ASIA CLEAN ENERGY FORUM 2024

Accelerating the Clean Energy Transition and Ensuring Energy Security and Affordability – Time for Urgent Action Now

3–7 JUNE 2024

ACEF Pre-Forum Event :
Role of Pilot Demonstrations to Accelerate Clean Energy Transitions

Moderator: Peter Warren, United Nations Industrial Development Organization (UNIDO)

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Objectives :

- To highlight the role of pilot demonstrations in accelerating the development of innovative clean energy solutions in Asia-Pacific, particularly in clean hydrogen, smart energy, industrial decarbonization and critical minerals.
- To introduce a new clean energy innovation programme (the Accelerate-to-Demonstrate (A2D) Facility), its objectives, supported activities and funding opportunities.
- To showcase case studies of existing and planned projects in Asia-Pacific and lessons learned.



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Agenda:

Item	Speaker
Opening Remarks	• Peter Warren, United Nations Industrial Development Organization (UNIDO)
Scene-Setting	• Ivana Dimitrova, UK Government (Foreign, Commonwealth & Development Office (FCDO))
New Programme: A2D Facility	• Valeria Arroyave, Critical Minerals Lead, UNIDO
Panel Discussion and Audience Q&A	• Kadidia Konare, International Finance Corporation (IFC) • Yatin Premchand, Black & Veatch • Ripu Bhanjan Singh, Swaniti Global • Steve Peters, Asian Development Bank (ADB)
Summary of Key Takeaways	• Valeria Arroyave, UNIDO
Closing Points	• Peter Warren, UNIDO

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Audience Poll Question:

What do you see as the most significant barrier to implementing pilot demonstration projects for clean energy transitions in the Asia-Pacific region?

A. Lack of funding and financial mechanisms
B. Technological challenges and innovations
C. Regulatory and policy obstacles
D. Stakeholder engagement and collaboration
E. Market readiness and scalability

Link to results:
https://www.mentimeter.com/app/presentation/almipzy9ibx23164qnn4va8kuson9f91

Instructions:
1. Scan the QR code or go to menti.com and enter the code **7649 3581**.
2. Read the question and select your answer.
3. Once everyone has responded, results will be displayed.

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

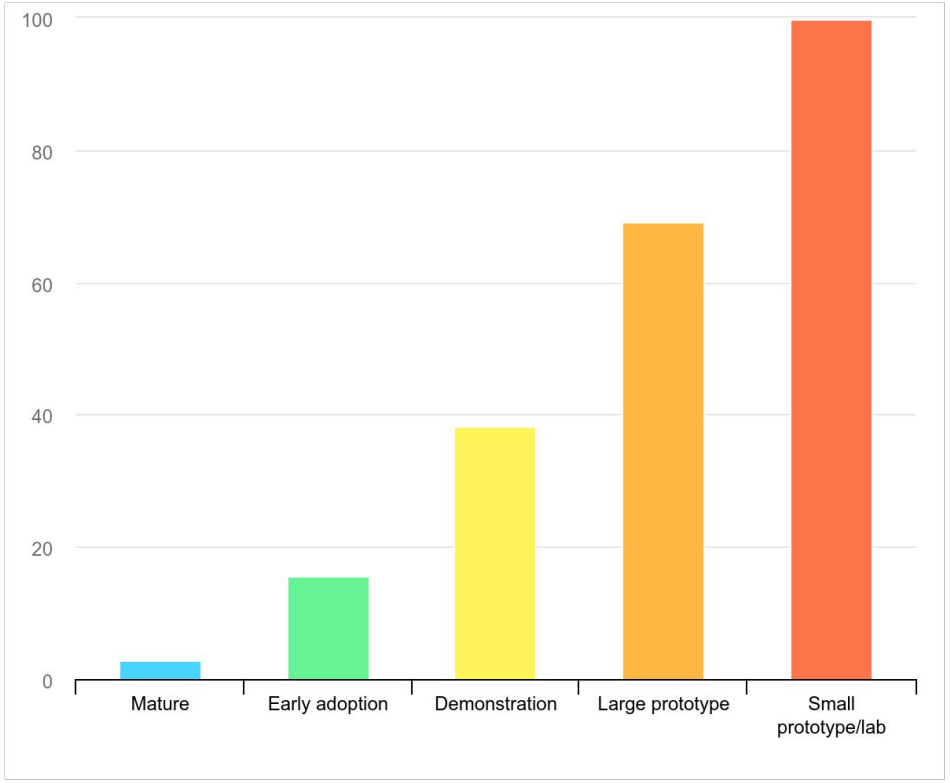
A2D Accelerate to Demonstrate Facility

Context:

- The International Energy Agency (IEA) highlights that almost half the emissions reductions required by 2050 need to come from technologies that are currently at the demonstration or prototype stage.

- Alongside the important need for private sector co-financing, this equates to least USD 90 billion in public funding being needed globally by 2026 for clean energy demonstration projects to be commercially ready by 2030.

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



Energy Technology Perspectives 2020. IEA, 2020.

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

UNIDO's Role in Advancing Clean Energy:

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

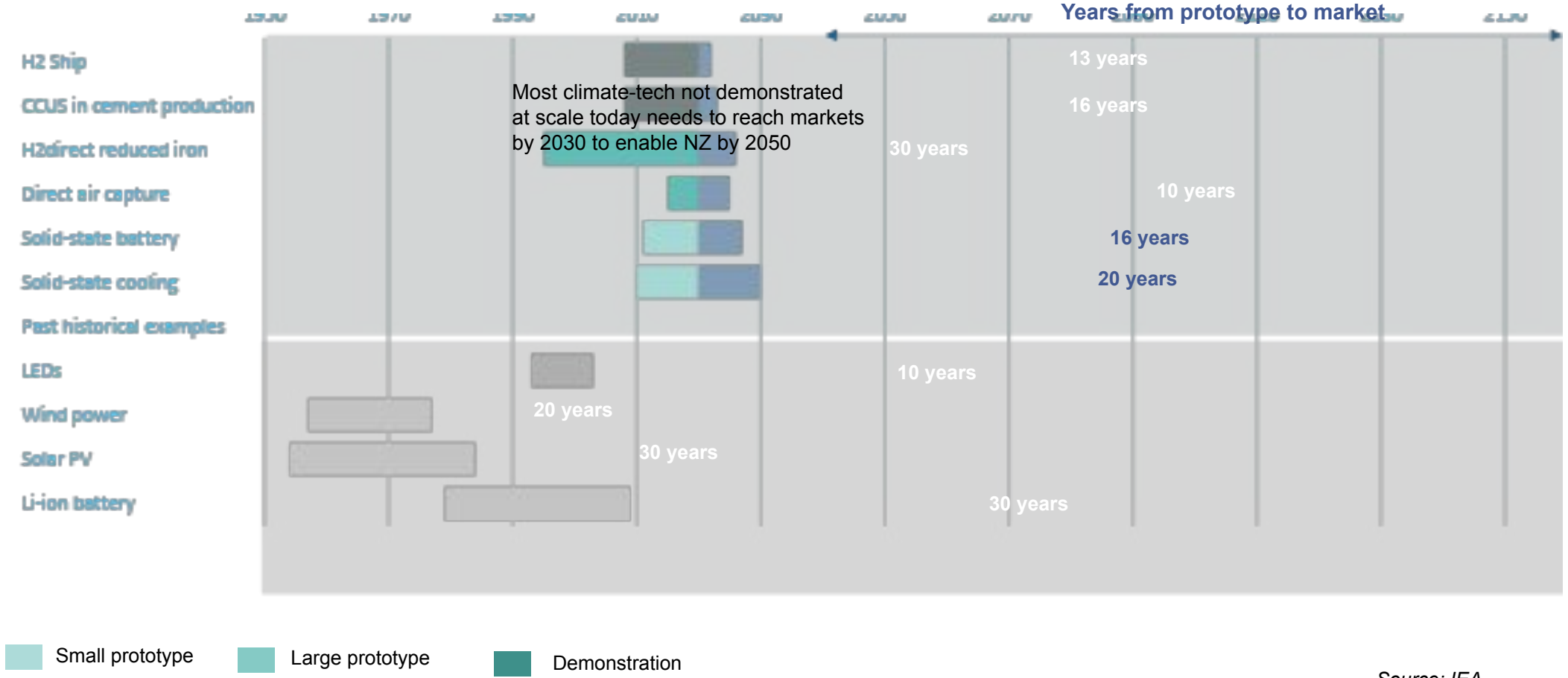
Foreign, Commonwealth & Development Office

ACEF – how can the public sector accelerate clean innovation?

June 2024

Innovation cycles for climate tech need to accelerate

- Current low-carbon technologies (wind, solar) scaled up over a 20–30-year period
- Bringing current technologies to market by 2030 requires going **20% faster on average than the quickest energy technology developments in the past**, and around **40% faster than was the case for solar PV**

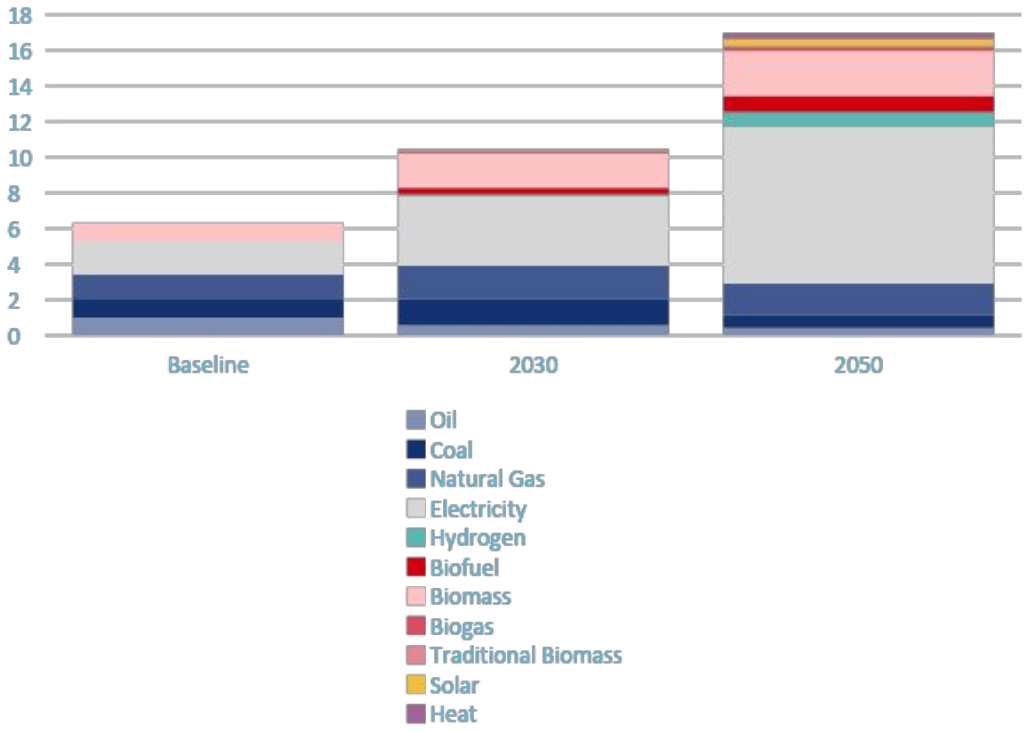


Source: IEA

Example: 37% of emissions in ASEAN industries like steel, cement, and chemicals are hard to abate with existing technologies

IRENA (2022) projects that industry will be the most energy-consuming end-use sector by mid-century, increasing its share in the region's total **final energy consumption from around 33% in 2018 to about 40% in 2050**

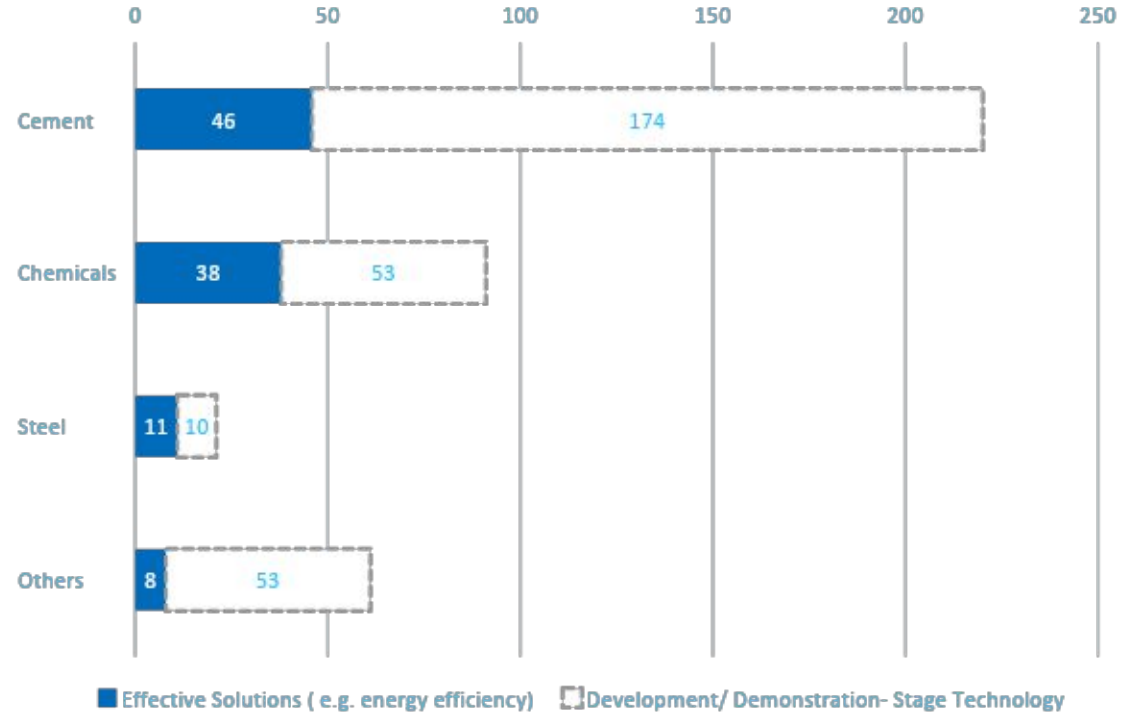
Industry Energy Consumption by Carrier (EJ) in IRENA,1.5C Scenario (90%)



Source: IRENA Renewable Energy Outlook for ASEAN (2022)

Technologies in development or demonstration stage hold 74% of the abatement potential in the cement, steel, chemicals and other industrial sectors

ASEAN-6 abatement potential (MtCO2e)



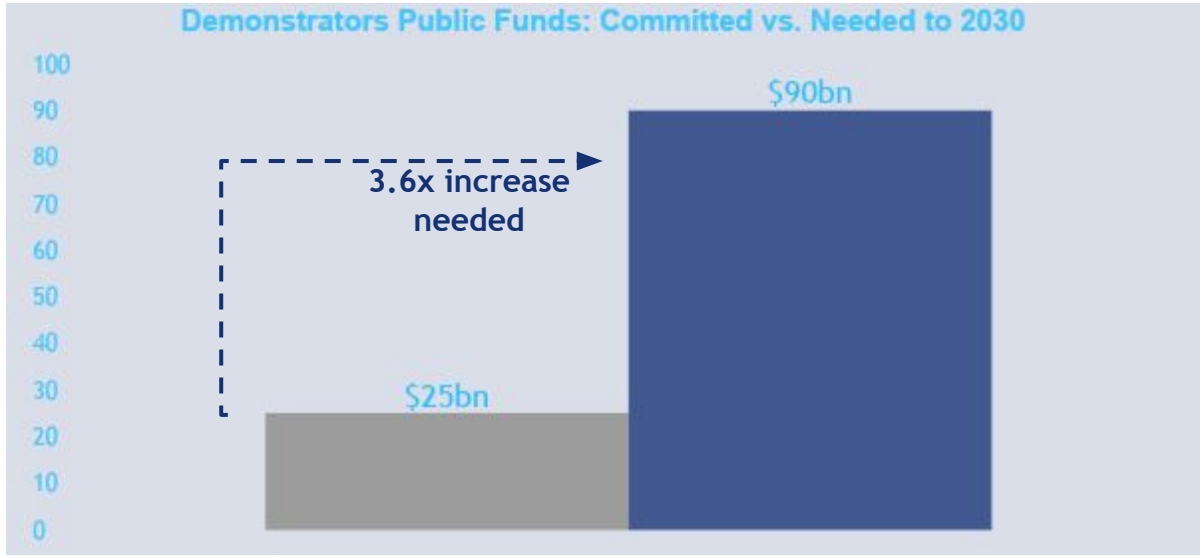
Source: Bain & Company Internal Marginal Abatement Cost Curve (MACC) models, SEA Green Economy (2023)

Source: (headline stat) Bain & Company SEA Green Economy (2023), ASEAN 6 (Indonesia, Malaysia, Philippines, Singapore, Vietnam, Thailand)

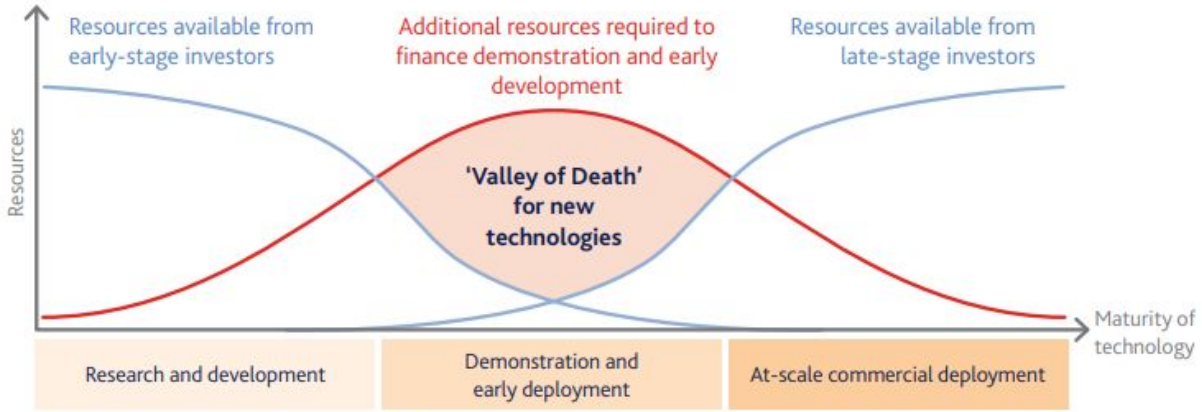
IEA calls for accelerated public funding for demonstrators, especially in emerging economies

Almost four-fold increase in public demonstration funding is needed to mobilise private finance

- $90billion of public money needs to be mobilised globally to complete a portfolio of demonstration projects before 2030.
- Currently, only roughly $25 billion is budgeted



Source: IEA

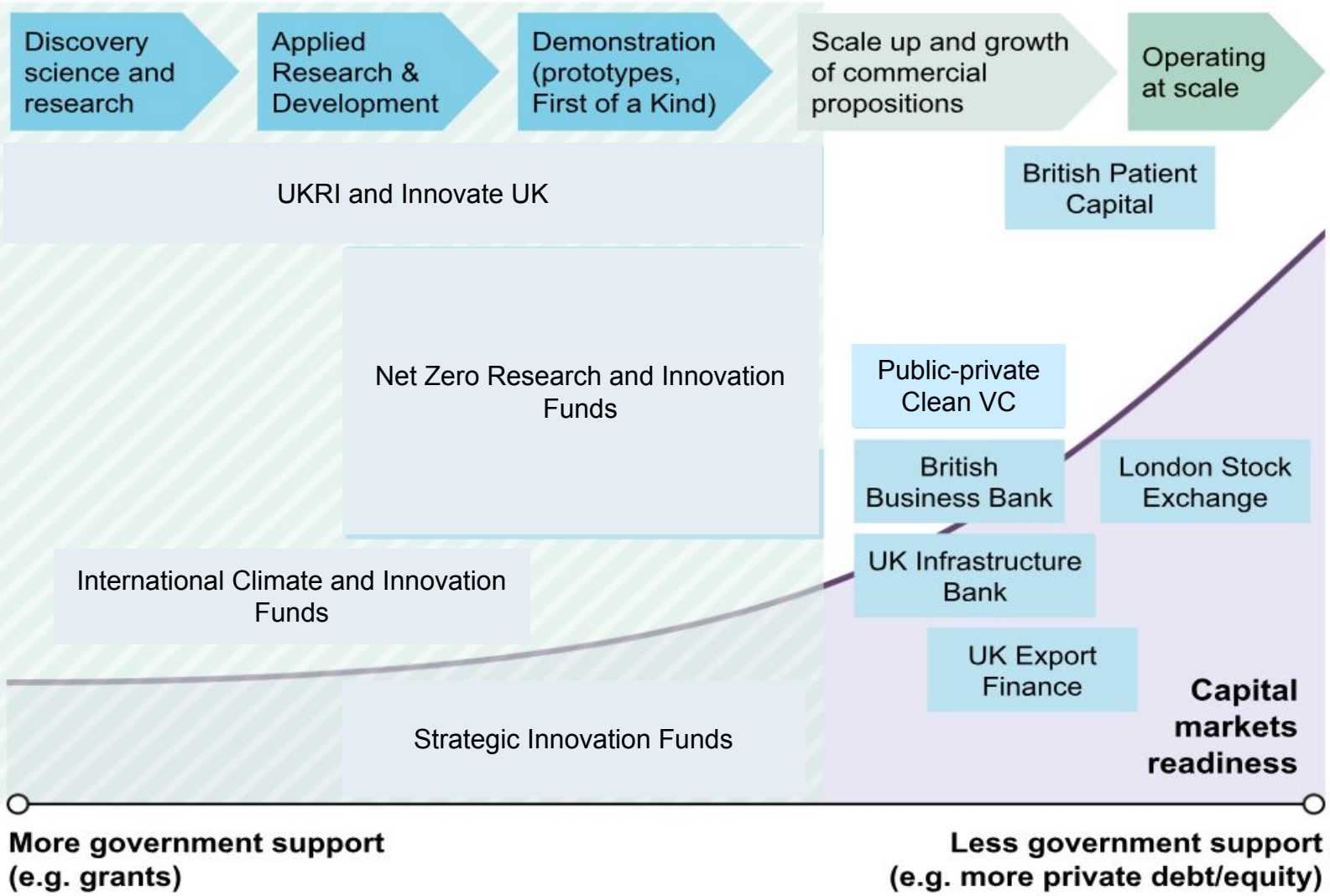


Source: The Geneva Association (revised from WEF)

However, less than 10% of energy demonstrators are in emerging and developing economies (excl. China)

- Nearly 80% of around 200 recent demonstration programmes are primarily in Europe (55%) and North America (15%), with about 10% in China and 10% in other emerging market and developing economies

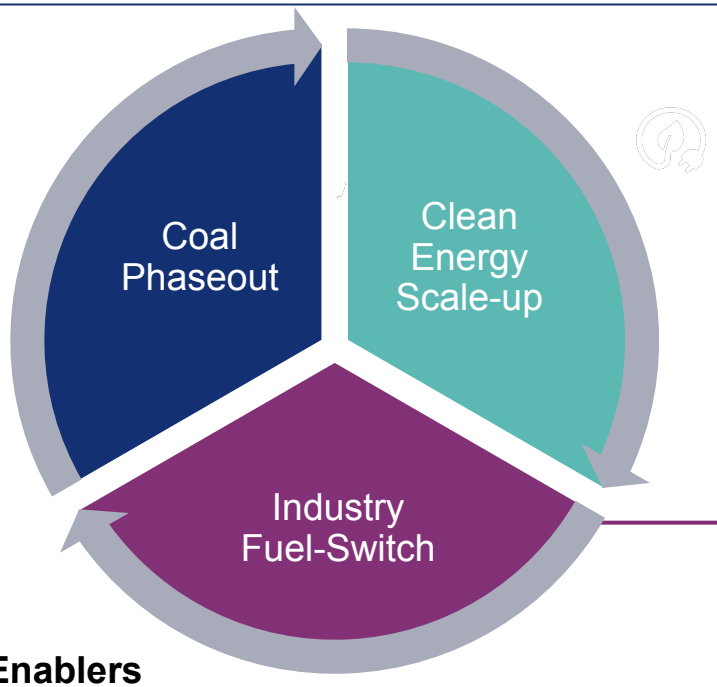
An ecosystems approach is crucial to commercialisation and scale-up



- An ecosystem approach ensures there is 'pull-through' to commercialisation and scale-up
- A key role of the public sector is to catalyse and accelerate private sector investment, so that companies can benefit from the growing clean tech market.
- It aims to deliver a pipeline of investable projects which increase investor confidence, crowd-in private sector investment, and support a cost-effective net zero transition.

A similar approach in Southeast Asia?

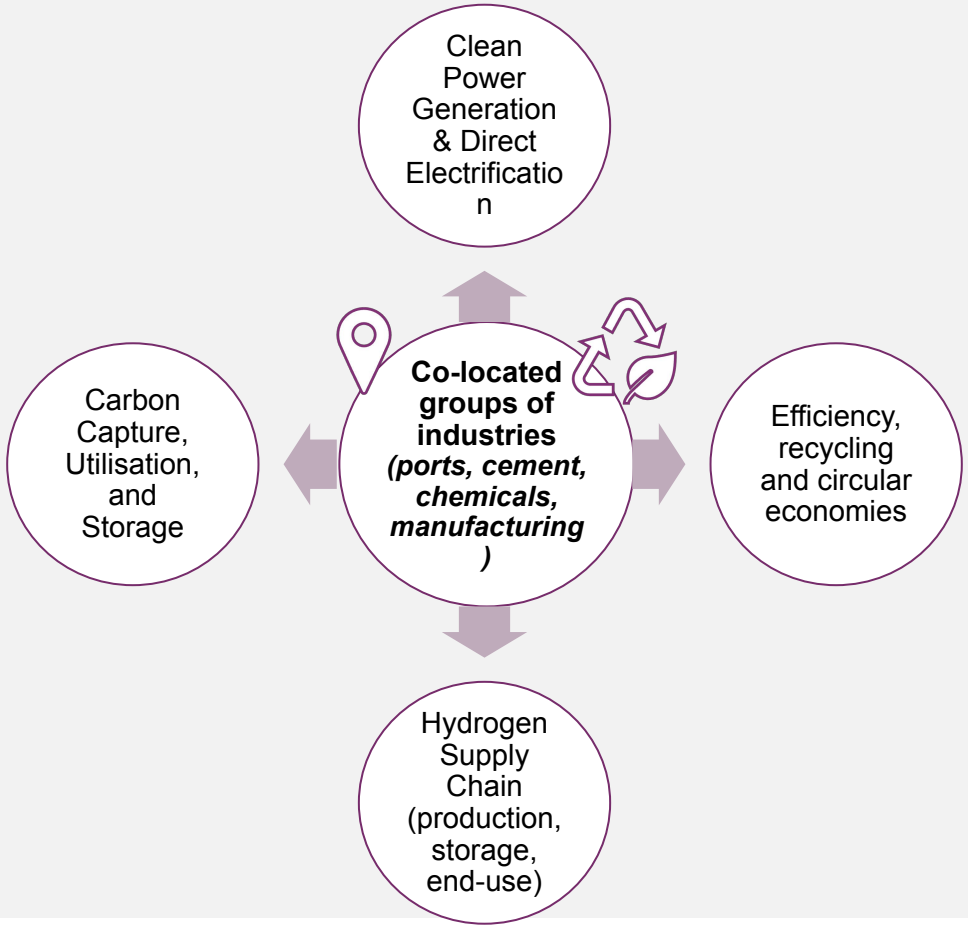
Energy & process efficiency as 'first line'



Key Enablers

- **Market Frameworks**
- **Grids and Flexibility**
- **Innovation Clusters**

- 'Industrial Twins' to share knowledge and expertise
- Porotypes and Testbeds, leveraging UK programmes in SEA



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

New Flagship Programme on Clean Energy Innovation: *Accelerate-to-Demonstrate (A2D) Facility*

Valeria Arroyave
Critical Minerals Lead, A2D Facility
United Nations Industrial Development Organization (UNIDO)

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Overview of A2D Facility

- **Aims and impacts:**
  - To accelerate the commercialization of innovative clean energy technologies in developing countries by supporting “lighthouse” pilot demonstration projects of innovative clean energy technologies in developing countries in the following key thematic areas:
    - Critical minerals
    - Clean hydrogen
    - Smart energy
    - Industrial decarbonization

  - Supporting developing countries to achieve SDGs 13 (climate action), 1 (no poverty) and 9 (industry, innovation, and infrastructure), while also generating co-benefits.

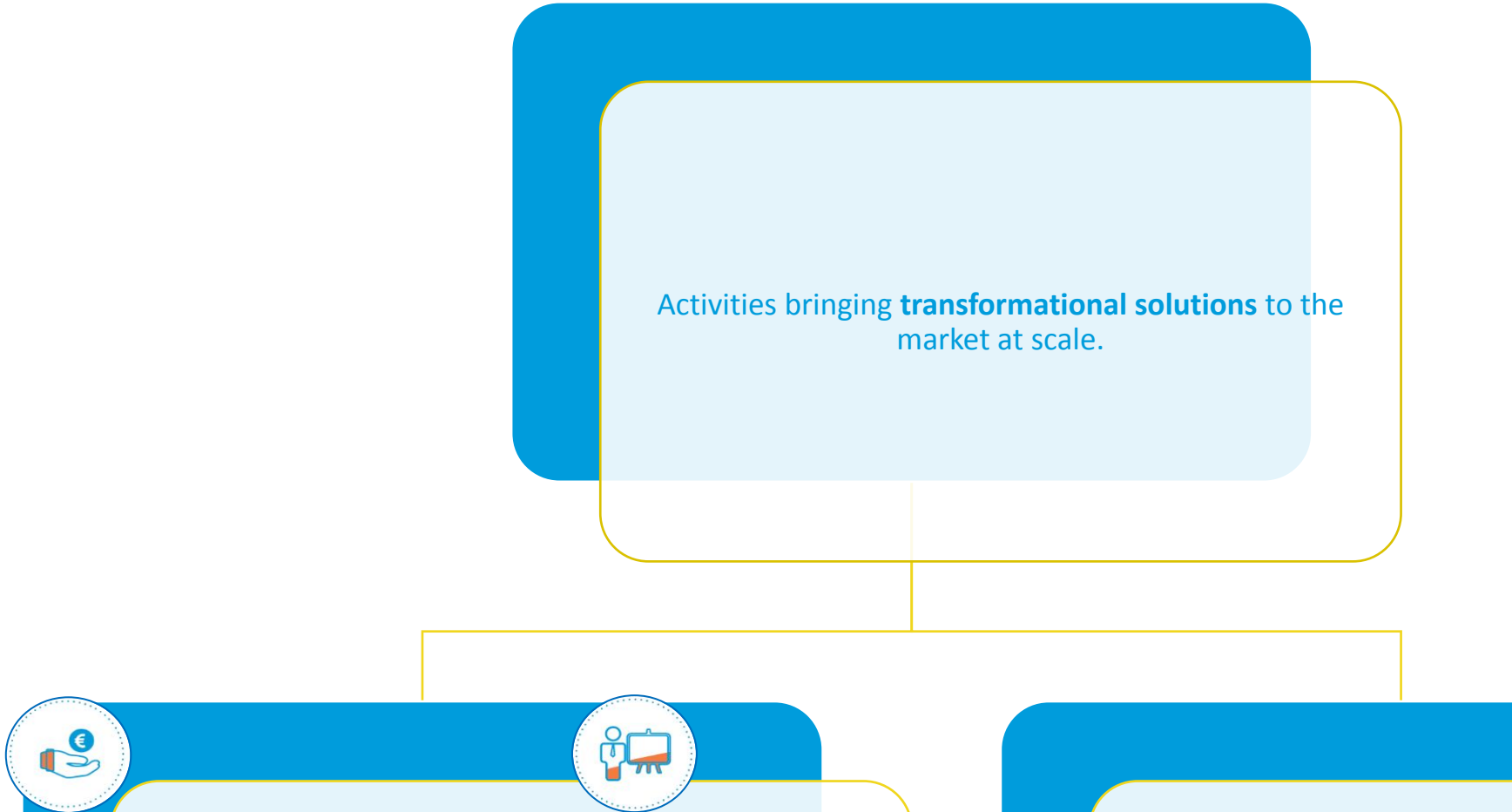
- **Funding and timescales:**
  - ~USD 80 million initial size and currently operates from April 2023 to March 2029 and supports projects through funding calls (the first funding call will be in July 2024 and open to any organization and country).

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Activities of A2D Facility

The A2D Facility is a global (developing country-focused) programme that focuses on the following activities:



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

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:

- Alongside supporting developing countries on ESG standards, policy and regulatory frameworks, incentive schemes, technical assistance and innovative financing mechanisms, there is an important role for pilot demonstration projects of innovative clean energy technologies to decarbonize the processes for re-fining, processing and recycling of 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

UNIDO's expertise in Critical Minerals

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION
Progress by innovation

A2D
Accelerate to Demonstrate Facility

A2D Facility - Illustrative Project Examples

Critical Minerals

- Urban Mining
- Processing, Refining and Re-Purposing
- Supply Chain Optimisation
- Alternative Materials Research

Clean Hydrogen

Smart Energy

Industrial Decarbonization

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Clean Hydrogen

Challenge:

- Developing countries face the risk of being left behind and 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 to other regions, especially those with abundant low-cost clean resources.

Solution:

- Clean hydrogen to decarbonize sectors, such as transport, industry, power and buildings, is one solution (amongst others) and a systemic approach across the value chain is important, integrating sources of clean hydrogen demand and supply with technology innovation, business models, market design, standards and regulatory support, innovative financing and system operations.

Programmes, Projects and Initiatives:

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

The focus areas for UNIDO's interventions are:

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

UNIDO's expertise in Clean Hydrogen

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION
Progress by innovation

A2D Accelerate to Demonstrate Facility

A2D Facility - Illustrative Project Examples

Critical Minerals

Clean Hydrogen
- Innovative Electrolysis Technologies
- Innovative Catalyst Development, Materials Science and System Design
- Innovative Integration and Optimization Technologies

Smart Energy

Industrial Decarbonization

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Smart Energy

Challenge:

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

Solution:

- Smart energy technologies, including machine learning, blockchain and Artificial Intelligence (AI), can help to optimize and digitalize energy management across sectors, such as transport, industry, power and buildings.

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 expertise in Smart Energy

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION
Progress by innovation

A2D
Accelerate to Demonstrate Facility

A2D Facility - Illustrative Project Examples

Critical Minerals

Clean Hydrogen

Smart Energy

- Renewables Adoption through Digital Transformation
- Smart Grids and Smart Micro-Grids
- Digital Solutions support Electric Mobility
- Smart Energy Storage Systems

Industrial Decarbonization

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Industrial Decarbonization

Challenge:

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

Solution:

- Alongside supporting developing countries on policy and regulatory frameworks, incentive schemes, technical assistance and innovative financing mechanisms, there is an important role for pilot demonstration projects of innovative clean energy technologies in energy-intensive industries, such as steel, cement and chemicals in developing countries.

Programmes, Projects and Initiatives:

- A2D Facility
- Industrial Deep Decarbonisation Initiative (IDDI)
- Private Financing Advisory Network (PFAN)
- Global Cleantech Innovation Programme (GCIP)
- Circular Economy programme
- Persistent organic pollutants (POPs) management

UNIDO's expertise in Industrial Decarbonization

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION
Progress by innovation

A2D
Accelerate to Demonstrate Facility

A2D Facility - Illustrative Project Examples

Critical Minerals

Clean Hydrogen

Smart Energy

Industrial Decarbonization

- Fuel Source Decarbonization
- Process Decarbonization and Optimization

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Panel Discussion:

	Name	Position	Organization
	**Kadidia Konare**	Asia Pacific Capital Markets Lead For Infrastructure	International Finance Corporation (IFC)
	**Yatin Premchand**	Managing Director of Global Advisory	Black & Veatch
	**Ripu Bhanjan Singh**	Strategy Consultant	Swaniti Global
	**Steve Peters**	Senior Energy Specialist	Asian Development Bank (ADB)

Moderator: Peter Warren, United Nations Industrial Development Organization (UNIDO)

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Pilot Demonstrations in Distributed Generation: Commercial and Industrial ("C&I") Rooftop Solar

June 3, 2024

IFC International Finance Corporation WORLD BANK GROUP
Creating Markets, Creating Opportunities

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

IFC is a member of the World Bank Group

WORLD BANK

IBRD	IDA	IFC	MIGA	ICSID
International Bank for Reconstruction and Development	International Development Association	**International Finance Corporation**	Multilateral Investment Guarantee Agency	International Centre for Settlement of Investment Disputes
Loans and Advisory to middle-income and credit-worthy low-income country governments	Interest-free loans and grants to governments of poorest countries	**Solutions in private sector development**	Guarantees of foreign direct investment's non-commercial risks	Conciliation and arbitration of investment disputes

IFC International Finance Corporation WORLD BANK GROUP
Creating Markets, Creating Opportunities

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

IFC Infrastructure – Key Value-Add in Climate and Sustainability

1. CLIMATE/ SUSTAINBILITY EXPERTISE

Baselining

Benchmarking

Solutions

Target setting & validation

Collaborate initiatives

Investment opportunities

Decarbonization pathways

Guide clients' GHG reductions with science-based targets and a results measurement framework.

Resilience & adaptation

Build resilience inside individual companies, across complex supply chains and within

Just transition process and plans

Manage transition risks, seize the opportunities of a low carbon economy, and ensure equitable development for communities

2. IFC ENGAGEMENT

Creating Markets

- Government/regulator policy dialogue
- Programmatic sector development
- Private sector enabling environment
- Analytic and diagnostic studies

Sector Intervention

Creating Opportunities

- Early-stage development activities
- Transaction advisory for tender
- Firm-level advisory
- Replicable platforms

Project Stage

Crystalizing Investments

- Providing early-stage capital
- De-risking of projects for financing
- Mobilizing 3rd party investors
- Implementation support / advisory

Investment

Selected Examples of IFC Engagement Models

IFC SUSTAINABLE FINANCE INFRASTRUCTURE

(support for sustainability in all sectors)

Utilities For Climate U4C

(for water companies & utilities)

Circularity+ Value Creation from Waste

(for solid waste companies)

Integrated Solution (Financing + Advisory + Upstream)

3. GLOBAL SECTOR EXPERTISE

4. ESG RISK MANAGEMENT EXPERTISE

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Infrastructure & Energy : Climate Smart Innovations

1. Creating Scalable Models for Sustainable Infrastructure

- **Scaling Solar - from Africa to Central Asia:** **PPP advisory** and **financing** for **first solar projects** in Zambia, Senegal, Uzbekistan
- **Scaling Wind:** **Offshore Wind Development Roadmap Advisory** for governments of Vietnam, Turkey, Azerbaijan
- **Scaling Mini-Grid:** **PPP advisory** to bring **clean, solar energy** to over **1.5 million homes** in DR Congo

2. Pioneering High-quality Sustainability-Linked Financing (SLF)

- **Engie (Chile):** **financing** + **mobilization** + **sustainability coordinator** to Engie to **daft SLF framework** and identify **innovative coal power decommissioning and reconversion KPI**
- **Elektro SLL (Brazil):** **financing** + **sustainability coordinator** to Neonergia to define innovative indicators on **digitalization** and gender

3. Mobilizing Capital Markets for Climate Finance

- **Continuum Green Bond (India):** **anchor investor** of a $561 million green bond, **catalyzing interest of $3.8 billion** for Continuum's renewable energy projects
- **Scatec Bond (Africa):** **anchor investor** of a $99 million green bond to sustain growth and investment in a pipeline of renewable energy projects

4. Piloting New Climate Technologies through Upstream

- **Polenergia (Poland):** **co-piloting** of a **5MW green hydrogen** project
- **HDF Energy & Rubis (Barbados):** **co-funding** a feasibility study for a 50MW solar PV plant with **green hydrogen** and **battery storage**
- **Electric Vehicles:** **advisory** on the viability of an EV platform in Nepal

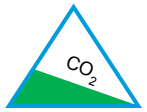
5. Promoting Blue Economy, Biodiversity, Climate Adaptation

- **SABESP (Brazil):** **blue loan** (loan I) + **sustainability-linked loan** (loan II) + **non-revenue water advisory** (U4C) for increased provision of sanitation services, removal of river pollution, and improved water resilience
- **Sanepar (Brazil):** **advisory** (U4C) to develop **climate change action plan**
- **Desalination:** **financing** expected for the construction of a desalination plant in Jordan to deliver **potable water to ~6M people** impacted by droughts

6. Reducing Emissions and Pollution through Circular Economy

- **Elemental (Poland):** **equity** for three greenfield refinery and smelting facilities (**e-waste**, **PGM metals, lithium-ion**) with sustainable wastewater treatment and on-site solar PV + **carbon credits advisory** (Circularity+)
- **Orizon Waste (Brazil):** **financing** (sustainability-linked loan) for **material recovery** & **waste recycling** facilities and **leachate treatment** infrastructure

7. Decarbonizing Energy-Intensive Infra Sectors



- **Almaty, Lima, Antalya:** **financing** of new, **green building certified airport terminals** for lower energy, water use, and less energy-intensive materials
- **Tabreed (India):** investment platform to deploy energy-efficient **district cooling** to support **adaptation** to global warming
- **Green Data Centers:** **equity** in Malaysia + **financing** expected in Asia/LAC

8. Supporting Urban Climate Actions

- **IFC's E-Buses Toolkit:** **advisory** to Podgorica (Montenegro) and Buenos Aires (Argentina)
- **APEX Green City Action Plan**: **advisory** to the City of Ekurhuleni (South Africa) and Medellin (Colombia)

IFC International Finance Corporation WORLD BANK GROUP
Creating Markets, Creating Opportunities

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

IFC Infrastructure & Energy: FY23 Commitment Highlights

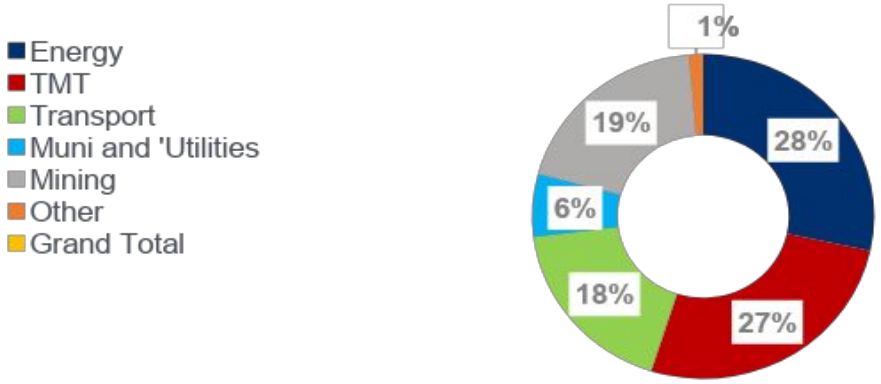
FY23 Commitment Activity

US$8.0 billion invested in FY23, including:

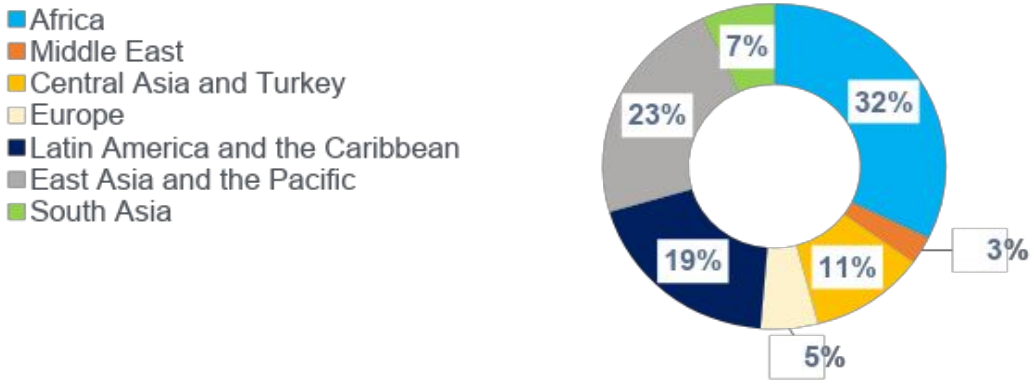
- **US$3.2 billion** for IFC's own account and
- **US$4.8 billion** of total mobilization.

US$13.7 billion committed infrastructure portfolio.

FY23 Commitment Activity By Sector



FY23 Commitment Activity By Region



In the last decade, IFC has invested over US$64 billion in infrastructure & energy in emerging markets.

Note: Financial year ends June 30. Commitment activity and charts include commitments for both IFC's own account and mobilization (including MIGA). Investment amounts for the past decade include IFC own account, core mobilization and MIGA.

IFC International Finance Corporation WORLD BANK GROUP
Creating Markets, Creating Opportunities

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Project Overview: C&I rooftops in India – 170 MW

FOURTH PARTNER ENERGY

- IFC committed **a local currency-equivalent US$52mn senior secured loan to Fourth Partner Energy Limited ("FPE")** subsidiaries to finance 170 MWp of distributed generation (DG) assets across India.
- FPE, founded in 2010, is one of the largest RE developers in India focused on the C&I segment with c.1018 MWp of capacity under management.
- The Project comprises a diversified portfolio of **solar PV projects, including a 75 MWp offsite solar park and rooftop solar** assets aggregating to 95 MWp selling electricity to Commercial and Industrial ("C&I") consumers through long term PPAs.

IFC ROLE AND PROJECT IMPACT

- C&I consumers account for 51% of energy consumption in India and direct procurement of RE power is a key part of **Indian C&I companies' decarbonization and net zero plans**. Through this investment, IFC supports the **decarbonization of India's power sector** that is heavily dependent on coal.
- IFC's first of its kind financing package in India to finance C&I DG assets at scale by aggregating a large number of projects across business models (offsite and rooftop projects) and across states in India.

IFC International Finance Corporation WORLD BANK GROUP
Creating Markets, Creating Opportunities

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Lessons Learned: DG is the fastest growing sub segment of the power sector

- As compared to utility-scale solar PV, DG is relatively faster and easier to implement with smaller E&S impacts and permitting requirements
- Scalability & growth
- Business model maturity
- Regulatory approach and contractual frameworks
- Possible to assess and structure around offtaker credit risk in the long term

IFC International Finance Corporation WORLD BANK GROUP
Creating Markets, Creating Opportunities

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Barriers to Overcome: Structuring financing for DG portfolios is not easy

- **Credit Risk:** Ability to pay: Long term exposure to relative lower quality C&I offtaker portfolio Willingness to pay: Declining system costs and imposition of new charges on C&I customers (i.e., less savings vs. grid) might make existing PPAs financially less attractive
- **Regulatory Risk:** utilities might increasingly view DG as a threat and lobby to increase open access/wheeling charges or delay requisite approvals
- **Operational Risk:** performance may be impacted by lower solar irradiation or operational underperformance, leading to potential penalties under the PPAs, and inadequate maintenance.

IFC International Finance Corporation WORLD BANK GROUP
Creating Markets, Creating Opportunities

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Pilot Demonstrations in Fleet Electrification Strategy for Heavy Vehicles

BLACK & VEATCH
100% EMPLOYEE-OWNED

Projects Overview

Siam Cement Group (SCG) sought to understand the opportunities from transportation decarbonization across their various fleets including medium- and heavy-duty vehicles as well as light cost-savings opportunities from electrifying its commercial fleets across business units and jurisdictions.

Title: Fleet Electrification Strategy for Heavy Vehicles

Key Objectives:

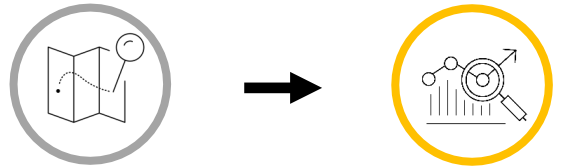
Sustainability impact assessment: assess impact of decarbonization of SCG's transportation fleets and develop a model for the carbon reduction including identifying the cost-savings opportunities from electrifying its commercial fleets across business units and jurisdictions.

Transportation electrification business opportunities: evaluate providing transportation electrification services to markets in southeast Asia balancing customer needs to decarbonize their own fleets with revenue opportunity for SCG.

Site assessments: perform specific site assessments at three pilot projects site to assess site needs and cost estimates to form the foundation for a broader buildout of transportation decarbonization infrastructure.

Lessons Learned: Readiness and ability to procure Medium to Heavy Vehicles in APAC : Project Article Link

Barriers Overcome: Access to applicable transportation solutions that match local technical and regulatory recrements.



Strategy

- Market view
- Value proposition
- Competitive model
- Provider landscape
- Economic model
- Financial targets
- Partner ecosystem & strategy

Investment Planning

- Target business units
- Target customer segments
- GHG reduction opportunities
- Scale up strategy
- Next step & priority sites

FEASIBILITY

Prelim. Feasibility & Design

- Detailed site assessment
- Grid capacity check & load submission
- Customer transportation ops survey
- Go/No-Go decision on site

Cement Plant (Northern Thailand)

Taxis (Bangkok)

Logistics (Central Thailand) (Northern Thailand)

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Pilot Demonstrations in DEVELOPMENT OF HYDROGEN BUSINESS TOWARDS NET-ZERO 2050 for Malaysia

BLACK & VEATCH
100% EMPLOYEE-OWNED

Projects Overview

Guiding technical, commercial, regulatory, risk, and market scoping (local/international), and reviewing related studies towards the design, deployment, investments, and requirements to build infrastructure for the production, transport, and use of (Green) Hydrogen, and its derivatives, in Malaysia.

Title: FEASIBILITY STUDY ON THE DEVELOPMENT OF HYDROGEN BUSINESS TOWARDS NET-ZERO 2050 for Malaysia

Key Objectives: building a Net Zero Road Map for 2050 for them and Malaysia with a focus on Green Hydrogen Value Chain development

Lessons Learned: Country Resources, Regulatory Frameworks, Technical Configuration / Design and Optional Analysis, Financing and Cost, Demand, Location and Infra Requirements, Cost Curves, Technical Feasibility of Scaleup & Action Plan.

Barriers Overcome: Resources vs Cost, Regulatory Augmentation, and Unlocking Local and Global Demand to Unlock Businesses

Our Value:

- Expertise in EPC across the value chain of GH2 developments
- Deep technical expertise including supply chains awareness, business & regulatory enablers, and end use in energy transition across power, transport, bunkering, use, etc.

Yatin Premchand
Transactions and Strategic Advisory
APAC / Asia / EMEA
premchandy@bv.com

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Pilot Demonstrations in (Coal Waste to Critical Minerals)

Title: State-Owned Enterprises in India: The "Business Diversification & Just Transition Agenda"

Key Objectives:

1. Business Diversification of Coal India Limited (world's largest coal sector SoE)
2. Role of state-owned coal companies in Just Transition

India's coal transition depends on coal SOE diversification plans

1. Can they diversify fast to help India meet its climate targets? Interventions to catalyze faster diversification
2. Can they diversify locally to enable "just transition"? Interventions to enable SOE diversification in local regions

Theory of Change:

All executives in the SoE don't think alike so we identify champions:

Work with champions to push the low-carbon agenda

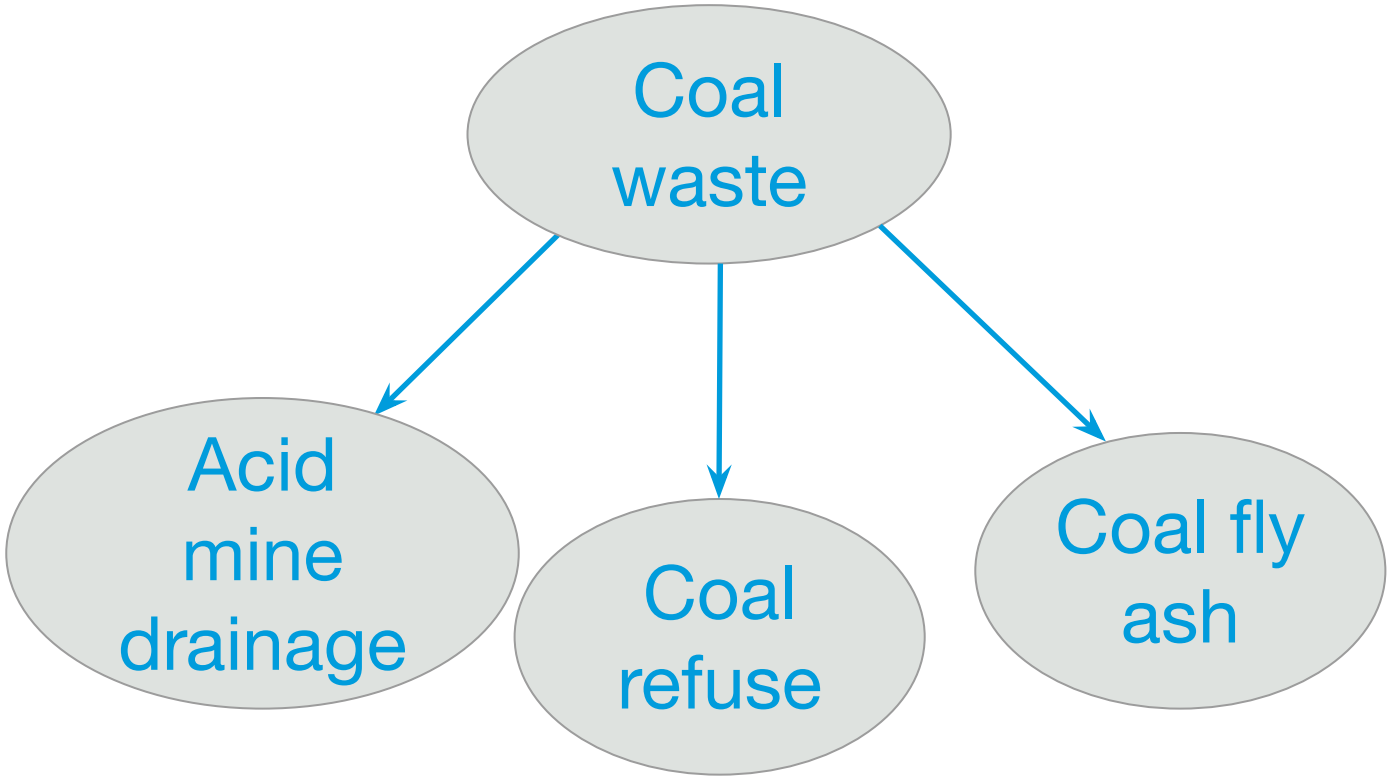
Give them tools to push the agenda:

1. Provide research support
2. Conduct techno-economic analysis
3. Provide peer connections (MoU – Norwegian company)

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Swaniti facilitated coal waste to critical minerals work at CIL



US, China and Canada have successfully found critical minerals in coal waste

Coal Mines	Fe	Cu	Mn	Ni	Pb	Cr	Cd	REE	References
Jaintia Coalfield (Meghalaya, India)	118400	320	4070	1080	430	60	30	714.7	(Sahoo et al. 2011)
Jharia Coalfield (Jharkhand, India)	423	32.3	136	17.6	14.9	8.1	×	×	(SINGH et al. 2009)
Raniganj (West Bengal, India)	329	18.8	39.4	45.6	22.6	44.6	×	×	(SINGH et al. 2009)
West Bokaro Coalfields (Jharkhand, India)	652	46	1431	154	34.3	81.2	×	×	(SINGH et al. 2009)
Makum (Assam, India)	105030	310	10200	3120	270	56	35	×	(Equeenuddin et al. 2010)
Gorbi Mines (Singrauli, MP)	166000	60	45000	70	50	5	50	×	(Shirin et al. 2021)
Korba coal field	913	2.7	244	9.2	4.1	1.01	×	×	(Singh, Varma, and Mondal 2016,)

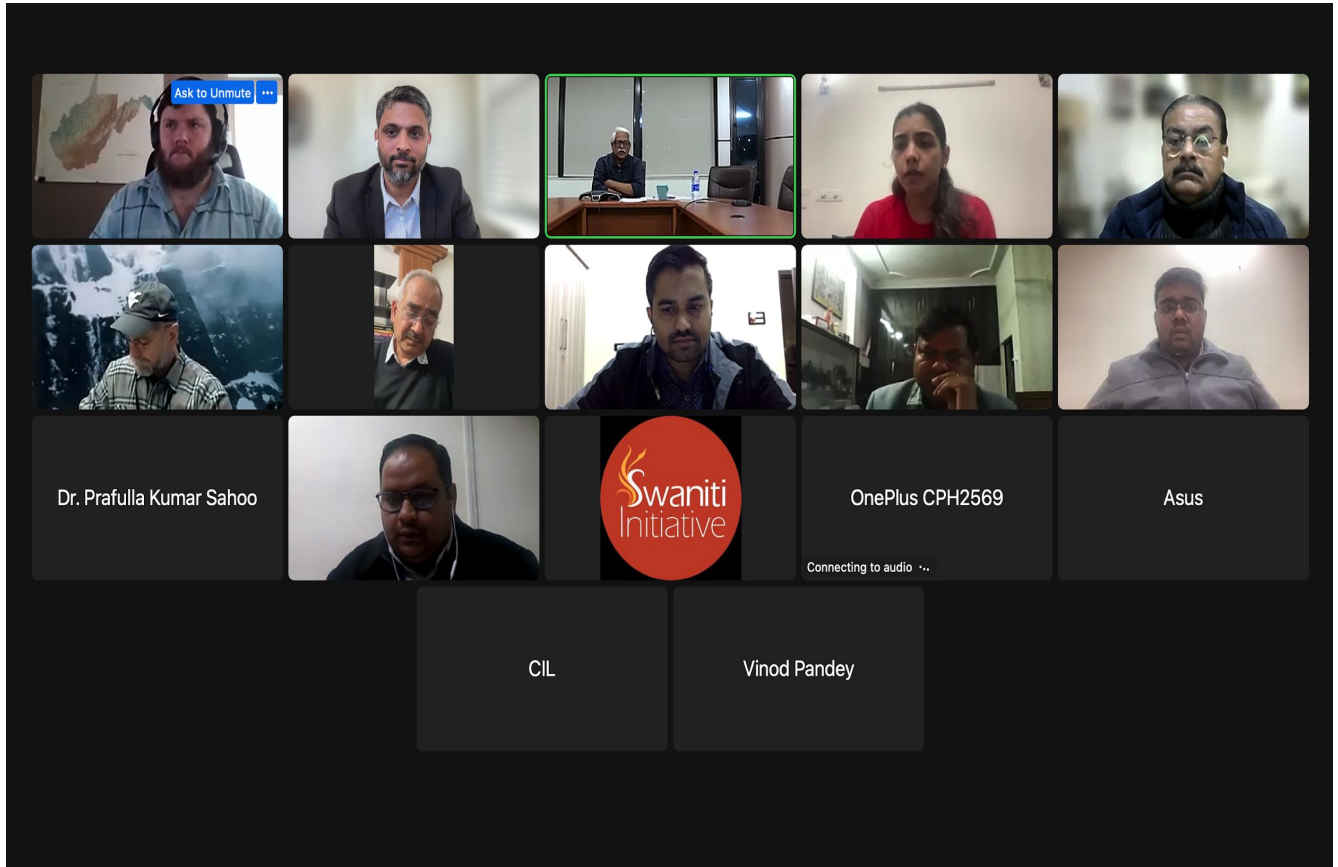
UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Where we are:

CIL Chairman has written a letter to…

1. Use R&D funds to collect coal waste to check for mineral availability
2. If samples are worthy, creating pit head project - this will be a win for energy transition & just transition!!



Note on critical minerals from Acid Mine Drainage by Swaniti Global
November 25, 2023

CIL business diversification option: Coal Waste to Critical Minerals

Objective

The objective of this memo is to show an assessment of concentrations at which critical minerals can be commercially extracted from acid mine drainage.

Background:

Critical minerals like Lithium, Cobalt and rare earths elements (REEs) are key ingredients for many sectors such as energy, defence, pharmaceuticals. According to the International Energy Agency, extraction and processing of critical minerals is a 300 billion $ opportunity for companies around the world. Globally, countries and companies are in a race to open critical mineral mines and processing units. China has already cornered the critical minerals markets, controlling over 60% of the global production and 85% of processing capacity. Recently, the United States and the European Union have come up with various pieces of legislation—such as the Inflation Reduction Act and European Critical Raw Materials Act—that provide billions of dollars in subsidies for increasing domestic supply of critical minerals including lithium, nickel, and rare earth minerals. In addition to control of mines and processing units, the United states, China and Canada have successfully found critical minerals like rare earths in coal ash, coal refuse and acid mine drainage (AMD). These countries have provided grants to universities and companies to run pilot projects, which have yielded positive results. Very recently, new commercial projects are coming in this sector.

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

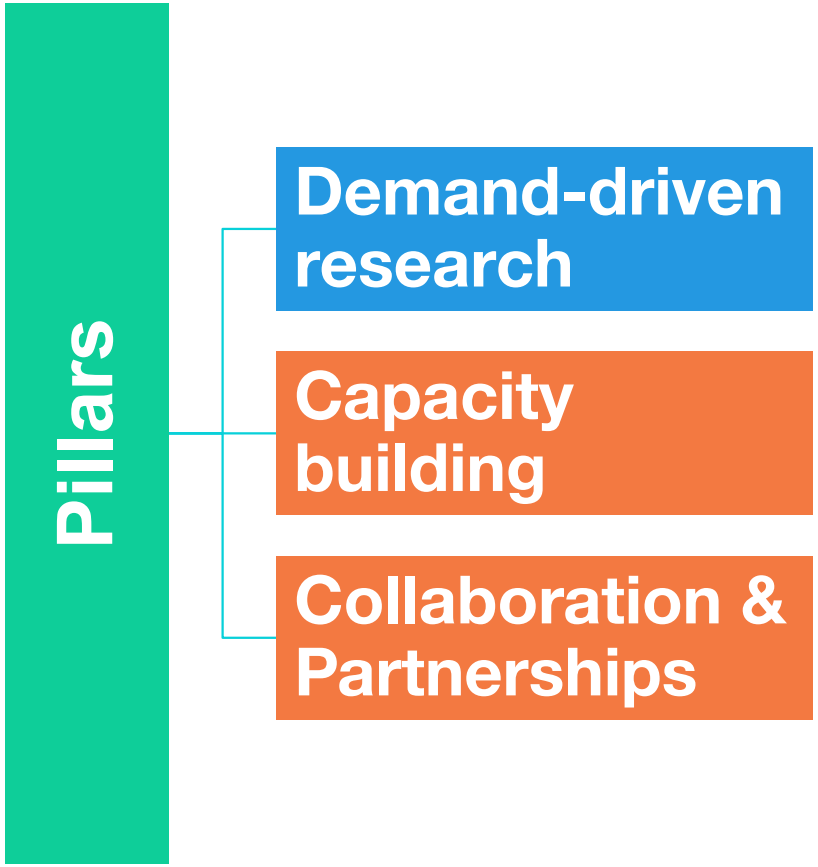
Projects Overview

Title: Strengthening South-South Cooperation on Critical Minerals for a Just Energy Transition

Key Objectives:

To bring together key producer and consumer countries in the Global South to:

1. Secure critical minerals required for their energy transitions;
2. Support ambitions for local value creation;
3. Promote sustainable and inclusive transitions for the local communities.



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Current and Prospective Focus Countries:

Phase 1 (2 years)

6 countries in the Global South, encompassing:

- Regional diversity
- Interested in partnerships
- Critical minerals as a national priority

Phase 2 (4 years)

20 countries, broadening the Council to:

- Engage more countries
- Increase partnership opportunities

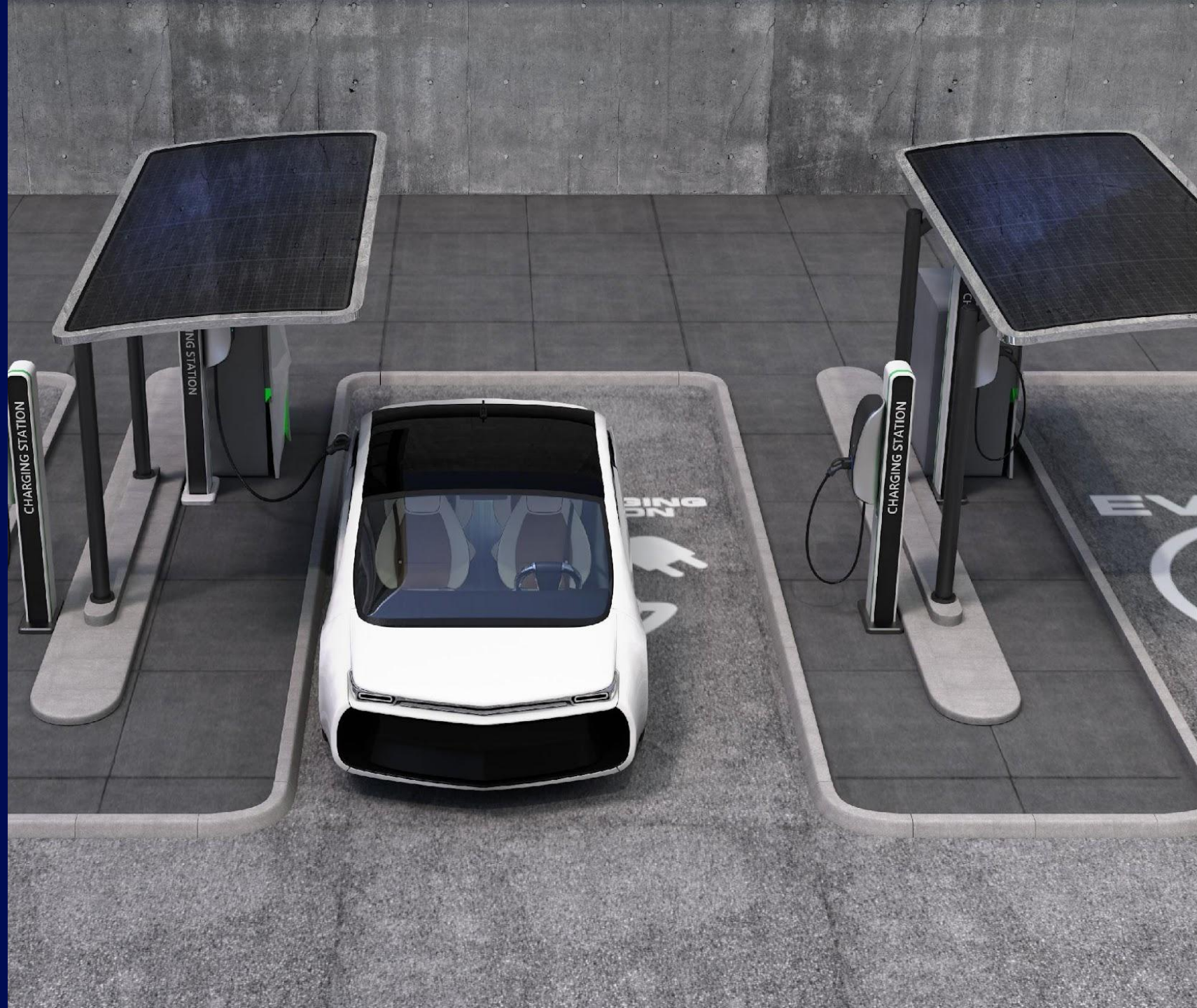
SUSTAINABLE ENERGY FOR ALL

UCDAVIS

India ZEV Research Centre

Institute of Transportation Studies

Swaniti Global



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D
Accelerate to Demonstrate Facility

Our website:
www.transitionmineralscouncil.org

Thank you

Ripu Bhanjan Singh
On behalf of
Dr. Sandeep Pai
Director
Swaniti Global

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Panel Discussion:

	Name	Position	Organization
	**Kadidia Konare**	Asia Pacific Capital Markets Lead For Infrastructure	International Finance Corporation (IFC)
	**Yatin Premchand**	Managing Director of Global Advisory	Black & Veatch
	**Ripu Bhanjan Singh**	Strategy Consultant	Swaniti Global
	**Steve Peters**	Senior Energy Specialist	Asian Development Bank (ADB)

Moderator: Peter Warren, United Nations Industrial Development Organization (UNIDO)

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Summary of Key Take Aways

Valeria Arroyave
Critical Minerals Lead, A2D Facility, United Nations Industrial Development Organization (UNIDO)

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

A2D Accelerate to Demonstrate Facility

Closing Points

Peter Warren

A2D Facility Manager, United Nations Industrial Development Organization (UNIDO)

Participant feedback form:

Feedback form - Role of Pilot Demonstrations to Accelerate Clean Energy Transitions