment Findings

- National hydrogen roadmaps have been established in several regions to **extend fiscal incentives and de-risk investment** in the industry
- Limited but growing private sector involvement through **public-private partnerships** and emerging clean hydrogen start-ups
  - India's Hygenco raised $25.4 million in private equity
- Funding is focused on improving the cost and technical efficiency of clean hydrogen **production technologies** (electrolysis)
- Early-stage hydrogen projects are often financed by companies from **high-income countries**
  - German, Japanese, and Norwegian companies are found to be implementing their own technologies in developing countries to open, boost, or unlock the economy across the globe and **increase demand**
- **State-owned enterprises (SOEs)** are also playing a pivotal role across Asia
  - In Malaysia, Semarak Renewable realized $425 million from Singapore Capital Ventures
- Government incentives, including subsidies, tax concessions, and funding from development organizations are primarily focused on **supply side** projects
  - Comparable demand use measures have yet to be implemented on a a similar scale

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Clean Hydrogen Market Assessment Findings

Delivery Mechanisms for Clean Hydrogen in Developing Countries						
Project Cycle	Scoping	Pre-Feasibility	Feasibility	Definition, Approvals	Construction & Commissioning	Operation
Risk/Return	High → Low					
DMs	RD&D Funds, TA, Dev. Equity	Incentives & Rebates	Concessional Finance	Credit enhancement & Guarantees	Traditional Loans	Sustainability/ Transition Loans & Bonds
Categories	Grants (Convertible), Equity	Subsidy	Concessional Debt, Equity	Guarantee	Commercial Debt	
Sources of Finance	Government, Philanthropies, DFIs, MDBs	Government	Philanthropi-es, DFIs, MDBs	Government, Insurers, DFIs, ECAs	DFIs, ECAs, Bank	Asset Owner, Bank, MDBs

Financial Challenges in Developing Countries

- Mobilization of investments constrained by key challenges
  - High capital requirements
  - Limited fiscal space
  - Insufficient public funding for green incentives
- Absence of a clear market for green hydrogen combined with low levels of infrastructure and technology readiness result in elevated production costs

Expert recommendations for financing clean hydrogen projects in developing countries:

- Standardize medium term off-take agreements
- Mitigate off-take risk with real options
- Scale use of concessional capital, guarantees, viability gap funding
- Manage hedging risks with proven hedging products
- Invest in project preparation and capacity building

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Clean Hydrogen Market Assessment Findings

Key Takeaways:

- Given the nascent nature of the clean hydrogen industry and its derivatives, investment in developing countries needs to focus on the adoption of technologies to **advance to the commercial stage**
  - Adaptation, implementation, and integration of these technologies in different environments is crucial to **lower the costs** of clean hydrogen and its derivatives and build a sustainable industry
- **Collaboration** between government, key stakeholders & financial institutions is essential to boost investors' confidence
- Financing is needed to **advance innovation** in development and refinement of concepts, leveraging networks, project preparation, and capacity building
- Phasing out of fossil fuel subsidies could **create fiscal space** for clean energy incentives and accelerate the transition

Market Assessment on Accelerating Innovation in Clean Hydrogen

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Thematic Area: Smart Energy

Challenge:

Industries in developing countries, such as manufacturing, power, transport and buildings, often face inefficiencies in energy use, emissions and access.

Solution:

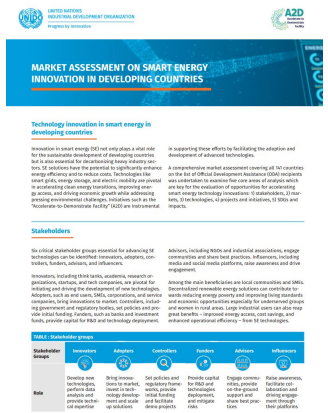
Supporting demonstration projects of smart energy technologies, such as machine learning, blockchain, digital twins, Artificial Intelligence (AI) and smart grid-enabling solutions, to optimize and digitalize energy management across different sectors, such as transport, industry, power and buildings, alongside support to building the enabling environment (e.g. policies, incentives, skills development).

Programme, Projects and Initiatives:

- A2D Facility
- Global Alliance on AI for Industry and Manufacturing
- UNIDO 4IR Strategic Framework to accelerate the attainment of inclusive and sustainable industrial development by 2030

UNIDO's activities in smart energy

Market Assessment on Accelerating Innovation in Smart Energy



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Smart Energy and Industrial Decarbonization Market Assessment Findings

Funders include banks, donors, financial institutions, private finance sources, and investment funds

- Their role is especially important at **TRLs 3-4** where they supply initial financial support required to advance technologies from research to early development

Economic constraints:

- **Limited availability** of different investment mechanisms such as green bonds or private sector engagement
- Financial instability and currency devaluation make **unpredictable financial environments** and decreased large-scale investment

Dimensions relevant for transformational impact:

- Macroeconomic relevance of local SMEs
- Rapids industrial growth
- Presence of energy-intensive export sectors

Market Assessment on Accelerating Innovation in Smart Energy & Industrial Decarbonization

Main Sources for financing and supporting technological Innovation

- **Government Support:** Policy frameworks, incentives, and subsidies.
- **International Investors and Global Organizations:** Funding large-scale projects.
- **Private Sector Contributions:** Investments from private enterprises and technology companies.
- **Development Banks and Specialized Agencies:** Subsidies, grants, and technical assistance from entities like WB, AfDB, ADB, UNIDO, USAID, and FCDO.
- **Climate Funds:** Green Climate Fund for low-emission innovations.
- **Traditional Energy Companies:** Investments in new and innovative technologies – e.g. hydrogen, geothermal, and carbon capture

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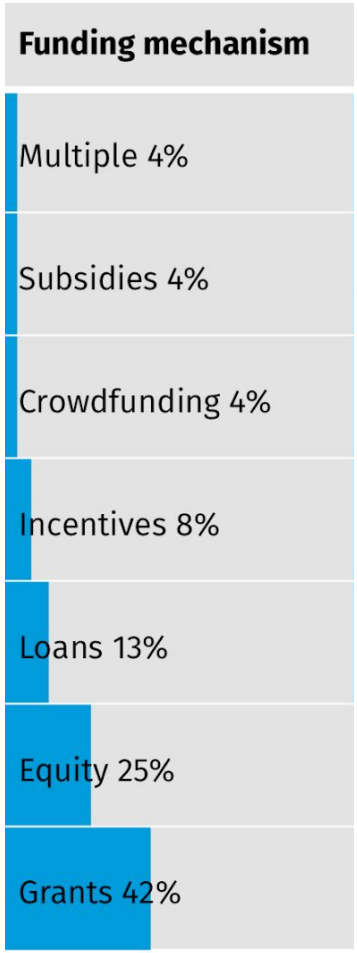
Smart Energy Market Assessment Findings



Key Takeaways:

- Dependence on foreign equipment and expertise requiring transactions in foreign currencies
- Additional financial risk when local currency values fluctuate
- Majority of projects are supported by government grants as governments seek to promote lighthouse projects, further driving interest and investment from other stakeholders

Case Examples:

- **Malaysia**: Malaysia's Green Tax Allowance covers energy efficiency and renewable energy integration among other green technologies
- **Thailand**: Currently majorly funded by Thai government which has committed $5.6 Bn to smart energy projects through 2036

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Thematic area: Industrial Decarbonization

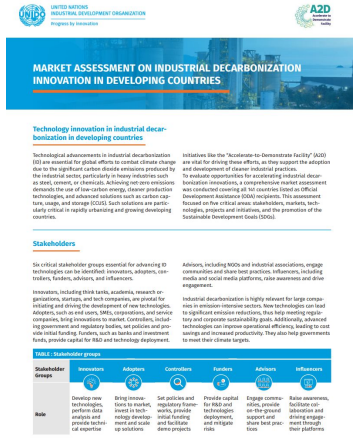
Challenge:

Forecasted growth in industrial emissions in developing countries due to rapid urbanization and an increase in middle-class consumers, poses a challenge for global efforts to combat climate change.

Solution:

Supporting demonstration projects of innovative and transformational solutions in different industries in developing countries, such as manufacturing, processing and energy-intensive industries, alongside support to building the enabling environment (e.g. policies, incentives, skills development).

Market Assessment on Accelerating Innovation in Industrial Decarbonization


MARKET ASSESSMENT ON INDUSTRIAL DECARBONIZATION INNOVATION IN DEVELOPING COUNTRIES

Programmes, Projects and Initiatives:

- A2D Facility
- Industrial Deep Decarbonisation Initiative (IDDI)
- Net Zero Partnership
- Circular Economy programme
- Persistent organic pollutants (POPs) management

UNIDO's activities in industrial decarbonization

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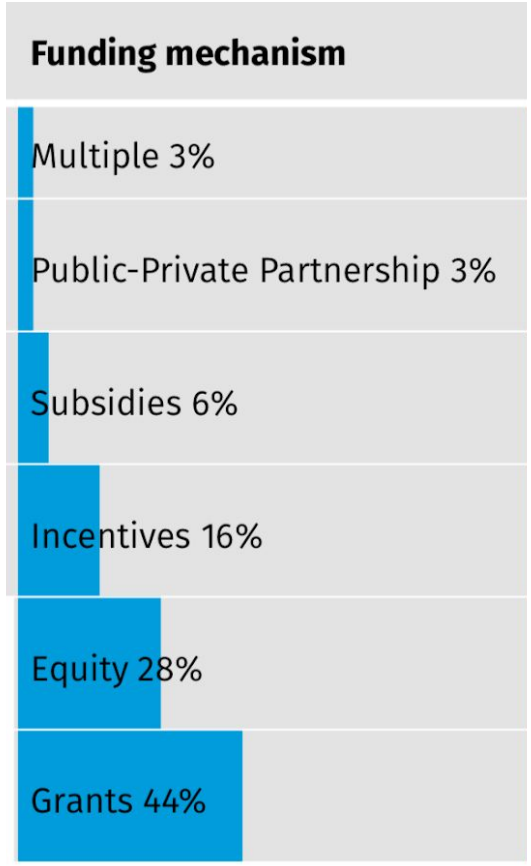
Industrial Decarbonization Market Assessment Findings



Key Takeaways:

- Key technologies such as green steel production or CCUS are very **cost intensive**
- High initial investment cost and **lack of concessional funding** mechanisms make deployment at scale difficult
- Most supported by **government or multilateral grants** bridging the gap between costs associated with these technologies
- **Private actors** play a critical role in ongoing projects as they are driven by a need to decarbonize due to increasing regulatory scrutiny (ex. Carbon pricing)

Case Examples:

- **Malaysia**: Financing packages and tax incentives are offered for green technology development and process improvement in manufacturing
- **Thailand**: The government offers multiple incentives for adoption of greener technologies majorly through tax breaks and subsidies for renewable energy projects

Innovative Financing Mechanisms: Potential Solutions

- **Innovative uses of grant funding:**
  - Using grants for capital/infrastructure investments (rather than just for TA) to de-risk private finance investments based on a milestones-based or results-based approach.
  - Explore use of returnable grants or grants as a guarantee mechanism.

- **Expand use of underutilized instruments for pre-scalability projects:**
  - Enhance use of blended finance and guarantee mechanisms with enhanced Public-Private Partnerships (PPPs).

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Innovative Financing Mechanisms: Potential Solutions

- **<u>Explore use of innovative financing instruments for clean energy innovations:</u>**
  - Pull financing approaches are higher risk but more transformational: e.g. Advance Market Commitments (AMCs), Green Public Procurement (GPP), Results-Based Financing (RBF) with open access, Buyers Clubs, larger-scale prizes, quantity-linked open payments or subsidies, Pigouvian Taxes, Contracts-for-Differences (CfDs).

- **<u>Importance of safeguards and social inclusion:</u>**
  - UNIDO-organized ACEF pre-forum event on Monday on the important role of environmental and social safeguards, and gender equality and social inclusion, in de-risking projects to enable private financing.

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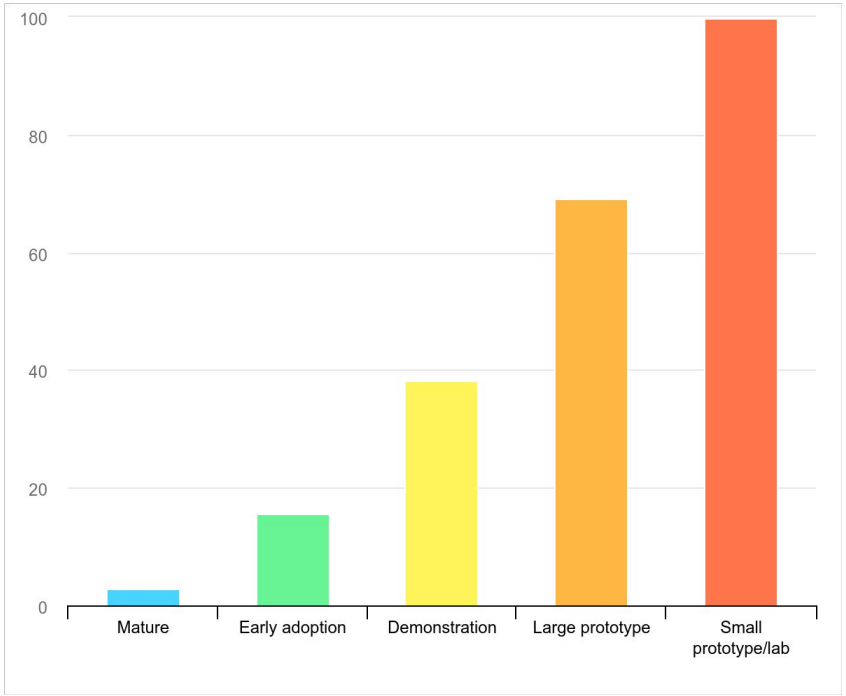
Deep Dive: Importance of Demonstration Projects

- Accelerating clean energy innovation is increasingly recognized as vital in global efforts to **combat climate change and to meet the Sustainable Development Goals** (SDGs).
- The International Energy Agency (IEA) highlights that almost 35% of the emissions reductions necessary for achieving a global **net-zero scenario by 2050 will come from technologies that are still in the demonstration** or prototype phase.
- Alongside the important need for leveraging private sector finance, at least USD 90 billion in public funding is needed globally by 2026 for clean energy demonstration projects to be commercially ready by 2030.
- The A2D Facility contributes to filling this important gap in support to developing countries by **targeting the demonstration phase of the innovation chain**, bridging earlier-stage and commercial-scale projects.

Relative increase in carbon dioxide emissions savings in 2050 by current technology maturity category:



Energy Technology Perspectives 2020. IEA, 2020.

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Solution Case Study: Accelerate-to-Demonstrate (A2D) Facility

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
- Initially operates from **April 2023 to March 2029**
- Projects supported through **calls-for-proposals** (first call in July 2024)
- Global (**developing country-focused**) programme
- **Grants of USD 1-5 million** per project.
- Main Sustainable Development Goals (**SDGs**)-of-focus:

Activities bringing **transformational solutions** to the market at scale.

Providing grant support for transformational demonstration projects with strong scalability potential.

Creating and **disseminating knowledge and experiences** to foster collaboration, learning and scalability.

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Supporting Catalytic Projects to Transform Sectors

- **"Lighthouse" demonstration projects** in critical minerals, clean hydrogen, industrial decarbonization and smart energy.
- **Impacts on SDGs** 13 (climate action), 1 (no poverty) and 9 (industry, innovation and infrastructure) in supportive enabling environments that foster scalability.
- Projects at the demonstration phase and at the **implementation and operation stages of project development** (earlier-stage pilot-testing or planning-related activities are out-of-scope).
- Strong focus on **sharing lessons-learned, dissemination and monitoring** (supported projects facilitating training and capacity building, regular high-quality monitoring and reporting, risk management, hosting study tours, and presenting in international events and workshops, alongside the construction and equipment implementation activities).

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A2D Facility Year 1 and 2 Key Milestones

Initial announcement

7 November 2022

Initial announcement of the new clean energy innovation facility at COP 27.

Official launch

15 May 2023

Official launch of the A2D Facility by UNIDO's DG and UK Ambassador.

Participation in Asia Clean Energy Forum

3 - 6 June 2024

Organization of three events at the Asia Clean Energy Forum.

Call-for-Proposals annuncement event

18 July 2024

Announcement event to launch the first Call-for-Proposals, led by UNIDO Director General Gerd Müller. Launch of the A2D Facility Year 1 Annual Report and A2D Facility website.

Launch of Market Assessments at COP29

14 - 16 November 2024

Launch of 3 market assessments on Critical Minerals, Clean Hydrogen, and Smart Energy & Industrial Decarbonization at COP29.

First demonstration projects begin

January 2025

Selection of the first five supported demonstration projects, with at least one project per thematic area.

Completion of GESI-ESS project

31 March 2025

GESI-ESS Action Plans developed.

A2D Global Workskop

April 2025

Scaling Innovation Through Demonstration Projects.

Brazil, São Paulo.
Mexico, Mexico City.
Indonesia, Jakarta.
South Africa, Johannesburg.

A2D Facility Annual Event

19-22 May 2025

Announcement of the second Call-for-Proposals.
Lauch of 2D Facility Year 2 Annual Report.

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Current A2D Facility-Supported Demonstration Projects (First Call-for-Proposals in 2024)

Smart Energy

Smart solar and storage microgrid for industrial-scale deployment at Laxmi Steel factory in Sunwal

Location: ***Nepal***

Peer-to-peer energy-sharing system to convert wasted renewables into community power

Location: ***Nigeria***

Industrial Decarbonization

Biomass gasification plant to power a Kenyan tea factory using local agricultural waste and biomass

Location: ***Kenya***

Clean Hydrogen

Ammonium sulphate fertilizer production facility powered by solar and clean hydrogen

Location: ***Namibia***

Critical Minerals

Local manufacturing of lithium-ion batteries for electric two-/three-wheeler motorcycles, and installation of charging infrastructure in urban and rural areas.

Location: ***Tanzania***

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A2D Accelerate to Demonstrate Facility

Second Call-for-Proposals (2025) – Open for Proposals until 7 July

- Published at first annual event of the A2D Facility in Nairobi, Kenya, on 20 May 2025 and call closes on 7 July 2025.
- Implementation of catalytic and scalable demonstration projects of USD 1-5m and 3-year timescales (ending by mid-December 2025).
- Three possible submission windows for proposals: global (from any ODA-eligible country), thematic (countries of the market assessments' deep dives), geographic (Brazil) and larger-scale demonstration projects (USD 15-20m).
- UNIDO – Procurement Portal for detailed information on the second call. Proposals can be submitted up until 16:00h CET on Monday 7 July 2025.
- All enquiries on the call must only be sent to: C.ZINIEL@unido.org, E.DORNER@unido.org, and M.HEMETSBERGER@unido.org

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D
Accelerate to Demonstrate Facility

Partners: UK Government

Further Information

- **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
- **A2D Facility Year 2 Annual Report:** Access the Annual Report here
- **A2D Facility Market Assessments:** Access the reports here