

2026 SIDS NDE Joint Programme

Forum, Capacity Building on AI and Energy, and Voluntary Technology Talk

16-18 September 2026,
Incheon & Busan, Republic of Korea



Session 5

**Updates by
UNFCCC
Finance
Mechanism
– Green Climate
Fund**



Mr. Jose Alfred Cantos
Climate Investment Principal,
Pacific and Asian SIDS,
Green Climate Fund



**GREEN
CLIMATE
FUND**

**Day 2: Updates from UNFCCC
Finance Mechanism**

Connecting SIDS Technology Priorities to GCF Investment Pathways

**2026 UNEP CTCN – SIDS Joint
Programme**

15 September 2026

| GCF.10 |

| 10 YEARS OF CLIMATE IMPACT |

From SIDS technology priorities to climate investment

Country ownership

Country ownership and nationally identified priorities

Faster, simpler access

Faster, simpler and more predictable access and appropriate financial instruments for different investment needs

Direct access

Direct access and stronger regional institutions and greater responsiveness to limited institutional capacity

Regional approaches

Programmatic and regional approaches where these add value

GCF's strategic direction and existing services can help SIDS move from nationally identified technology needs to financeable climate investments

GCF financial-support relay: Diagnose where the investment journey is blocked and select the right service at the right time

Stage 1: Country priorities and institutional readiness

- Country programmes and investment priorities
- NDA capacity and coordination
- National adaptation planning
- Direct Access Entity capacity
- Enabling policies, sector planning and pipeline development



Stage 2: Project preparation

- Feasibility and technical studies
- Climate rationale and evidence
- Environmental and social safeguards
- Gender assessment
- Financial and economic analysis
- Institutional and implementation arrangements



Stage 3: Financing and implementation

- Funding Proposal or Simplified Approval Process
- Appropriate combination of financial instruments
- Board approval, legal arrangements and disbursement
- Implementation, monitoring, learning and adaptive management

Access and delivery roles: Who does what?



Accredited Entity: AE works with the country and implementing partners to develop and submit the funding proposal

Executing Entity: EE carries out, implements or delivers part of the funded activity. GCF proceeds may be used by or channeled to an EE for the purposes of the project or programme

Project Specific Assessment Approach: PSAA broadens access by allowing entity to be assessed in relation to a specific proposed project or programme rather than through conventional institutional accreditation

Co-investor: Contributes financing alongside GCF resources and may include public and development finance, private investment. Co-financing helps demonstrate broader commitment, financial viability and potential for scale.

Financial Instruments to Investment Needs



Grants

public goods, capacity, technical assistance and investments without reliable revenue-generation potential

Use when there is no revenue stream to repay



Concessional loans

investments with repayment capacity but facing affordability or financing barriers

Use when revenues exist but market terms are unaffordable



Guarantees

reduction of risks that prevent other financiers from participating

Use when perceived risk blocks other financiers



Equity

investments where patient risk capital can help establish or scale viable climate solutions

Long-horizon equity that stays invested while a venture proves itself

More concessional

More commercial

Choosing the right GCF pathway

Getting ready: preparation and capacity support



Project Preparation Facility

provides financial and technical support for preparing funding proposals. Existing GCF support has two modalities: PPF funding and PPF service

Use when a FP needs work to become investment-ready



Readiness Preparatory Support

strengthen NDA coordination, country programming, DAE capacity, adaptation planning, pipeline development and enabling policy or institutional conditions

Use when institutions and pipelines need strengthening including support for investment readiness

Getting approved: routes to a GCF funding access



Regular funding proposal

appropriate for projects and programmes requiring the full GCF appraisal and approval process

Use for larger projects needing full appraisal



Simplified approval process

smaller-scale, lower-risk projects via streamlined approval with clear climate rationale, country ownership, safeguards and credible implementation arrangements

Use for smaller, lower-risk projects

GCF support to SIDS: Global and Asia and the Pacific

USD 2.44bn

Global SIDS portfolio as of 31 August 2026 — 12.0 percent of cumulative GCF financing

USD 1.02bn

Asia-Pacific SIDS portfolio as of August 2026, including Readiness, with USD 1.42bn in co-financing

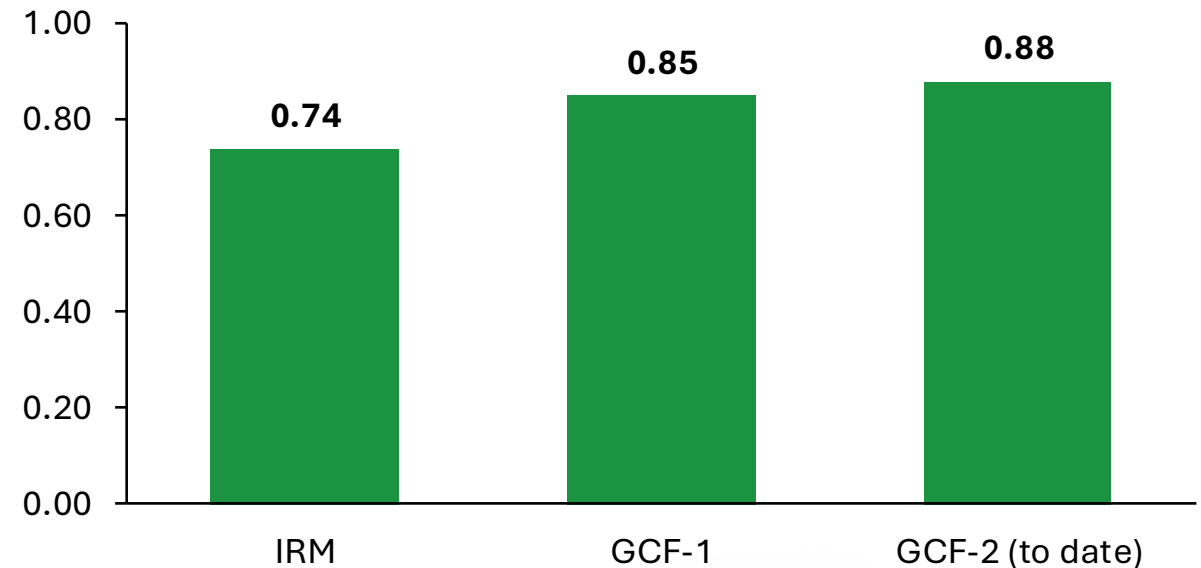
Steady growth

SIDS funding has scaled across every GCF resource mobilization period

14 of 14

Pacific Island countries have accessed GCF resources

GCF funding to SIDS by period (USD billion)



Making technology and AI investment-ready

GCF finances climate outcomes. Technology and AI can be part of the solution where they **respond to an identified mitigation or adaptation need** and are supported by appropriate institutions, infrastructure, data and long-term operating capacity



Renewable-energy forecasting
and system management



Climate-information and
early-warning services



Remote monitoring of
geographically dispersed
infrastructure



Adaptive management of
water, coastal or ecosystem
investments

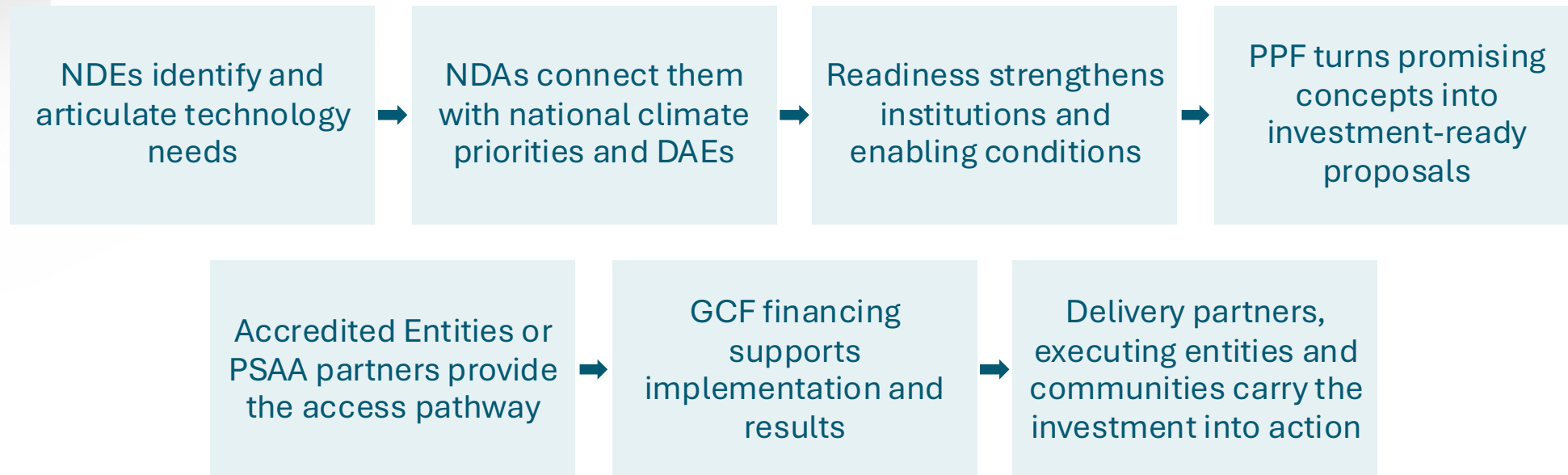


Climate-risk and investment
decision support



Monitoring of project
performance and climate
results

From technology needs to climate results





GCF.10

**10 YEARS OF
CLIMATE IMPACT**



Readiness & Preparatory Support Programme

AJ Untalan, Readiness Programme Officer, GCF



Readiness & Preparatory Support Programme

Department of Investment Services

10 Years of the GCF Readiness Programme

Number of Readiness
requests approved

906

Number of countries
supported

142

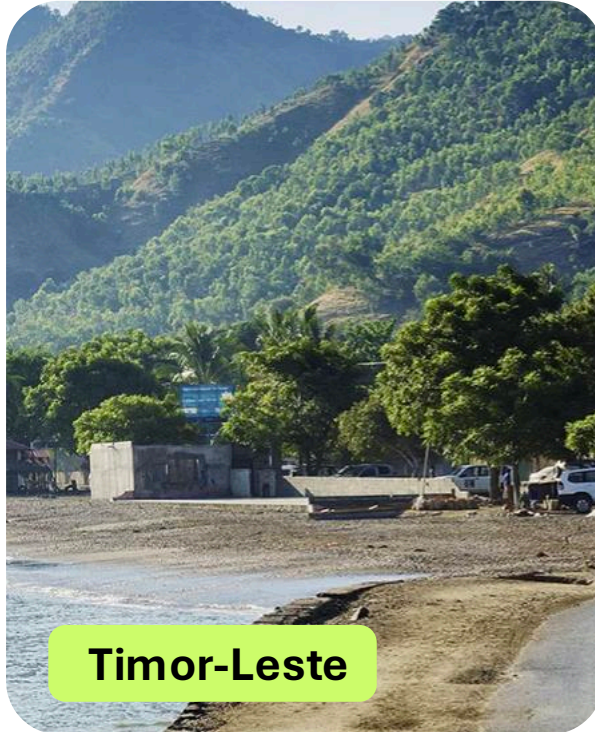
Total resources approved for
Readiness

\$786m

GCF Readiness Programme & CTCN

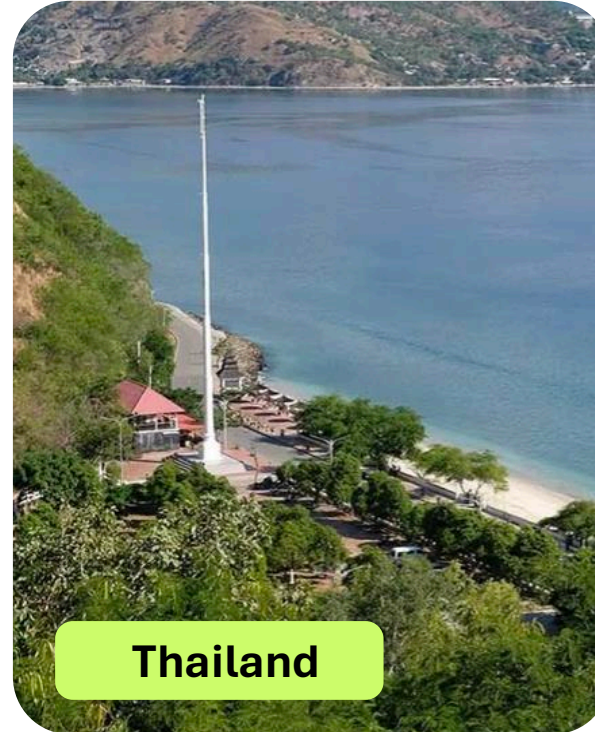
Number of
Readiness
requests
approved

31



Timor-Leste

Enabling Readiness for
Capacity Building on
Installation and Maintenance
of Solar PV in Timor-Leste



Thailand

Enabling readiness for up
scaling investments in
building energy efficiency for
achieving NDC goals in
Thailand



Myanmar

Strengthened drought and
flood management through
improved science-based
information availability and
management in Myanmar

Readiness Strategy 2024-2027

By 2027, developing countries have strengthened programming capacities & enabling environments for NDC, NAP, & LTS implementation, investment planning & enhanced access to GCF resources through an **enhanced focus on climate programming & direct access** to advance implementation of the UNFCCC & Paris Agreement.

Readiness Strategy 2024-2027



OBJECTIVE 1

Institutional strengthening & strategic frameworks

Strengthen capacity & **coordination** mechanisms across stakeholders

Support development and implementation of **NDCs, NAPs, LTS**

Develop **policies**, instruments, and enabling environment

Strengthen **Direct access entities (DAEs)** and accreditation capacity

OBJECTIVE 2

Pipeline development & implementation

Develop and update **country programmes**

Build pipelines of **high-quality project ideas & concept notes**, that lead to approved proposals

Strengthen capacity of NDAs and DAEs for **project implementation, financial management and monitoring and evaluation**

OBJECTIVE 3

Knowledge-sharing & learning

Generate and **disseminate knowledge** to address policy gaps

Capture and **share best practices** and lessons learned

Strengthen **regional cooperation and partnerships** and South-South collaboration

Readiness Strategy 2024-2027

Funding Envelopes



Country support modality

Main country envelope

\$4m

NAP formulation envelope (NAP.1)

\$3m

NAP implementation envelope (NAP.2)

\$3m

Additional envelope for SIDS & LDCs for Liaison Officer

\$320k

DAE support modality

DAE envelope

\$1m

Readiness Strategy 2024-2027

Access Type for Country Support Modality

Option 1

Direct access by a country through the NDA or other competent government ministry or agency

Option 2

Access by a country through an **entity nominated by the NDA**, which can be a national entity; an entity that has entered into a Readiness Framework Agreement with the GCF; or a GCF accredited entity

Option 3

Access by a country through a competitive tender process involving **GCF pre-qualified delivery partner** based on the selection of the best technical and financial offers

Option 4

A **hybrid approach** that combines any of the above methods

Readiness Strategy 2024-2027

Access Type for DAE Support Modality

Option 1

Direct access by a DAE

Option 2

Access by a country through an entity that has entered into a Readiness Framework Agreement with the GCF

Option 3

Access by a country through a competitive tender process involving **GCF pre-qualified delivery partner** based on the selection of the best technical and financial offers

Option 4

A **hybrid approach** that combines any of the above methods

Readiness Strategy 2024-2027

Country & DAE Support Modalities

Country support modality

Number of requests
received

100

Number of proposals
approved

12

Amount approved

\$31.2 m

DAE support modality

Number of requests
received

60

Number of proposals
approved

18

Amount approved

\$16.0 m

Readiness Strategy 2024-2027

Liaison Officer Placement Scheme

Number of requests received

96

Number of liaison officers deployed

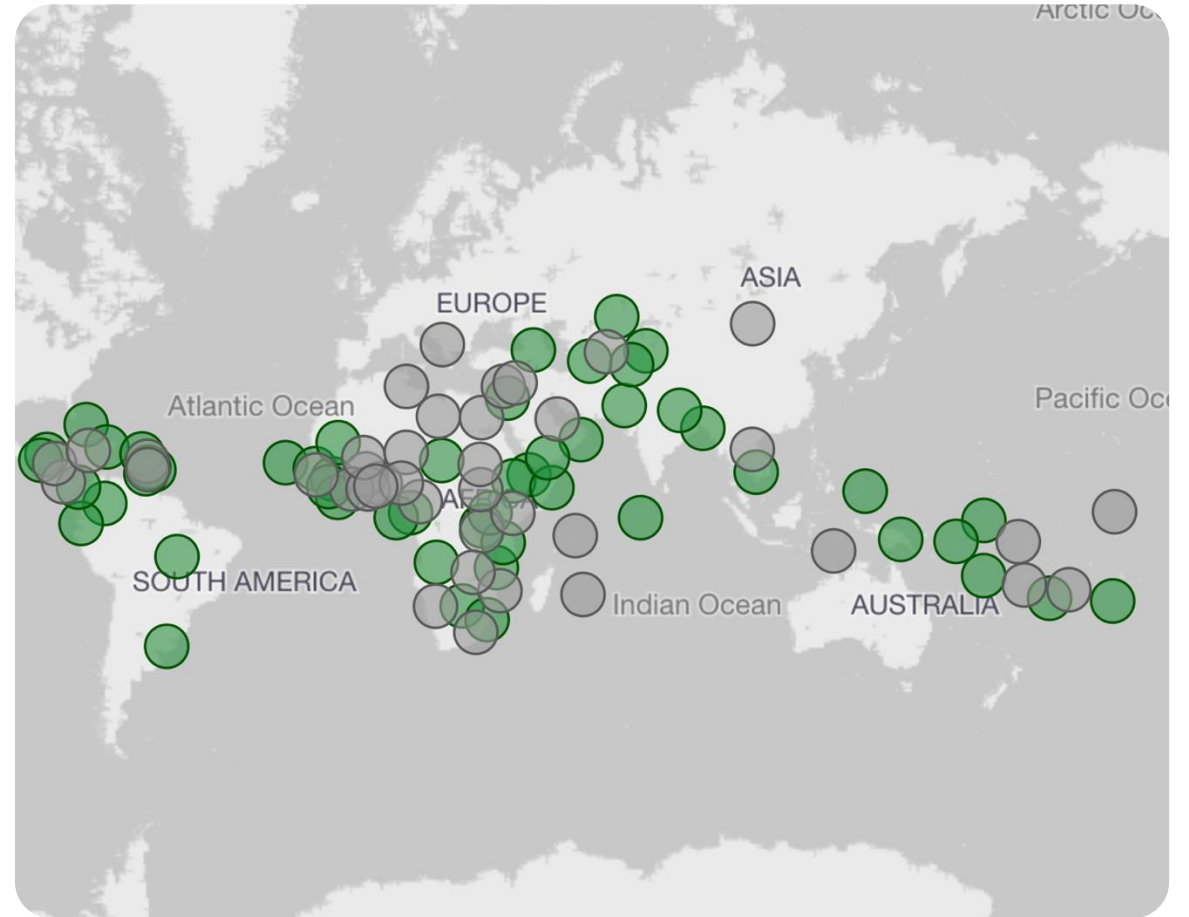
60

Liaison officers in SIDS

18

Liaison officers in LDCs

24

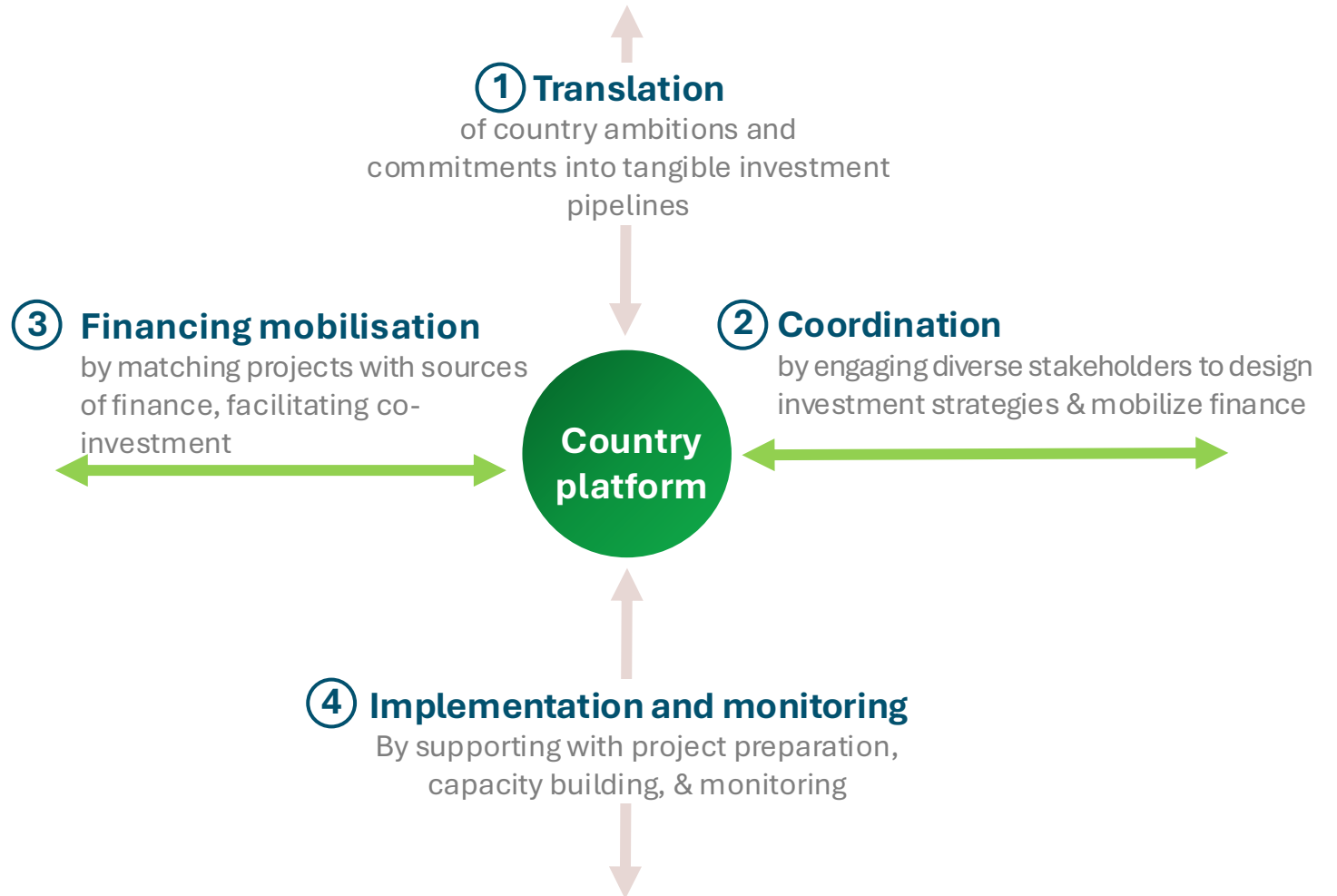


Country Platforms

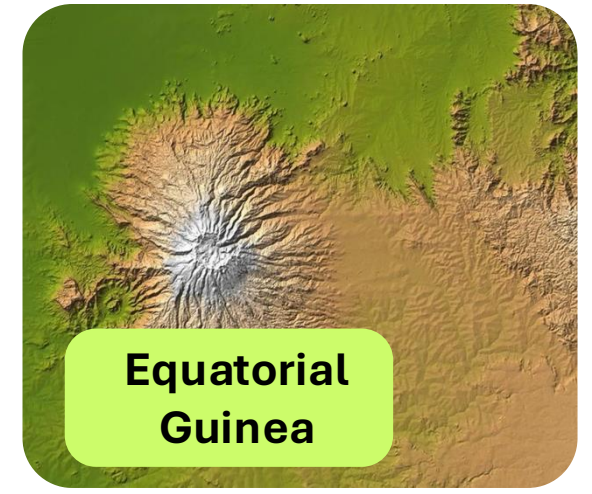
What are Country Platforms?

G20 Saudi Arabia (2020)

“Voluntary country-level mechanisms, set out by governments and designed to foster collaboration among development partners, based on a shared strategic vision and priorities”



Approved GCF Readiness support for Country Platform establishment



Approved Readiness support for Country Platform establishment



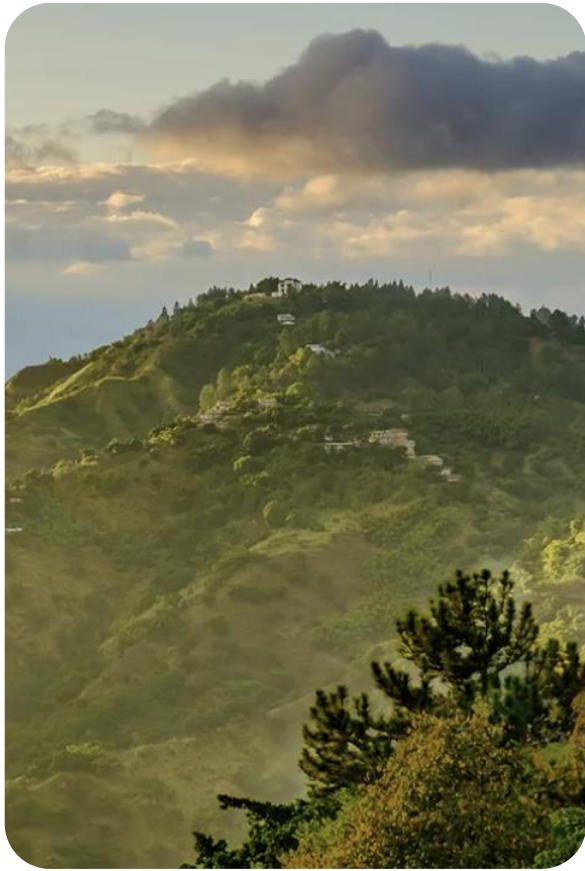
Brazil

Brazil Climate & Ecological Transformation Investment Platform

The Brazil Investment Platform (BIP) brings together projects, financiers, government institutions, and private sector stakeholders to accelerate investment in Brazil's climate transition. Established to address fragmented project pipelines, limited institutional capacity, and insufficient private sector engagement, the platform focuses on key sectors including nature-based solutions and the bioeconomy, industry and mobility, and energy.

Through GCF Readiness support, a dedicated BIP Secretariat is being established to strengthen governance, stakeholder coordination, and pipeline development, enabling the platform to mobilize climate finance at scale and support Brazil's goal of achieving net-zero emissions by 2050.

Approved Readiness support for Country Platform establishment



Jamaica

Catalyzing Climate Action by building Jamaica's NDA Capacity & Country Investment Platform

Jamaica is establishing a Country Investment Platform to strengthen coordination of climate action, mobilize climate finance, and translate national climate priorities into investment-ready projects. The platform will bring together government agencies, Direct Access Entities, development partners, private sector actors, civil society, academia, youth groups, and financiers through a structured, country-owned mechanism aligned with Jamaica's NDC, NAP, Long-Term Strategy, and updated Country Programme.

The platform will be supported by a dedicated Secretariat and will serve as a central hub for identifying, prioritizing, screening, and advancing climate investments.

Approved Readiness support for Country Platform establishment



Dominican Republic

Dominican Republic's Country Platform – Strengthening institutional capacity and developing an investment pipeline to advance the NDC and strategic climate frameworks

The initiative will enhance coordination among key stakeholders, build capacity for GCF accreditation, develop a prioritized climate investment pipeline, and improve climate finance monitoring and data systems to support NDC implementation.

Upon completion, two national financial institutions are expected to be ready for GCF accreditation and able to channel climate finance through a pipeline coordinated by the Country Platform, laying the foundation for sustained access to climate finance and scaled-up climate action.

Approved Readiness support for Country Platform establishment



Oman

Building Oman's Climate Finance Platform for Effective Institutional Coordination and Investment Mobilization

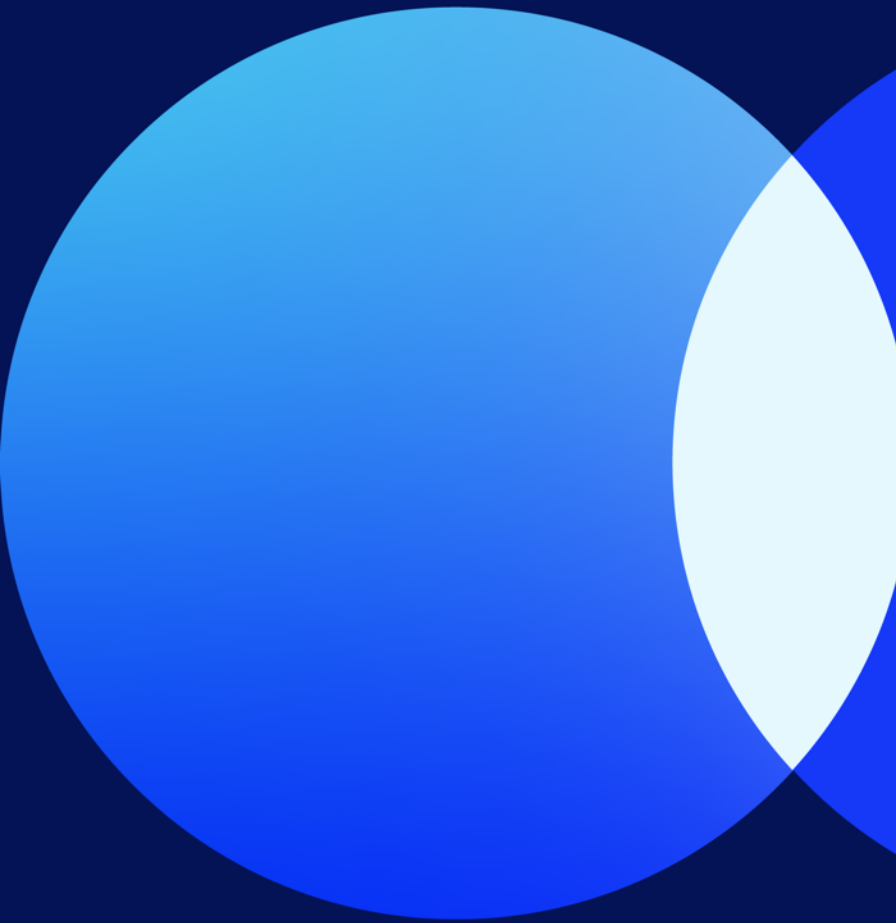
Readiness will support the establishment and operationalization of the Country Platform, anchored within the NDA and supported by a dedicated Country Platform Coordination Unit, as the central mechanism for climate finance governance, stakeholder coordination, investment pipeline development, and engagement with the GCF.

It will strengthen institutional capacity, bring together government, private sector, civil society, academia, and development partners under a common platform, and develop a Climate Investment Plan and Financing Framework aligned with Oman's NDC, NAP, Net Zero 2050 Strategy, and Vision 2040.

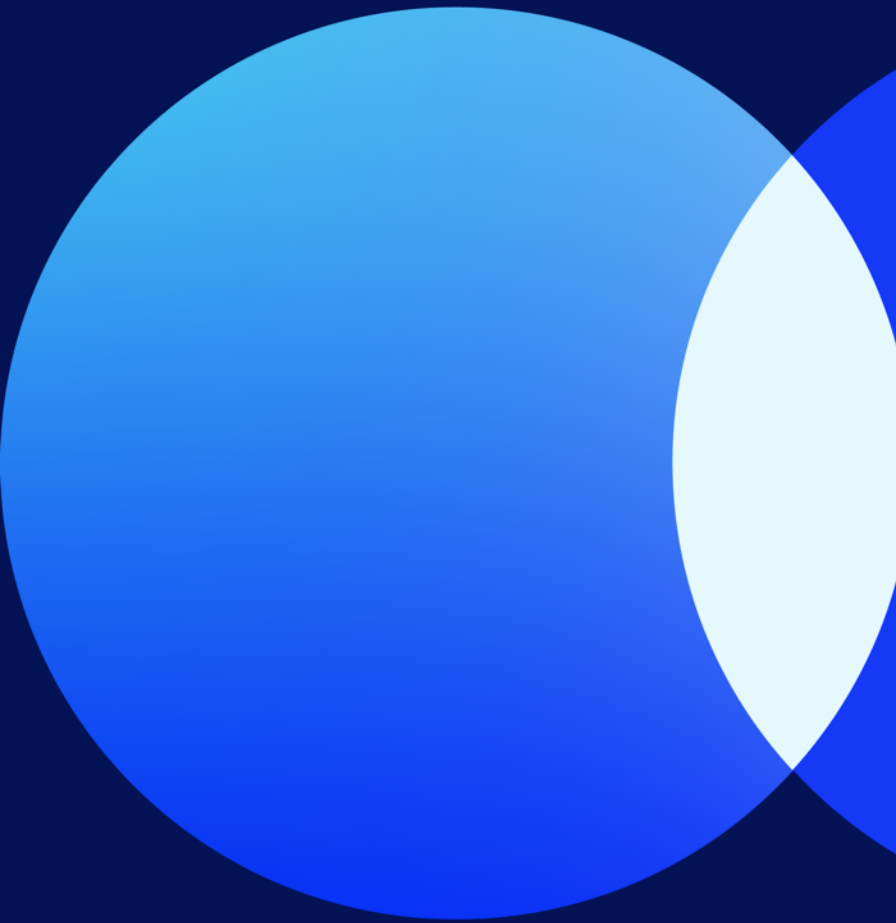


Readiness & Preparatory Support Programme

Department of Investment Services



Q&A



Coffee break (10:30~10:45)

Session 6

**Updates by
UNFCCC
Finance
Mechanism
– FRLD &
Santiago
Network**



Introduction to FRLD – Support and procedures

Zoha Shawoo
Programming Specialist, Programming and Country
Engagement, FRLD



Introduction to the Fund for responding to Loss and Damage

FRLD Secretariat

About the FRLD



Operating entity of the Financial Mechanism under the UNFCCC



Also serves the Paris Agreement



World Bank serves as interim Trustee and host of Secretariat



The Philippines serves as host of the Board

Mandate

To assist developing countries that are particularly vulnerable to the adverse effects of climate change in responding to economic and non-economic loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events



Unique features of FRLD

Only dedicated
MCF for loss and
damage

Bottom-up,
country-led and
country owned
approaches

Focus on direct
access

First MCF to offer
direct budget
support

Emphasises need
to respond to non-
economic L&D

Simplified and
streamlined
approaches

The Barbados Implementation Modalities (BIM): FRLD's start-up phase



\$342 million in grants
(\$250M + \$92M initial
starter package)



**\$5 million to \$20
million** per funding
request



**Minimum allocation
floor of 50%** for SIDS
and LDCs

Call for funding requests: Dec 15th 2025 – June 15th 2026

Overview of FRs submitted

176 Funding Requests

From **119** countries spanning Africa, Asia-Pacific, LAC and Eastern Europe

\$2.8 B

Total budget requested

\$15.9 M

Average amount requested

4.1 years

Average duration

**as of 29 June 2026*

NFP Designation: Status Update

As of 11 May 2026 — 96 of 155 eligible Non-Annex I countries have designated an FRLD National Focal Point

126

**countries have designated
an FRLD NFP**

29

**countries yet to designate
an NFP**

155

**eligible developing
countries (Non-Annex I)**

Countries without an NFP must designate one prior to submitting a funding request — send designations to nfp@fird.org

FRLD National Focal Points (Decision B.7/D.3)

The FRLD Board has adopted guidance for countries on the designation and role of FRLD focal points. Developing countries may designate a national authority or national focal point to oversee the management and implementation of activities supported by the Fund, consistent with paragraph 48 of the Governing Instrument.

WHO can be a focal point?

DESIGNATION & SELECTION

- Govt-designated entity
- Updated by the government as needed
- Mandate + capacity

CONTACT STRUCTURE

- 1 senior signatory
- ≥1 technical contact

WHAT do focal points do?

COMMUNICATION & COORDINATION

- Maintain regular communication with the FRLD Secretariat
- Retain all relevant documentation related to proposals and/or funding requests
- Ensure timely submission of required report and updates
- Consulted on funding requests through any access modalities, including in para 49 of GI

ACCESS TO THE FUND

- Sign + submit proposals
- Consulted on all requests

Focal point designations and updates can be sent to: nfp@frld.org

**Guidance for FRLD focal points is available here: <https://www.frld.org/nodefocal-points>*

Frequently Asked Questions: NFPs

Can a country submit a funding request without an NFP?

No. All countries must nominate an FRLD NFP **prior to submitting** a funding request, even if not yet designated.

Is an existing UNFCCC focal point required?

No. Countries should nominate an FRLD-specific focal point. It can be the same person as the UNFCCC or GCF focal point, but this is not required.

Can the NFP be from a national access entity?

Yes, considered case-by-case. However, the NFP must be **firewalled** from the access entity responsible for conducting oversight functions.

Is there an endorsement letter template?

Yes. A template for the NFP endorsement letter is available on the [FRLD website](#). The senior signatory official signs the funding request; the technical focal point liaises with the Secretariat throughout the process.

Funding Criteria

Eligible activities for funding

Activities responding to economic and non-economic loss and damage

Activities focused on priority gaps

Funding criteria



Bottom-up, country-led and country-owned approaches

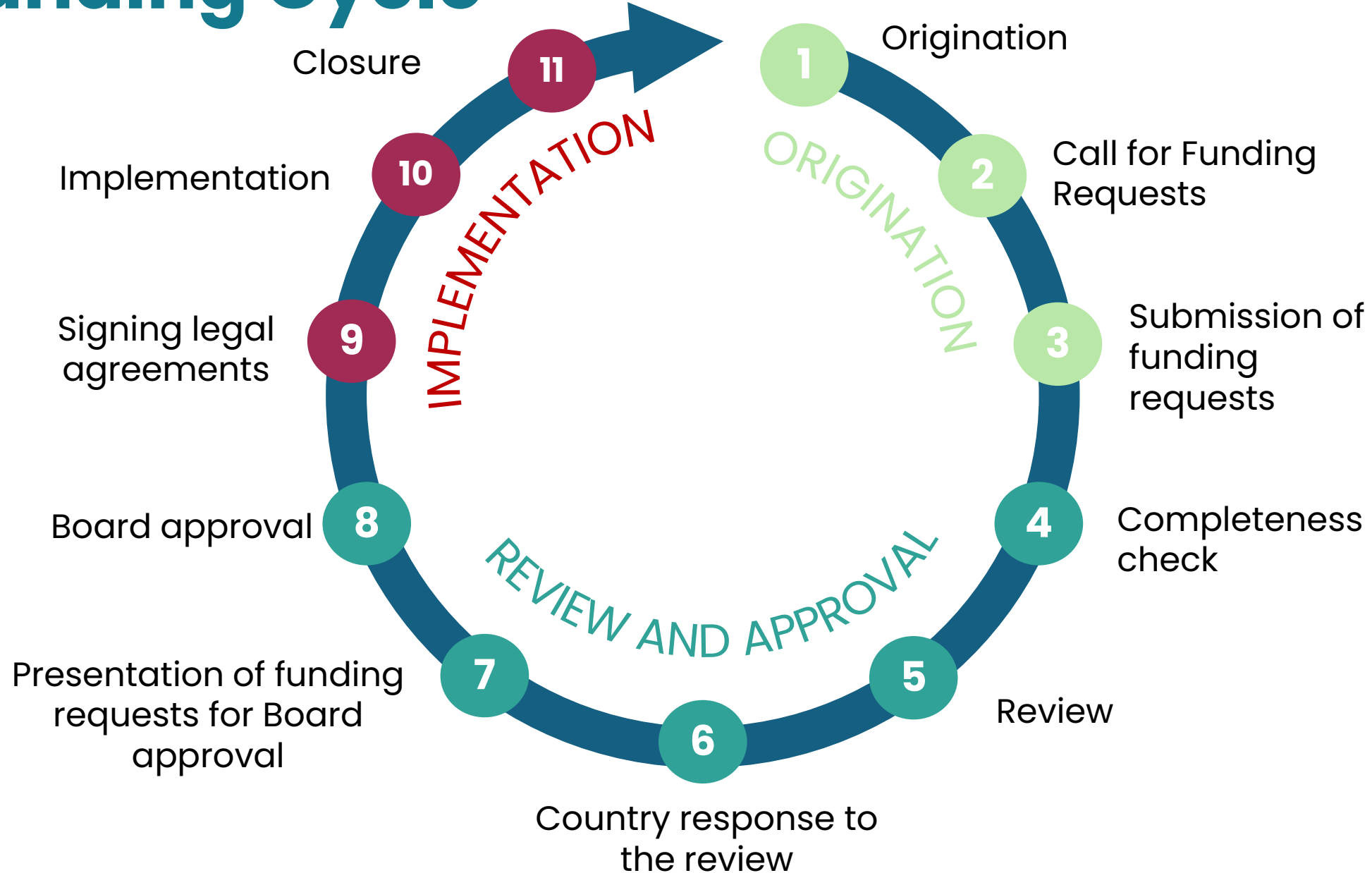


Expected results and impacts for responding to L&D



Complementarity and coherence at the national level

Funding Cycle



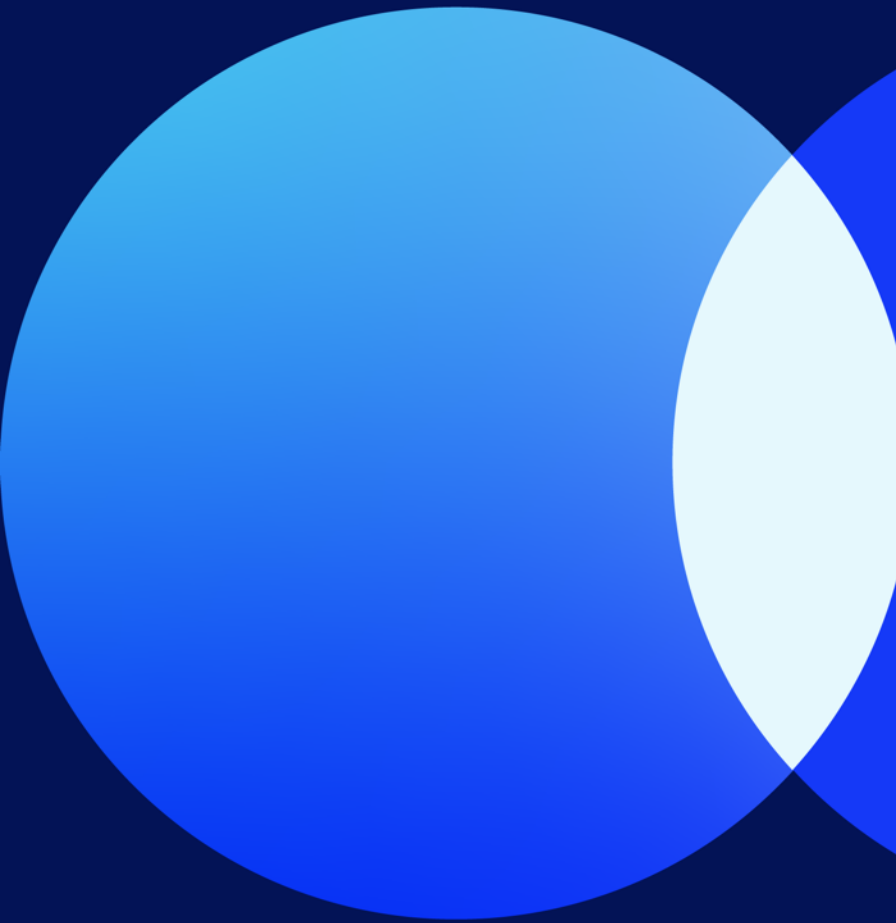
Access Modalities

Direct access via direct budget support:

- 1. Through national governments**
(relevant modalities and risk management framework now adopted and operational post-B.8)
- 2. In partnership with MDBs accredited to the AF, GEF, and GCF**
and which have been granted access to the funds.

Access in partnership with entities accredited to the Adaptation Fund, Global Environment Facility, and Green Climate Fund

The full list of entities accredited to the AF, GEF, and GCF is available here:
<https://www.frlid.org/nodebimaccess>



Introduction to Santiago Network – Support and procedures

Nazgul Borkosheva
Regional Coordinator for Asia-Pacific, Santiago Network
Secretariat



Building a world where developing countries and communities shape and drive inclusive action on loss and damage.

Santiago Network

15 September 2026



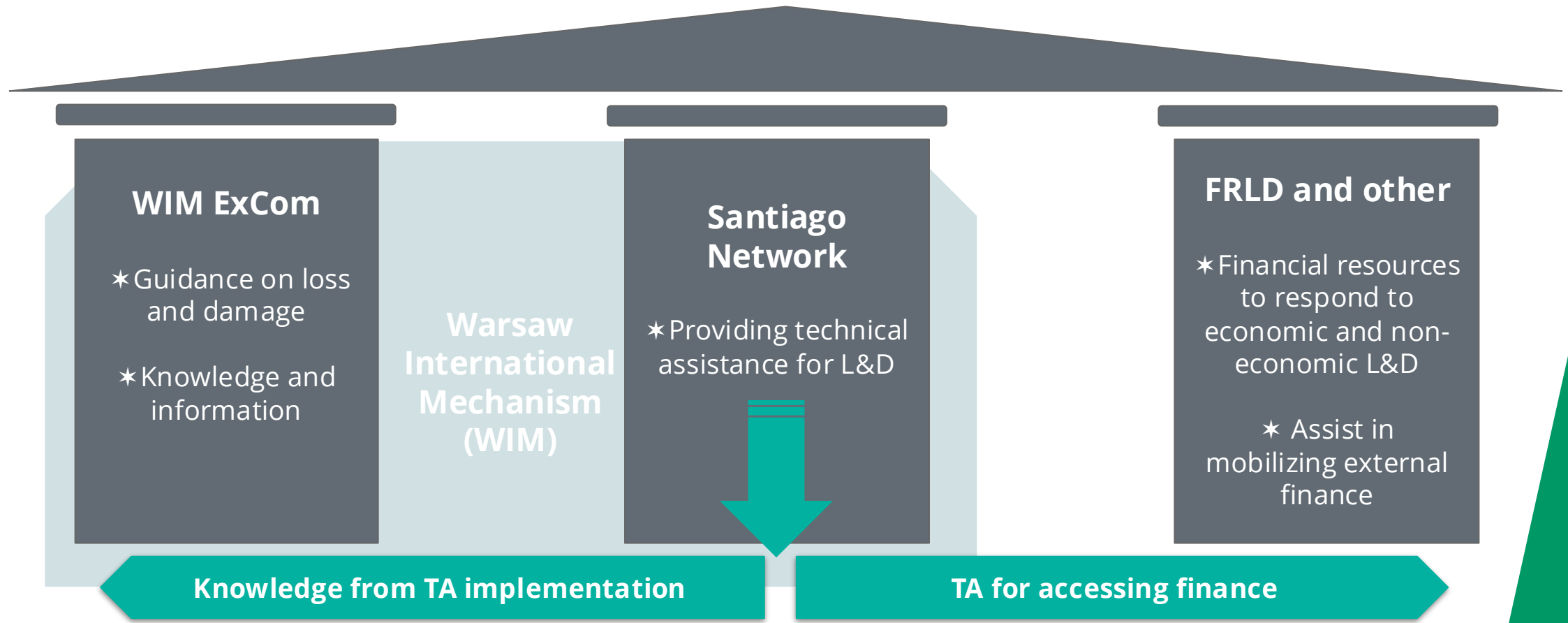
OUR MANDATE

Catalyzing technical assistance from organizations, bodies, networks and experts, in developing countries and vulnerable communities for **averting, minimizing, and addressing loss and damage** associated with the adverse effects of climate change.

OUR VISION

Building a world where developing countries and communities shape and drive inclusive action on loss and damage

Santiago Network



Progress

- ❖ Delivered the first technical assistance in Vanuatu, 3 more in implementation including Kenya, Cook Islands and Yemen.
- ❖ Expanding a pipeline of approximately 40 requests for technical assistance. 16 of these are currently active.
- ❖ Adopting the Santiago Network Strategic Framework 2026–2028, providing a clear vision for the years ahead.
- ❖ Growing the Network's membership to nearly 400 institutions, organizations, networks and experts from around the world.
- ❖ Establishment of regional presence, bringing expertise closer to the countries and communities the Network serves.
- ❖ More than 60 nominated National Liaisons to the Santiago Network.



Membership composition

MEMBERS

371

ORGANIZATIONS

268

BODIES

5

NETWORKS

13

EXPERTS

85

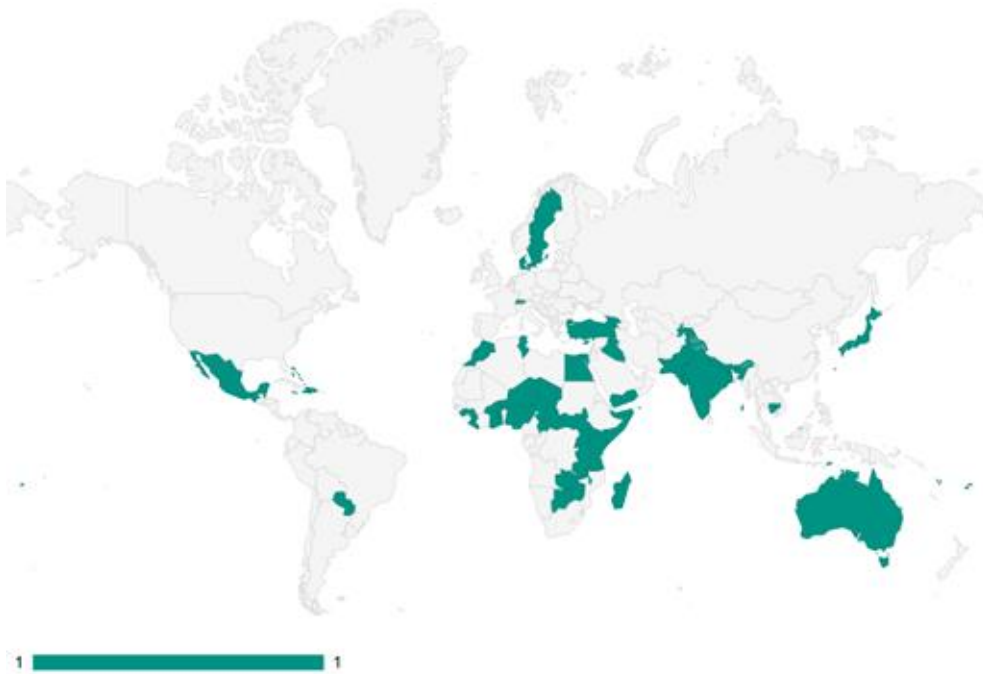
Growth since 2025

- **Members are diverse** and cover a wide range of topics related to averting, minimising and addressing loss and damage
- **Membership is inclusive** covering, among others, women-led, indigenous-led, and youth-focused OBNEs

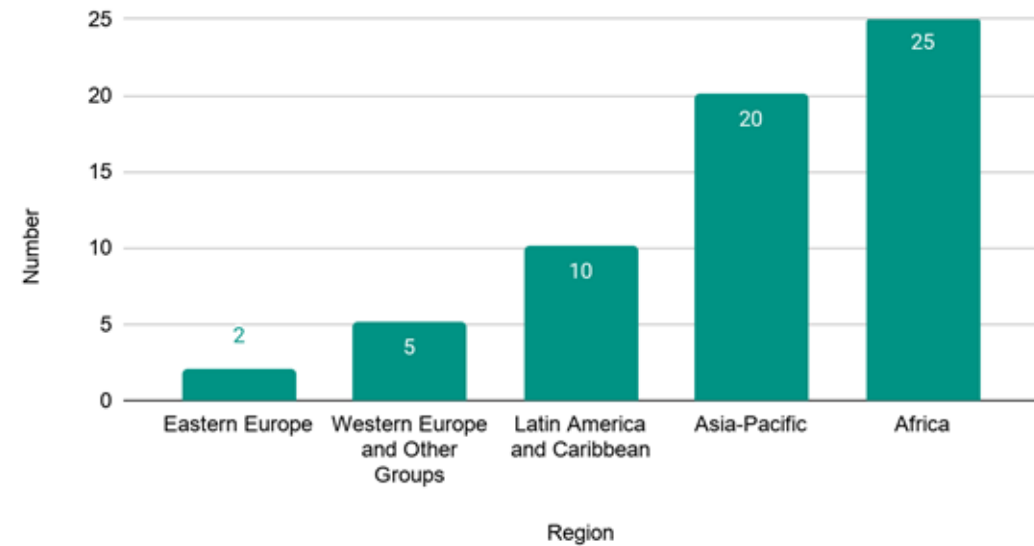


National Liaisons

Nominated by UNFCCC National Focal Points.



Countries with National Liaisons nominated: by region



Role of National Liaisons

National Liaisons to the Santiago network Secretariat play an important role in ensuring that technical assistance provided through the network aligns with national priorities.

Countries can nominate national liaisons through their UNFCCC focal point

Until a nomination is received, the UNFCCC national focal point acts as the Liaison

Act as a bridge between their country and the Santiago Network

Coordinate national stakeholders in request development

Provide input to the Santiago Network during the grant making process

Provide guidance during technical assistance implementation

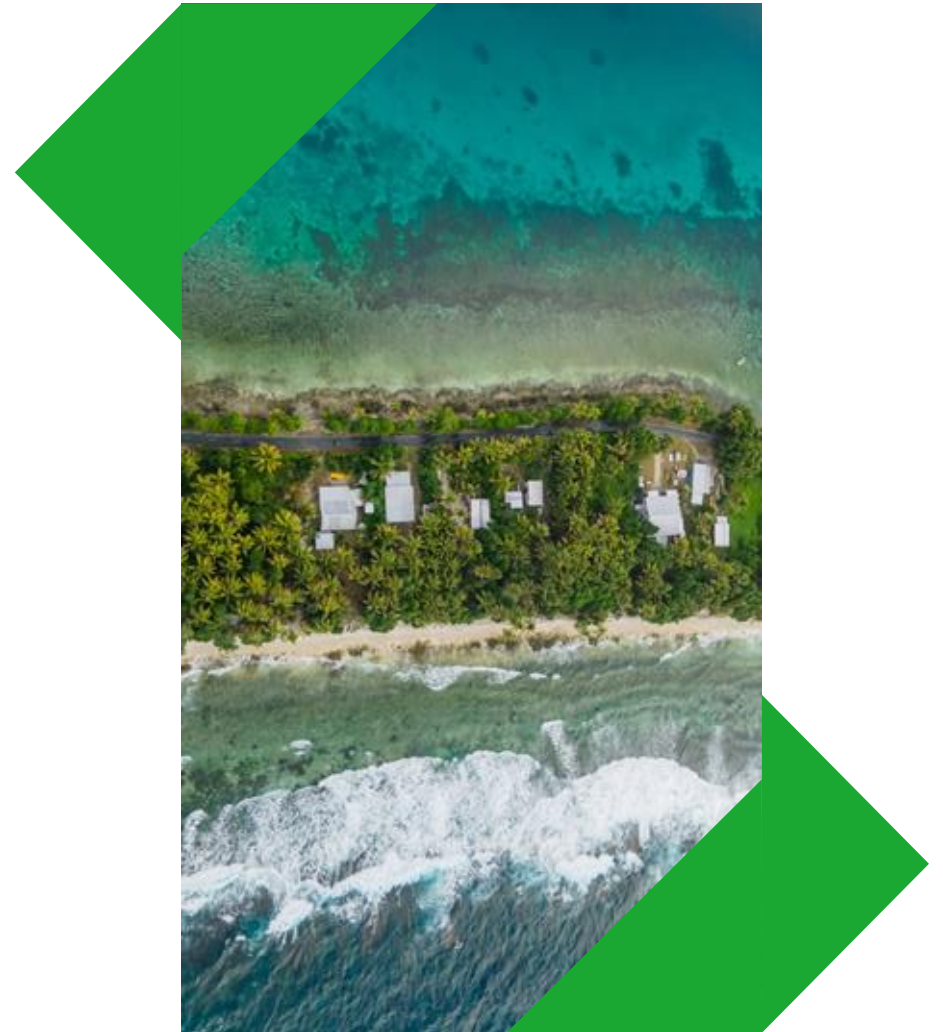
TECHNICAL ASSISTANCE

The Santiago Network will provide technical assistance in a demand-driven manner through an inclusive and country-driven process, taking into account the needs of vulnerable people, Indigenous Peoples and local communities.

Who can make technical assistance requests?

Requests may be prepared by the following and submitted according to the process determined by each country:

- Government/public institutions (including national, regional, sub-national and local governments)
- Non-governmental organizations
- Civil society organizations (including local communities, women's, children and youth, and Indigenous Peoples)
- Others



Credit: Bianca Vitale

ELIGIBILITY CRITERIA

1

Received from within a developing country

Related to averting, minimizing and addressing loss and damage associated with the adverse effects of climate change

For initiatives at the local, national and/or regional levels

Describes how the technical assistance aligns with and/or contributes to national/ regional/ local policies, strategies or plans on loss and damage

ELIGIBILITY OF REQUEST

2

Clear rationale and identified regional, national or local gap

Clearly describes how it was developed through an inclusive and country-driven process

Explanation if the request is urgent and requires immediate action and attention

DEMONSTRATED NEED

3

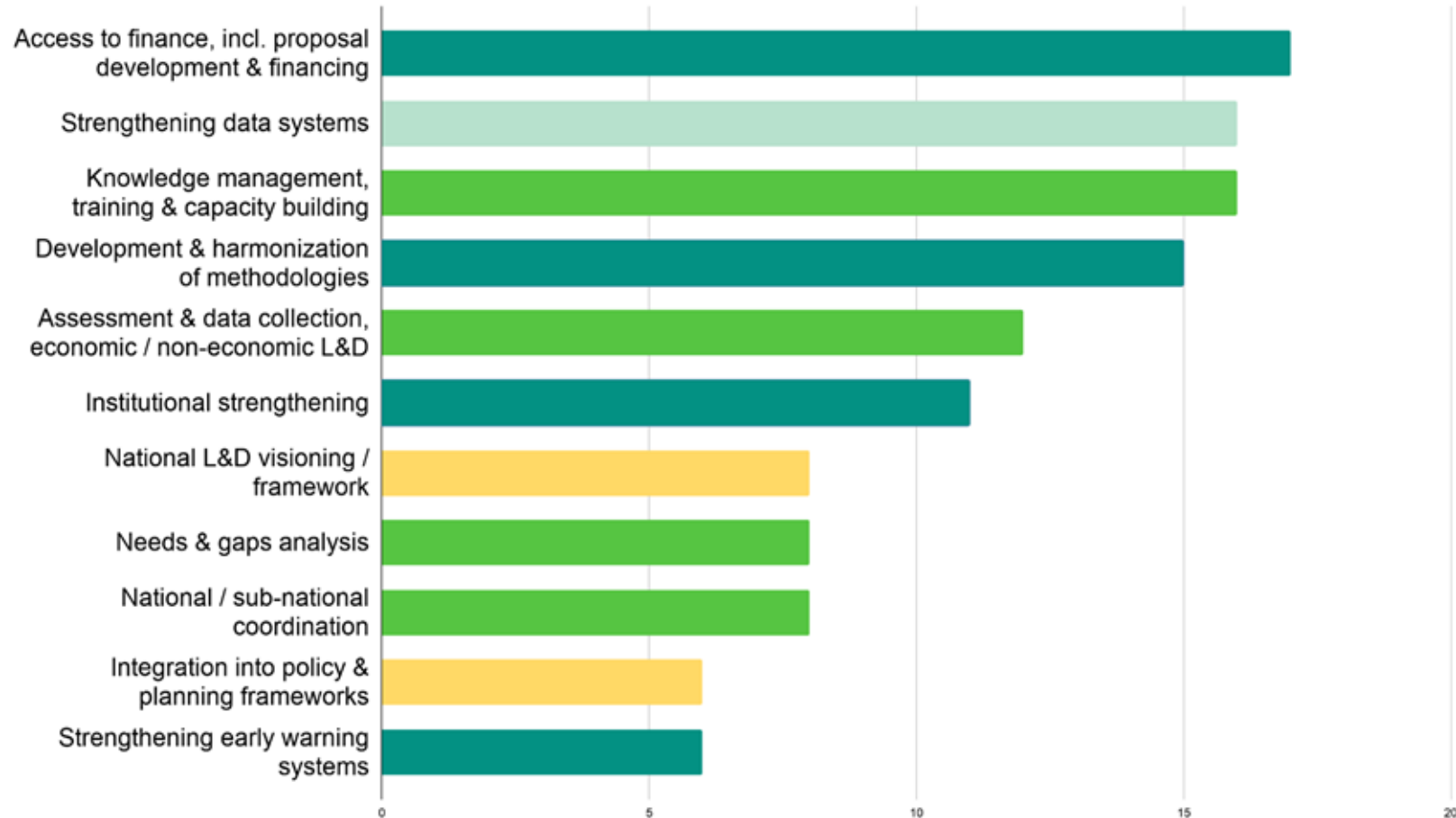
Directed to communities particularly vulnerable to the adverse effects of climate change

Promotes development and retention of capacities in country as well as long-term sustainability or multiplier impact of the technical assistance

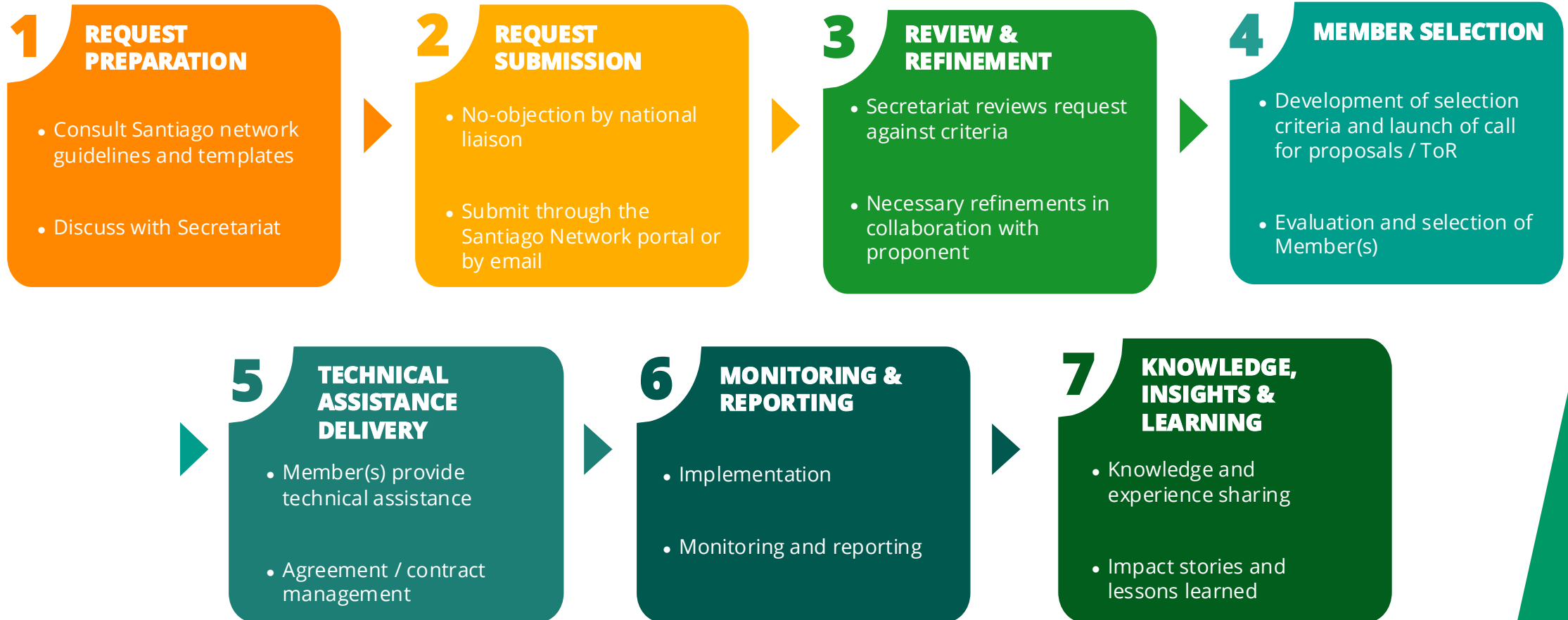
PRIORITIZATION

Santiago Network Secretariat will ensure the consideration of the **inclusive, balanced** and **equitable nature of the technical assistance** catalyzed across all regions

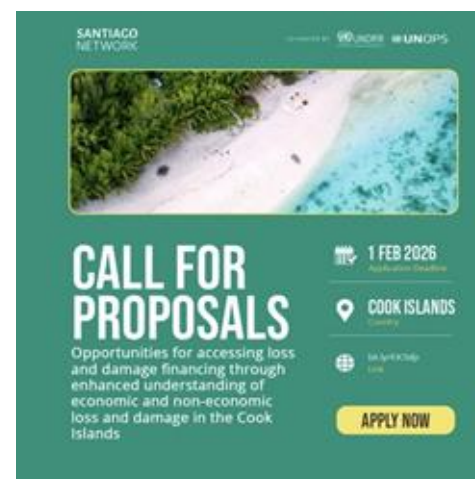
TYPES OF TECHNICAL ASSISTANCE



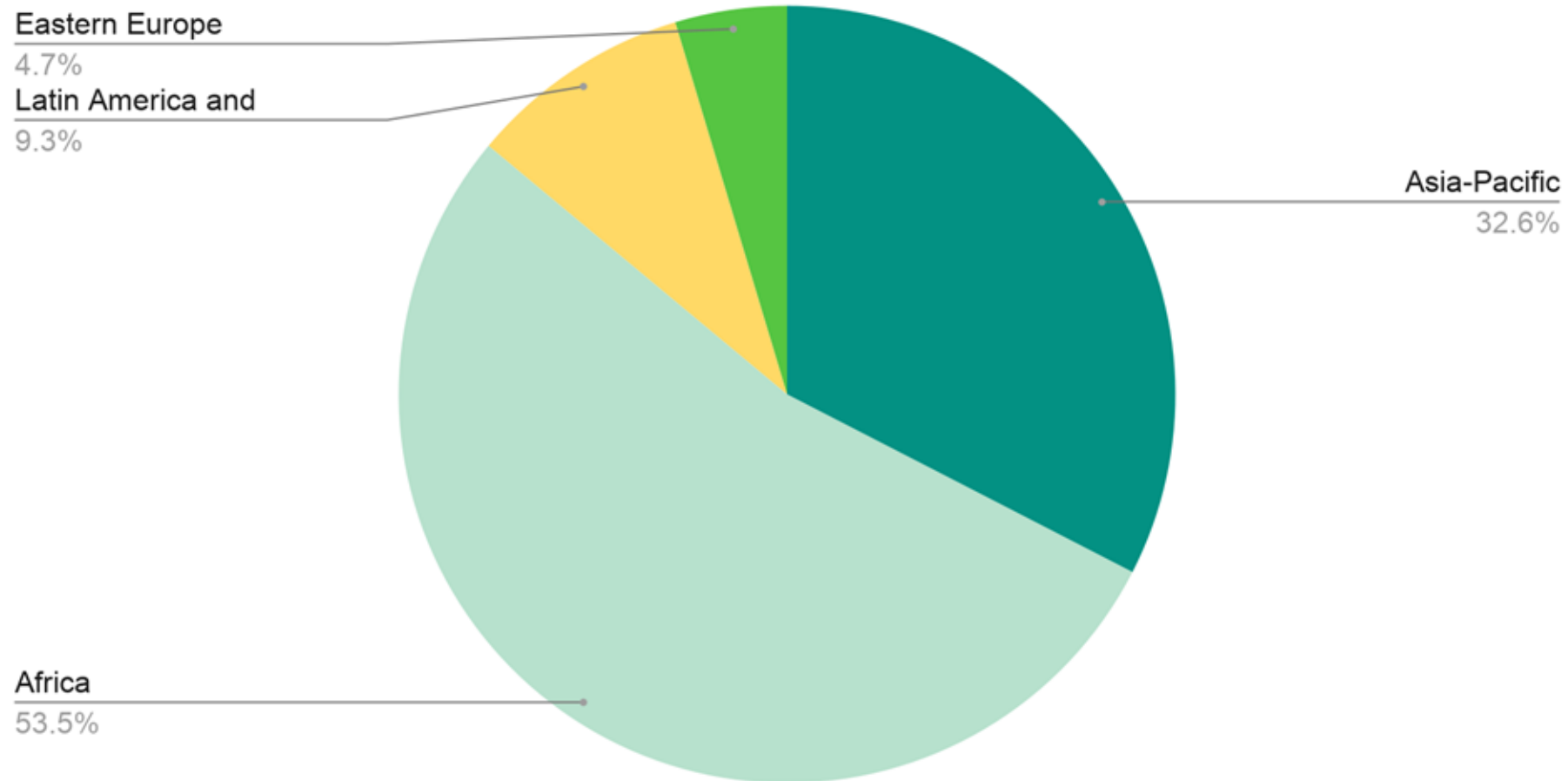
Technical Assistance Life Cycle



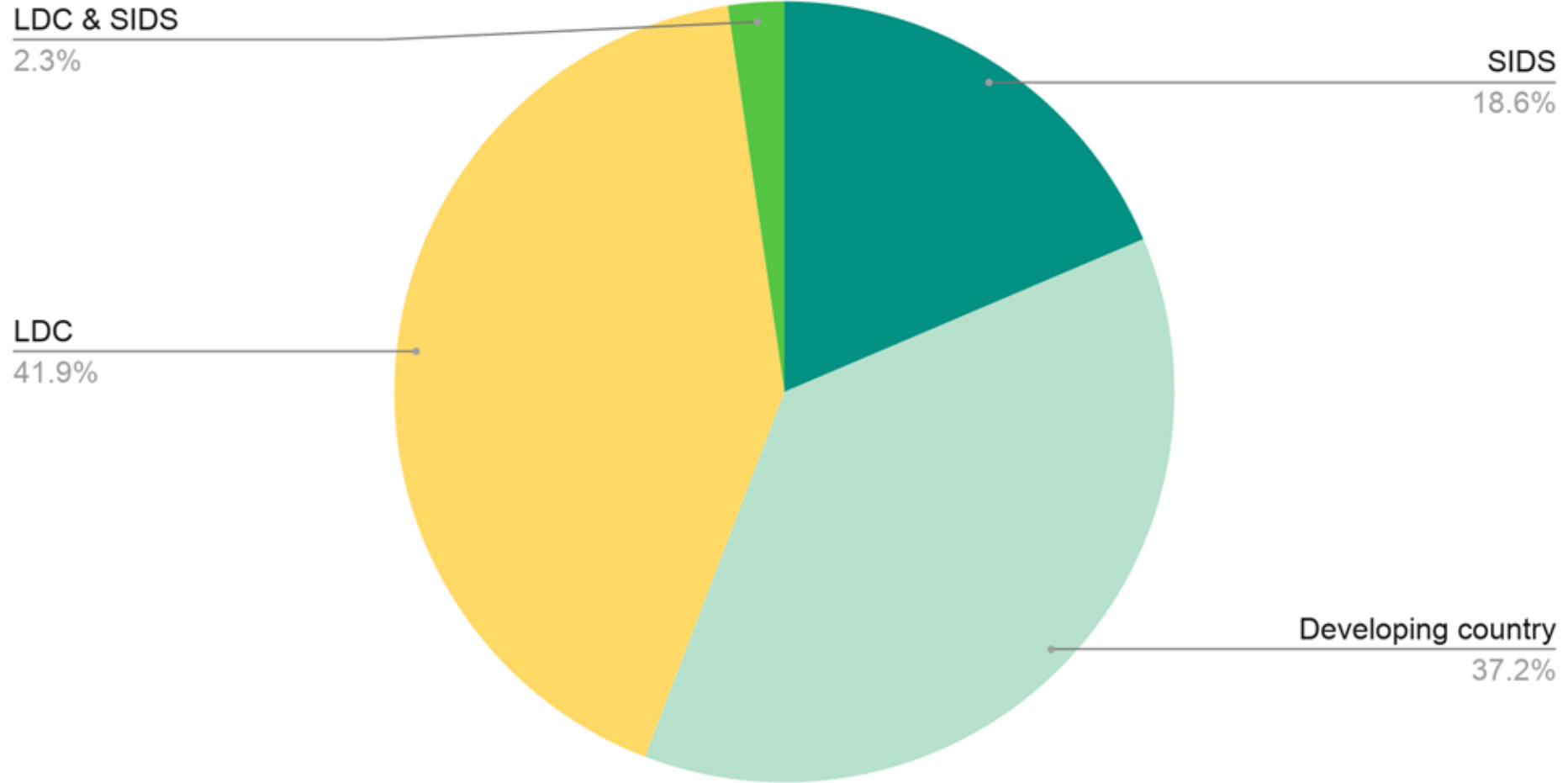
Technical Assistance at a glance (SIDS)



Regional technical assistance trends



Regional technical assistance trends



Regional workshops for SIDS and LDCs

SIDS and LDC workshop in the Pacific, 2024



SIMPLIFIED FUNDING OPPORTUNITY FOR COMMUNITIES



ENABLING TECHNICAL ASSISTANCE FROM AND FOR COMMUNITIES FACING LOSS AND DAMAGE ASSOCIATED WITH CLIMATE CHANGE



ABOUT THE SANTIAGO NETWORK

The Santiago Network connects communities in developing countries with timely, tailored, and demand-driven technical assistance, knowledge, and support, enabling them to avert, minimize and address loss and damage associated with the adverse effects of climate change, such as floods, droughts, heatwaves, crop losses, water shortages, and damage to homes and livelihoods.

SIMPLIFIED FUNDING OPPORTUNITY FOR COMMUNITIES

The vision of the Santiago Network is to build a world where communities in developing countries shape and drive inclusive action on loss and damage. By placing communities at the centre of this action, the Network ensures that technical assistance responds to real needs on the ground and supports locally driven solutions.

To advance this vision, the Santiago Network has established a simplified funding opportunity of up to **US\$50,000**, enabling communities to initiate and access technical assistance in ways that strengthen local leadership and deliver effective, equitable, and sustainable benefits. The standard technical assistance modality remains available for accessing broader resources.

This support enables technical assistance to emerge:

- From communities: as knowledge holders and implementers
- For communities: as beneficiaries recipients addressing urgent and long-term climate impacts
- By communities: as leaders designing, managing, and steering the work
- With communities: through participatory, inclusive, and collaborative processes

TYPES OF TECHNICAL ASSISTANCE TO REQUEST

Technical assistance examples include, but are not limited to, the following:

- Loss and damage assessments, including for non-economic losses
- Early warning and preparedness information
- Relocation and safe settlement planning
- Training and capacity building

HOW TO ACCESS?

EASY ACCESS, SIMPLE APPLICATION, END-TO-END SUPPORT

- 1 Identify your community's needs on loss and damage from climate change
- 2 Contact the Santiago Network Secretariat or your National Liaison
- 3 Receive support to develop a request
- 4 A member is identified to respond to your needs
- 5 Technical assistance delivered

WHO CAN REQUEST SUPPORT?

- Community-based organizations, groups, and networks, including those working with Indigenous Peoples, women, youth, and vulnerable groups
- Local experts and practitioners
- Local institutions working directly with communities



Download the [technical assistance request form](#).



Building a world where developing countries and communities shape and drive inclusive action on loss and damage

secretariat@santiago-network.org
www.santiago-network.org



Building a world where developing countries and communities shape and drive inclusive action on loss and damage.

THANK YOU

Follow us for more updates!



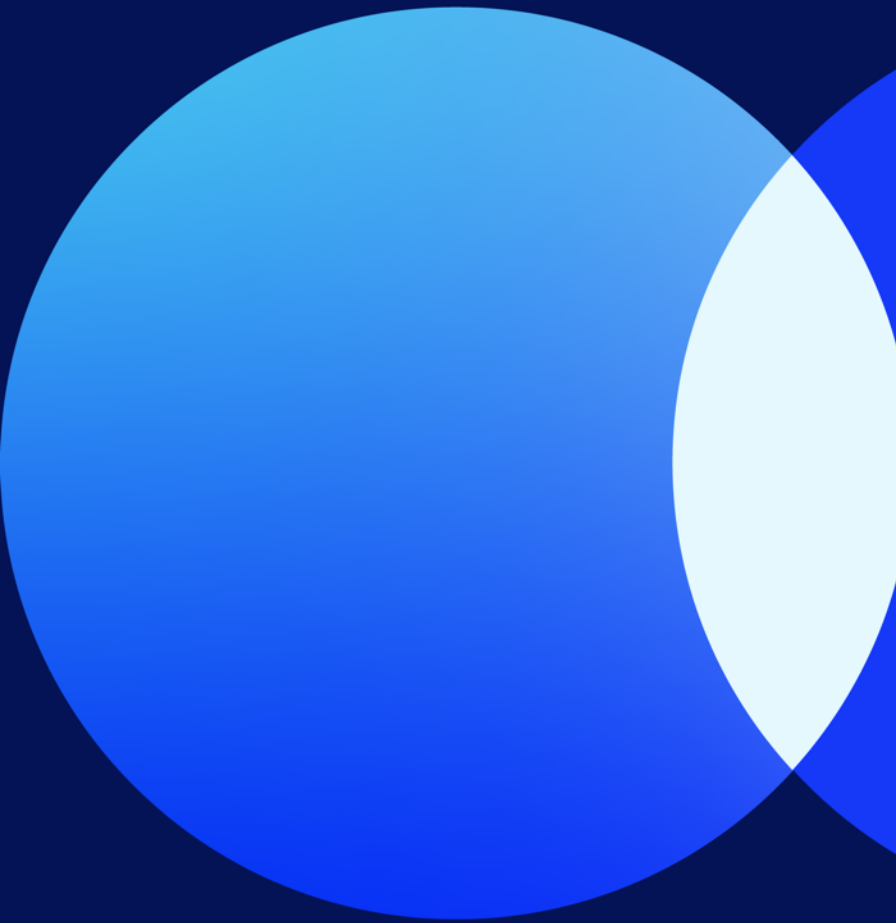
www.santiago-network.org



[/company/santiago-network](https://www.linkedin.com/company/santiago-network)



secretariat@santiago-network.org



Q&A

G-Tower

Where to eat?

 Follow the route

Click name for
Google Maps

Gobok Shabu Shabu (2F)
(Korean)

Cafe Comma &
Yann Couvreur
(Cafe & bakery/Vegetarian)

Sushi Ra
(Japanese sushi,
closed Mondays)

Mattarello
(Italian/Vegetarian,
closed Mondays)

Elbed-el
(Chinese, dimsum,
closed Mondays)

Impasto
(Western/italian)

Osuog
(Korean, closed Mondays)

For a full list of nearby
eateries,
Follow this link:
<https://bit.ly/45LLaVA>

Karez
(Japanese-style curry,
closed Mondays)

Nice Time
(Italian/Vegetarian)

Danbaku Ramen
(Japanese)

Cafe Tree (1F)
(Cafe/snacks)

Sandria
(Sandwiches/Vegetarian)

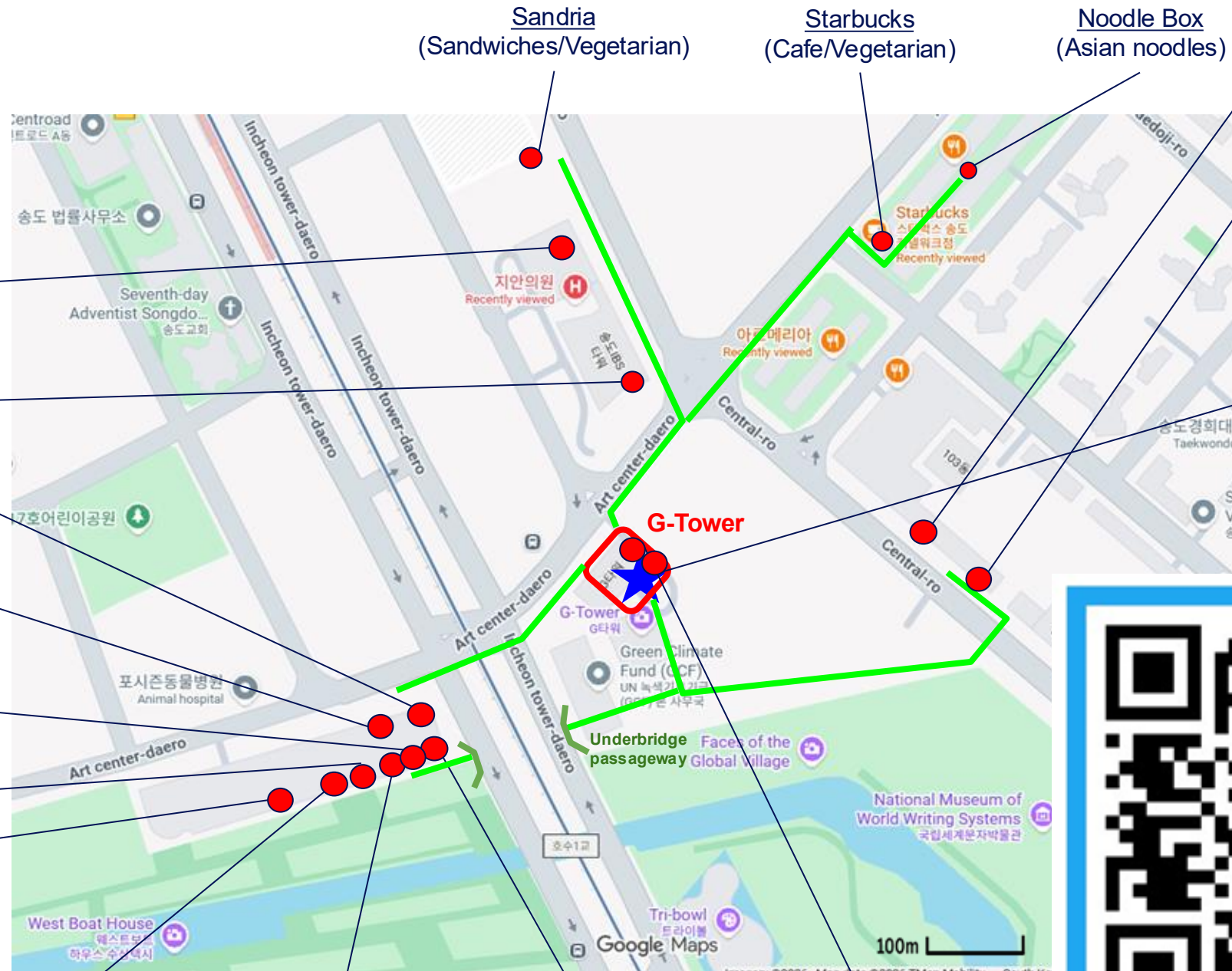
Starbucks
(Cafe/Vegetarian)

Noodle Box
(Asian noodles)

Oozy Coffee
(Cafe/snacks/Veg
etarian)

Lounge 25
(Cafe &
pizza/Vegetarian)

Haegin (2F)
Inside G-Tower
(Coffee & Bistro)
Quick lunch options:
Sandwiches
Mealboxes
Soup
Salad
Poke



Capacity Building on AI for Adaptive Management in the Energy Sector

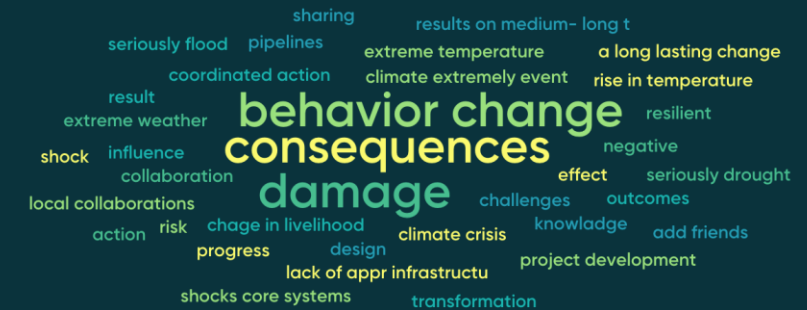
Jeawon Kim
CTCN Secretariat



Why Are We Here today

- Climate challenges are increasingly interconnected
- Solutions require coordination across sectors, institutions, and technologies
- Energy transformation offers opportunities for integrated climate action
- 1.5-day programme focuses on practical learning, peer exchange, and identifying opportunities for implementation

What is an impact to you?



Why do we need an impact?

To ensure resilience

Better understanding the situation
so it helps with a better planning

To measure success of a project

Measurement the action

Transformational change

For better future and for my
daughter

To enhance our resilience and to be
able to adapt

Sustainability

To overcome the Loss and damage

In order to support climatic goals

For more resilient environment

Purpose and Justification
Sustainability and Relevance Decent
life to all No one left behind

To better the lives of global citizens
in the long run

To create desirable change and to
build resilience to change

Mentimeter.com

Code 8416 2796

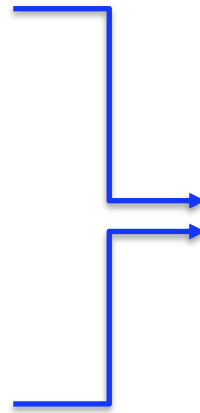


Common Challenges

- Climate risks
- Resource pressures
- Coordination gaps
- Competing priorities

Opportunities

- Stronger resilience
- Better resource efficiency
- Cross-sector benefits
- More impactful investments
- Scalable solutions



Role of NDEs

- Connecting sectors and institutions
- Leading integrated technology planning
- Identifying technical assistance opportunities
- Strengthening regional action

Key Insights from SIDS NDCs and Technology Priorities

- **Energy efficiency** as a tool to strengthen endogenous capacity development on water and coastal resilience
- Strong demand for **capacity building** that:
 - Enhances the application of AI-related technologies
 - Reduces fragmentation application and duplicated projects
- Emphasis on readiness for transformational adaptation capabilities – managing climate risks rather than improvements alone

Group's Priority Technologies

Energy

- off-grid electrification
- battery electric vehicles

Overall Regional Trend

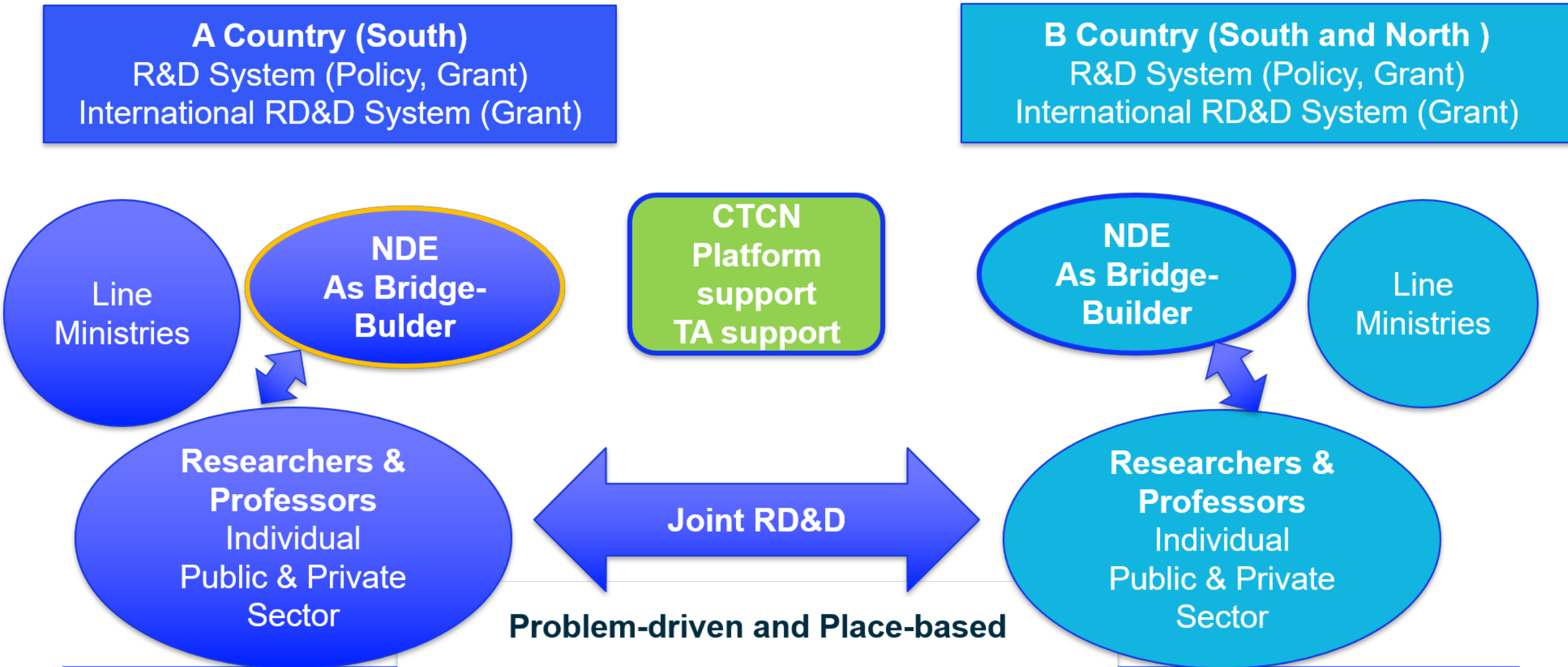
- Increasing readiness for **system transformation through integration**
- Strong relevance to link production, energy, and planning systems rather than being deployed in isolation



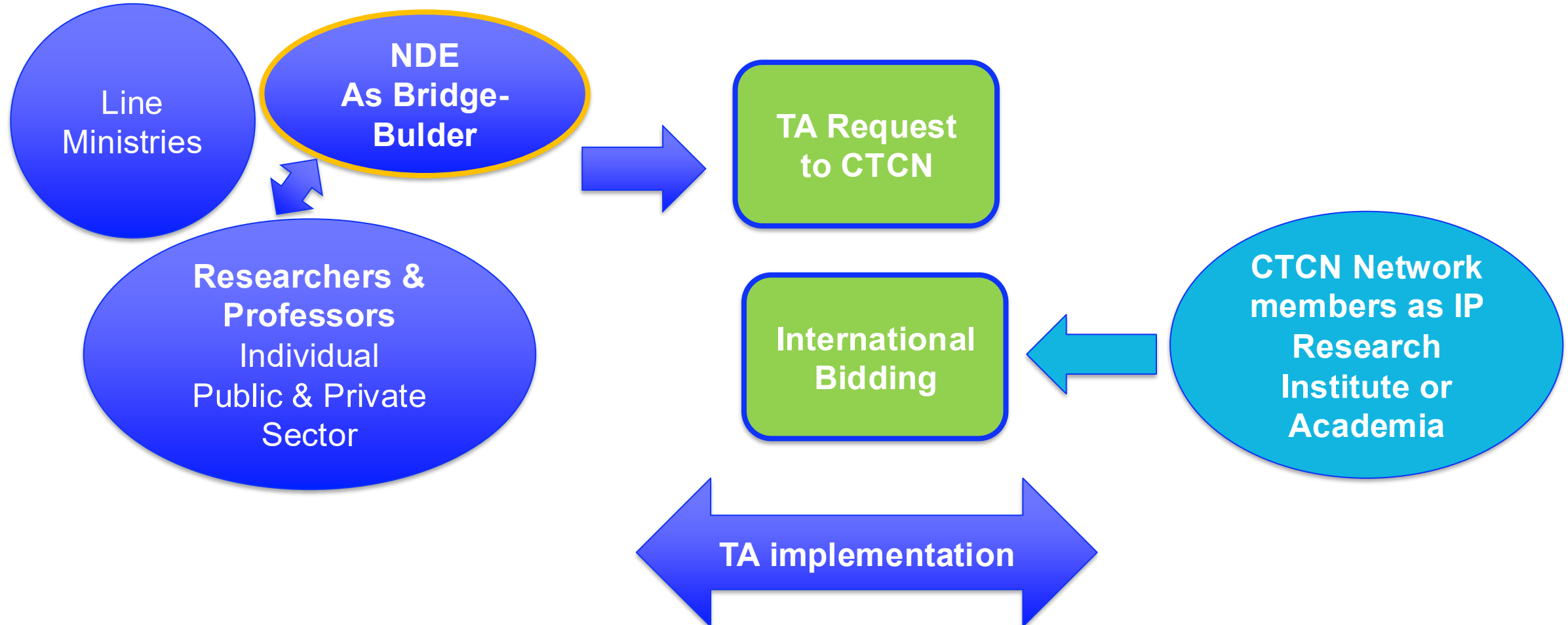
Collaborative Research, Development, and Demonstration for Adaptive management - Support and Procedure

Suil Kang, Coordination Officer

Collaborative (approaches in) RD&D Concept



Collaborative (approaches in) RD&D Supporting Modality





2026 Activities

Global Learning Visit on Green Hydrogen Production and Fuel Cell

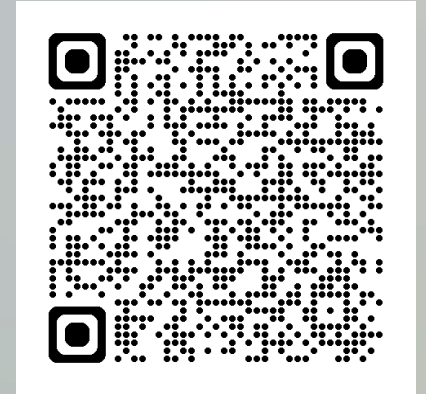
14-16 July 2026, Seoul and Daejeon, Republic of Korea

Ten participants: Indonesia (AP), Egypt, Kenya, Namibia and South Africa (Africa), Brazil, Chile, and Paraguay (LAC)

Partners: KIST (Science and Technology), KRICT (Chemical Research) and KIER (Energy Research)

Outputs: submission of five concept notes for CTCN TA request proposals (Indonesia, Namibia, South Africa, Brazil, and Chile)

- Expected actions: submission of TA request proposals by NDEs



Event information



Global Energy Storage Workshop and Learning Visit

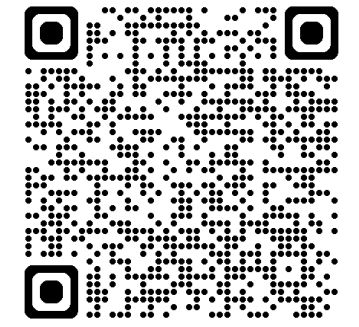
1-4 September 2026, Jeju, Republic of Korea

Participants: 23 NDEs and energy experts from 12 countries, Kyrgyzstan (Asia), Chad, Cote d'Ivoire, Gambia, Lesotho, Liberia, Somalia, Tanzania (Africa), Fiji, Haiti, Papua New Guinea, St Kitts and Nevis (SIDS)

Co-hosts: KIER Jeju Global Research Centre and UNITAR CIFAL (Jeju International Training Centre)

Outputs:

- Recording presentation by Climate Future Architects for TEC on Draft Policy Brief on ES
- Preparation of key components of CTCN TA request proposals
 - Expected actions: submission of TA request proposals by NDEs



Event information



News on homepage

Facilitating ideation of demand-driven and scalable cRD&D project

CTC Network member with high capacity and UN-agency specialized on training

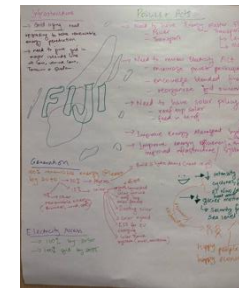
Day 1 NSI and Country Status

Example of NSI and country status on energy policies, projects shared among NDEs and experts



Day 3 Public financing

GCF presentation on USP2 and financing architecture. Ideation of climate-narrative-led energy (ESS) project facilitated.



Follow up

Expect to receive locally-led ESS/energy TA project proposals with cRD&D activities (knowledge exchange) included.



Day 2 Technology

Deep dive into blue battery and microgrid building blocks (MBB) accompanied with two field visits: BESS and Carbon Free Island centre



Day 4 Private and philanthropic financing

Innovation funds and facilities and related grading system covered. University-led technology incubation programme introduced.

Field visit to local heritage to remind locally-led policy, technology, and financing.

Maturation of project ideas with angle of **measurability, scalability, and additionality** facilitated.

23 certificate of completion issued.



Collection of global cRD&D information and data on global collaborative RD&D groups

Objective: to collect information and construct data on global collaborative RD&D research groups in 5 system transformation including academic societies and research associations through NDEs' contribution and then to disseminate and share them with the relevant stakeholders to promote global cRD&D activities

Progress: Initial dialogue with Research and Independent Non-Governmental Organizations (RINGO) focal point

Potential follow-up actions in 2026 and 2027

- Preparation of scope and work plan
- Collection of information and construction of data
- Potential integration onto CTCN Web page and dissemination

3

Piloting cRD&D TA Projects

Collaborative RD&D: Technical Assistance Projects

1. CTCN TA support for pre-feasibility for small-scale demonstration:

1-1. Papua New Guinea: Pre-feasibility study on ocean energy focusing on salinity gradient energy technology and electrochemical ocean thermal energy conversion

Implementing partner: Korea Institute of Energy Research (KIER)	Duration: Sep. 2024 – May 2026	Budget: USD 246,500
---	--------------------------------	---------------------

Objective: to conduct a pre-feasibility study on ocean energy, specifically focusing on **Salinity Gradient Energy Technology** and **e-OTEC**, including **Blue Battery** (water-based ESS) Technology.

Emerging outcomes

- Under the planning stage with the National Institute of Green Technology (NIGT) for the scale-up project grant through ROK MSIT's climate technology demonstration program (CTDP) in 2027 as a potential candidate
- Under consideration for the feasibility study on scale-up (Oct. 2026 – Feb. 2027)



Collaborative RD&D: Technical Assistance Projects

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- Under consideration for the feasibility study on scale-up (Oct. 2026 – Feb. 2027)



Collaborative RD&D: Technical Assistance Projects

1. CTCN TA support for pre-feasibility for small-scale demonstration:

1-2. Uzbekistan: Pre-feasibility study for groundwater desalination and resource recovery in Uzbekistan

Implementing partner: Korea Institute of Industrial Technology (KITECH)	Duration: Sep. 2024 – Nov. 2026	Budget: USD 249,914
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Objective: Contribute to addressing water scarcity and strengthen Uzbekistan’s capacity for efficient resource utilization through the design of a pilot system and feasibility assessment based on groundwater desalination and resource recovery technologies.

Progress to date:

- Deliverable 1: Report of applicable desalination and resource recovery technology in Uzbekistan (30 April 2026)
- Second Project Steering Committee (PSC) Meeting in Uzbekistan: 17 June 2026

Emerging outcomes

- **The Eurasian Development Bank** showed its interest in scale-up and it is in the communication loop for sharing reports and the update
- Under consideration for the feasibility study on scale-up (Oct. 2026 – Feb. 2027)



Second PSC Meeting

2. CTCN TA support for feasibility towards RD&D:

2-1. Bangladesh: Feasibility research of Solar Electric-Based Cold Warehouse equipped with Low-temperature Latent Heat Material for Fruit Storage in Bangladesh Climate Conditions

Implementing partner: Korea Institute of Energy Research (KIER)	Duration: Mar. 2025 – Nov. 2026	Budget: USD 249,584
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Objective: To introduce Solar Electric-Based Cold Warehouse equipped with Low-temperature Latent Heat Material for Fruit Storage in Bangladesh Climate Conditions.

Expected outcomes: Bangladesh has an important need for accessible, affordable, and sustainable refrigerated storage solutions. The introduction of refrigerated storage devices using solar energy is a strategic intervention to address technological, logistical, and environmental challenges facing the agricultural sector, with the potential to significantly reduce post-harvest losses and contribute to the country's broader development goals.

Emerging outcome: Under consideration for the feasibility study on scale-up (Oct. 2026 – Feb. 2027)

Progress to date

- **Testing and monitoring of the facilities:** From 9 September 2026
- **Gender relevant seminar:** 9 September 2026

2. CTCN TA support for feasibility towards RD&D:

2-2.Côte d'Ivoire: Development of Sustainable Biochar Production and Application for Climate Mitigation and Adaptation in Côte d'Ivoire

Implementing partner: Korea Institute of Energy Research (KIER) & ENVELOPS	Duration: Dec. 2025 – Nov. 2027	Budget: USD 250,000
--	--	---------------------

Objective: to support Côte d'Ivoire in establishing a sustainable biochar production system using agricultural residues and to enhance the country's capacity to mitigate and adapt to climate change by reducing deforestation, improving waste management and providing a sustainable energy source.

Expected outcome: Strengthened national capacity to develop, operate, and expand sustainable biochar production, thereby promoting the adoption of climate-resilient waste management and agricultural practices. This includes the in-depth training of 2 experts from Côte d'Ivoire in South Korea, as well as the development and deployment of a test-scale biochar reactor in Côte d'Ivoire.

Progress

- Internal kick-off meeting held on 14 April 2026
- October 2026: in-depth training of 2 experts from Côte d'Ivoire in South Korea

Explore the opportunities of scale-up of CTCN Collaborative RD&D TAs through GCF funding modalities, MDBs and other funding organizations, focusing on Collaborative RD&D

Objective

CTCN PALO will explore the opportunities to scale up three CTCN Collaborative RD&D (CRD&D) TAs in Papua New Guinea (PNG), Bangladesh and Uzbekistan through GCF Funding modalities, MDBs and other Korean funding organizations (overseas demonstration projects by MSIT, KEA, KIAT, KIND, and KOICA).

Emerging outcomes

- PNG TA
 - ROK MSIT's climate technology demonstration program (CTDP) in 2027 as a potential candidate
 - Under consideration for the feasibility study on scale-up (Oct. 2026 – Feb. 2027)
 - Bangladesh TA
 - The implementing partner (KITECH) are communicating with regional private sector and Korean funding organizations for the scale-up of cold value chain business in Bangladesh within 2027.
 - Under consideration for the feasibility study on scale-up (Oct. 2026 – Feb. 2027)
 - Uzbekistan TA
 - The interest from Eurasian Development Bank and the communication for sharing reports and the update
- Under consideration for the feasibility study on scale-up (Oct. 2026 – Feb. 2027)

4

Planning of 2027 Activities

Collaborative RD&D: Technical Assistance Projects

Support CTCN TA request proposals from 2026 Learning visit on green hydrogen production and fuel cell and 2026 Workshop and Learning visit on Energy Storage based on a new MoU that would govern PALO's operations after February 2027

Explore the opportunities of scale-up of CTCN Collaborative RD&D TAs through GCF funding modalities, MDBs and other funding organizations, focusing on Collaborative RD&D

Objective

CTCN PALO will explore the opportunities to scale up three CTCN Collaborative RD&D (CRD&D) TAs in Papua New Guinea (PNG), Bangladesh and Uzbekistan through GCF Funding modalities, MDBs and other Korean funding organizations (overseas demonstration projects by MSIT, KEA, KIAT, KIND, and KOICA).

Emerging outcomes

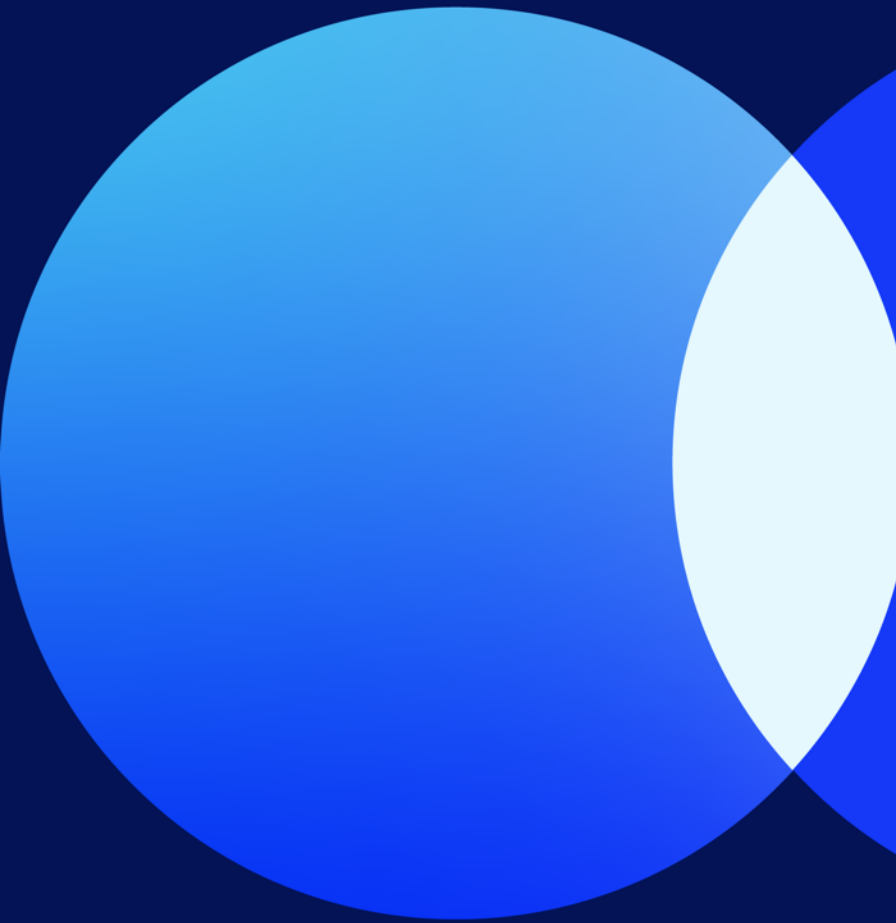
- PNG TA
 - ROK MSIT's climate technology demonstration program (CTDP) in 2027 as a potential candidate
 - Scale-up based on the feasibility study on scale-up
- Bangladesh TA
 - Scale-up based on the feasibility study on scale-up
- Uzbekistan TA
 - Scale-up through Eurasian Development Bank
 - Scale-up based on the feasibility study on scale-up

Collection of global cRD&D information and data on global collaborative RD&D groups

Objective: to collect information and construct data on global collaborative RD&D research groups in 5 system transformation including academic societies and research associations through NDEs' contribution and then to disseminate and share them with the relevant stakeholders to promote global cRD&D activities

Potential follow-up actions in 2027

- Preparation of scope and work plan with RINGO
- Collection of information and construction of data
- Potential integration onto CTCN Web page and dissemination



Introduction to potential partners - Green Society, Hyundai Motors CMK Foundation

Meet potential partners and network members

Four organizations will introduce their technologies in this 1-hour session:

- Tae-Hyun Sung, CTO, **Huject**
- Woo-Kyun Lee, **Korea University–E3**
- Jae-Hong Park, **Code of Nature**
- Jisung Kang, CEO, **Korea Grid Forming**

10 mins presentation + 5 mins Q&A each.

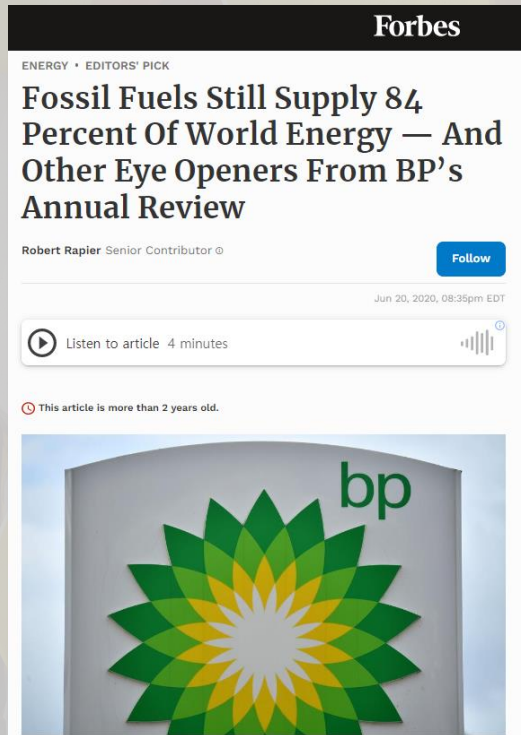




Harvest unused energy and convert into electrical energy

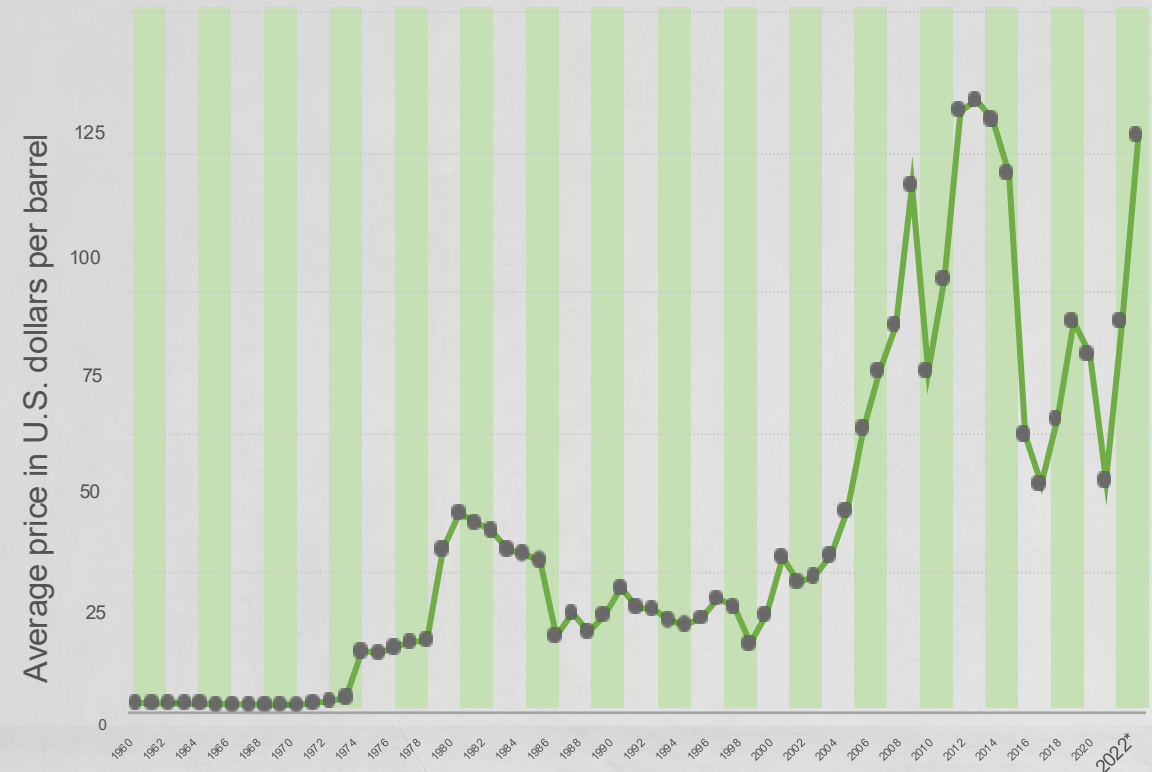
“ **84% of the World's Energy** is dependent on fossil fuels ”
Fluctuations in oil prices are a massive global energy issue

High dependence on fossil fuels in the global



*Forbes

Growing trend in oil prices fluctuation

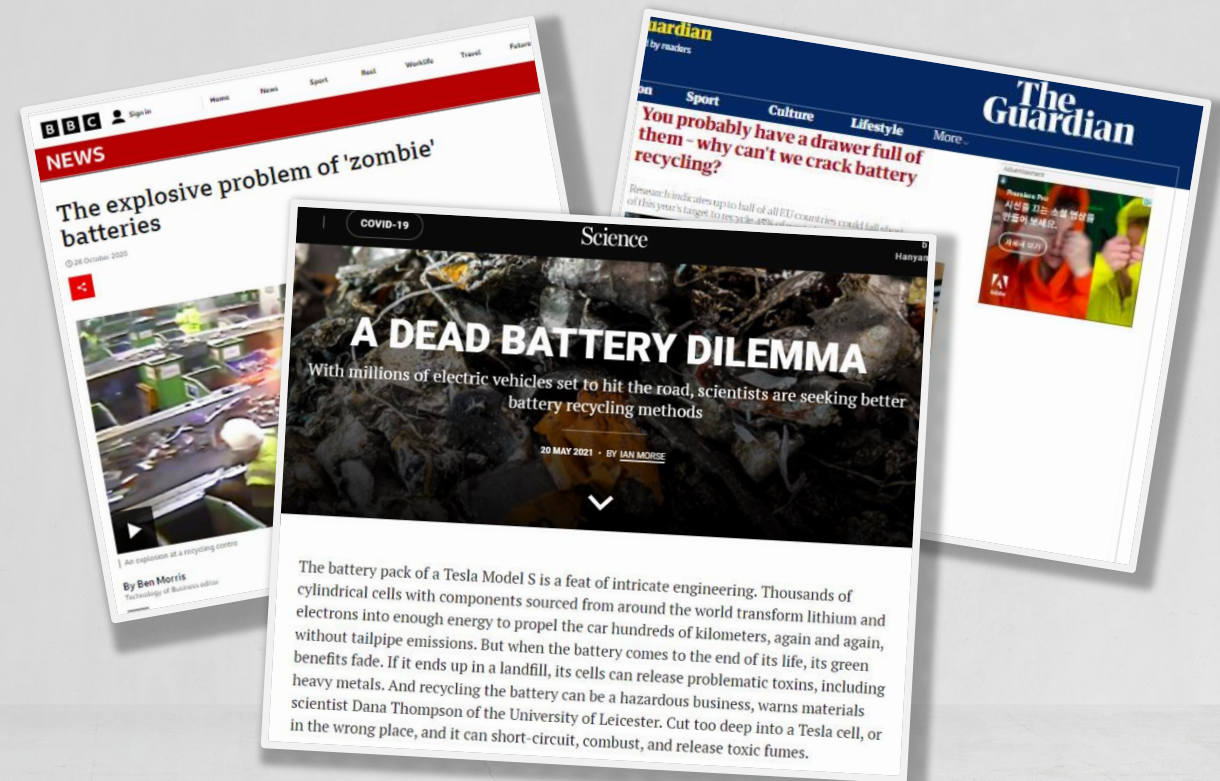


Waste battery emissions are expected to increase dramatically
'Hazardous/toxic substances' in battery production and disposal

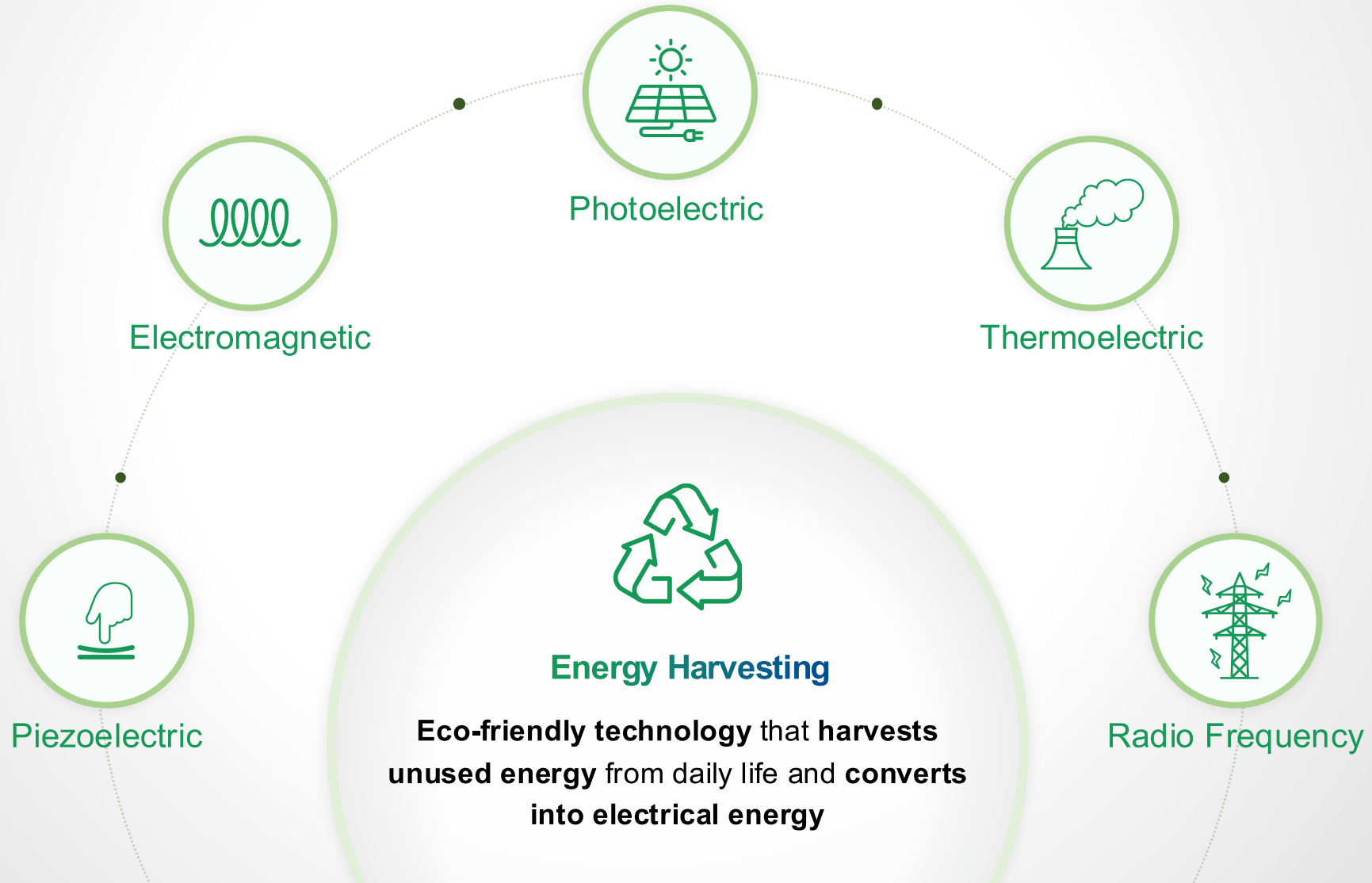
Global Used Batteries Forecast



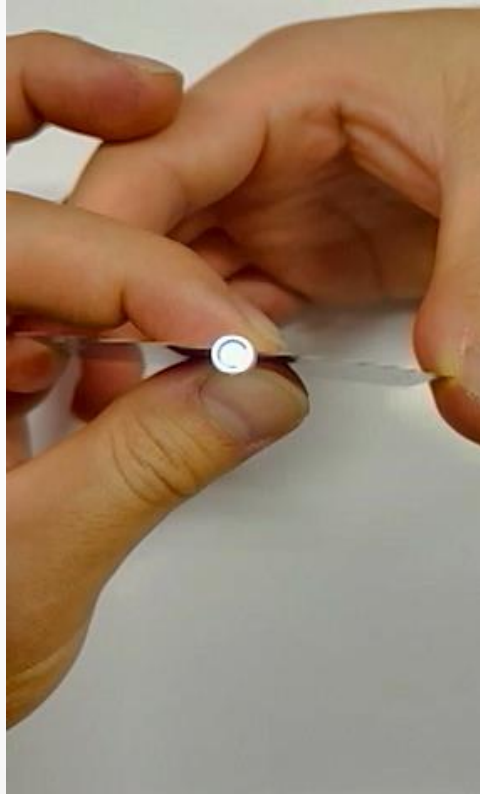
Battery Environmental Pollution Problem



“Utilize **Energy Harvesting Technology** to solve energy and environmental issues”



“ Energy Harvesting Technology allows to generate electricity **with a small force** ”



Power can be generated by
bending the piezoelectric by 1 mm



Able to generate power with 1mm
movement onto the piezoelectric

“ Energy Harvesting Technology allows to generate electricity **with a small movement** ”



**Power can be generated
with small movement**

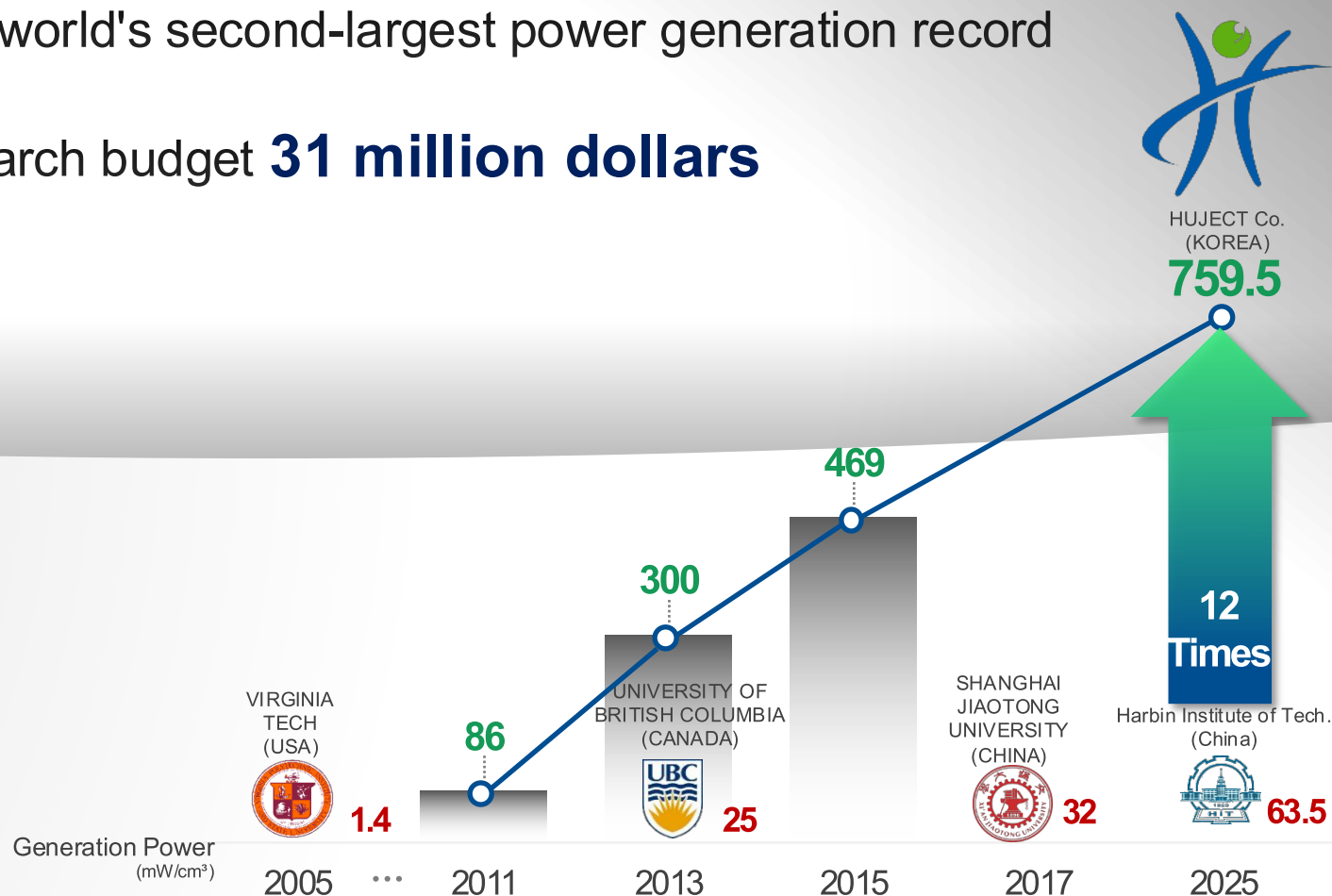


**Power can be stored with
small movement**

World's Highest Power Generation Record since 2011

12 times more power than the world's second-largest power generation record

Total accumulated government research budget **31 million dollars**

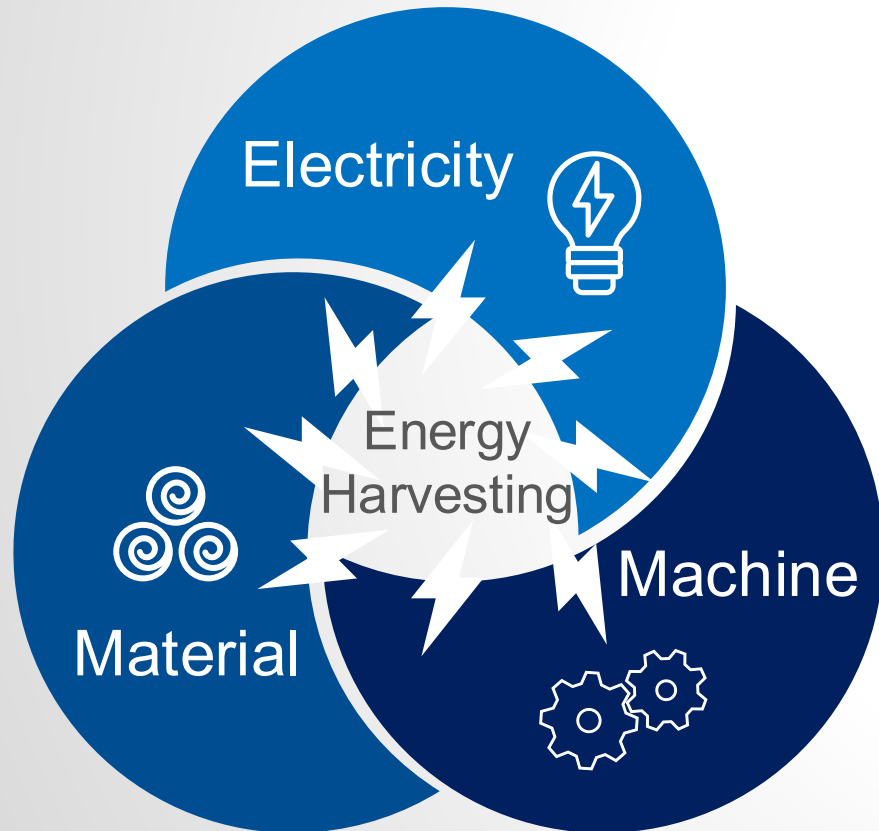


The Superiority

of the Original
Technology



Taehyun Sung CTO has **more than 10 years of experience** in each field



Material 17 years

- Tokyo Institute of Technology - Material Engineering Ph.D.
- MIT(Massachusetts Institute of Technology)- Postdoc.

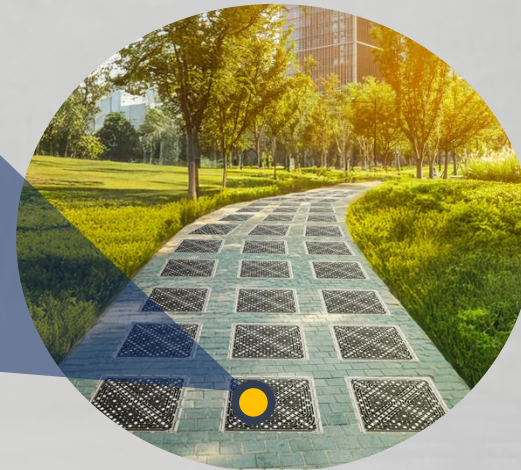
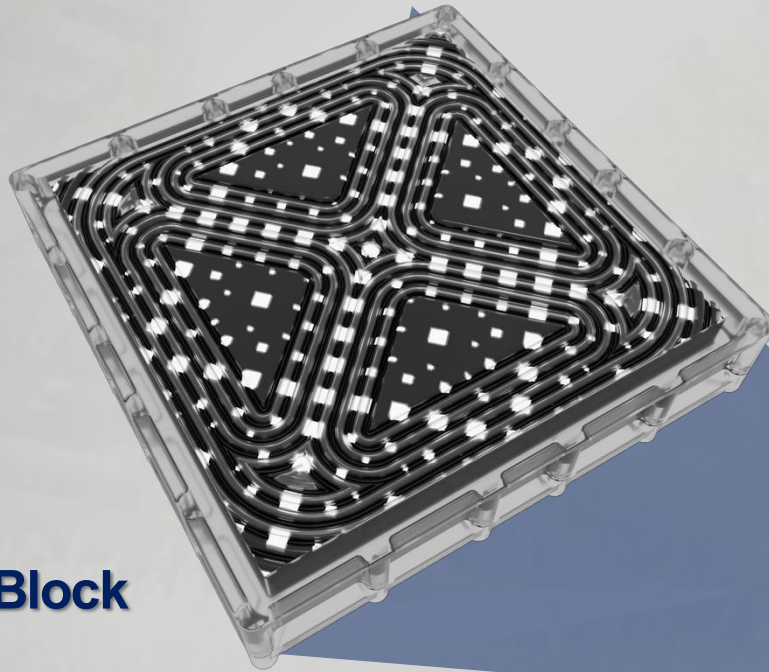
Machine 13 years

- KEPCO(Korea Electric Power Corporation) - Researcher

Electricity 16 years

- Hanyang University - Electrical Engineering Professor

Energy Block



3D Image



No Power
Supply Required



No Battery
Required



Perfect Sealing
Waterproof



Light up LED with
Human Step



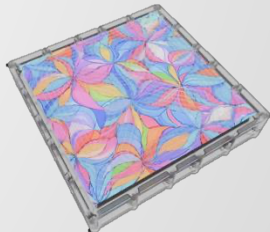
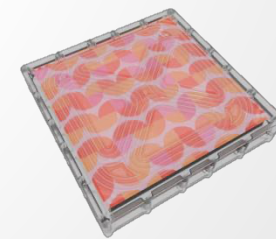
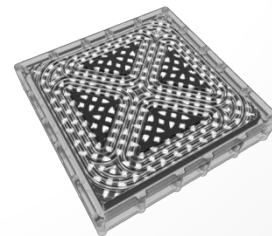
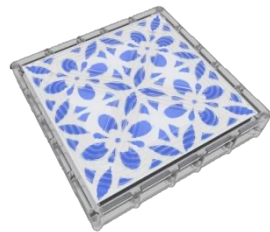
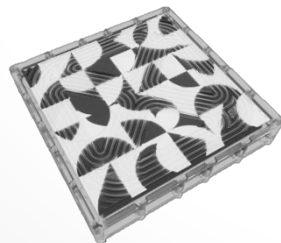
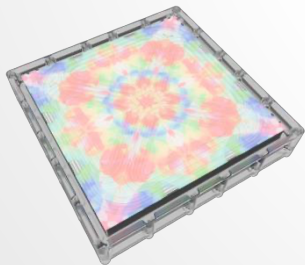
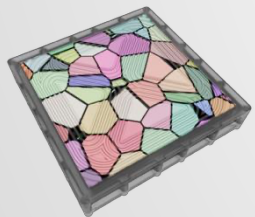
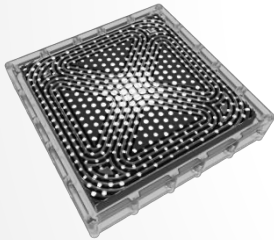
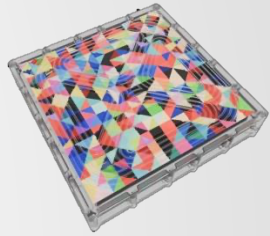
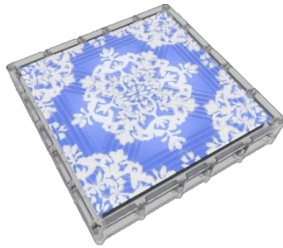
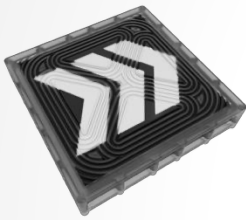
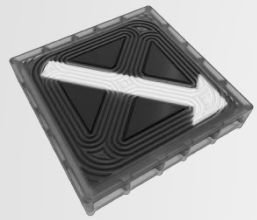
EASY

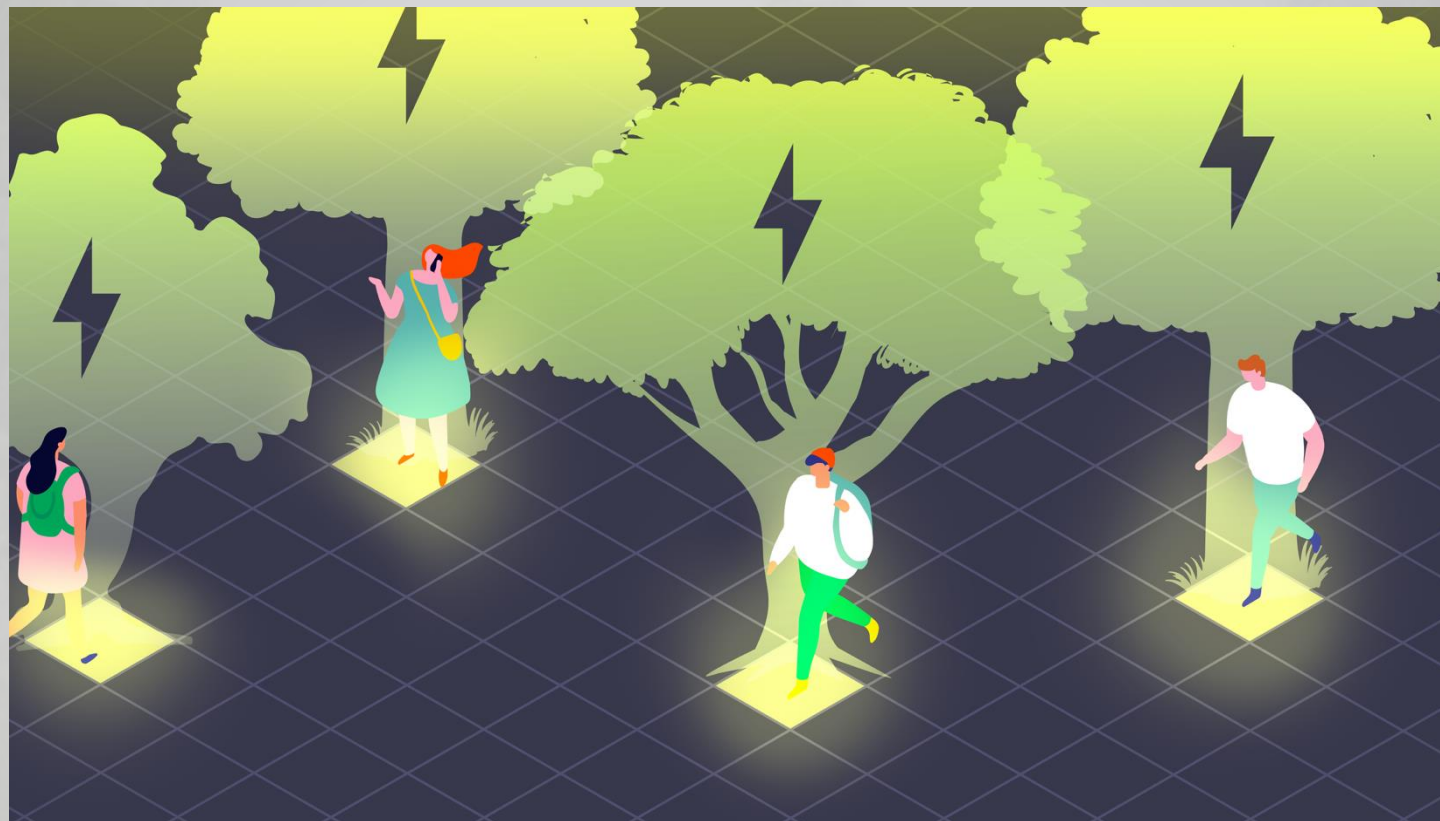
Simple
Installation





“ Direction Signs and Various Designs ”



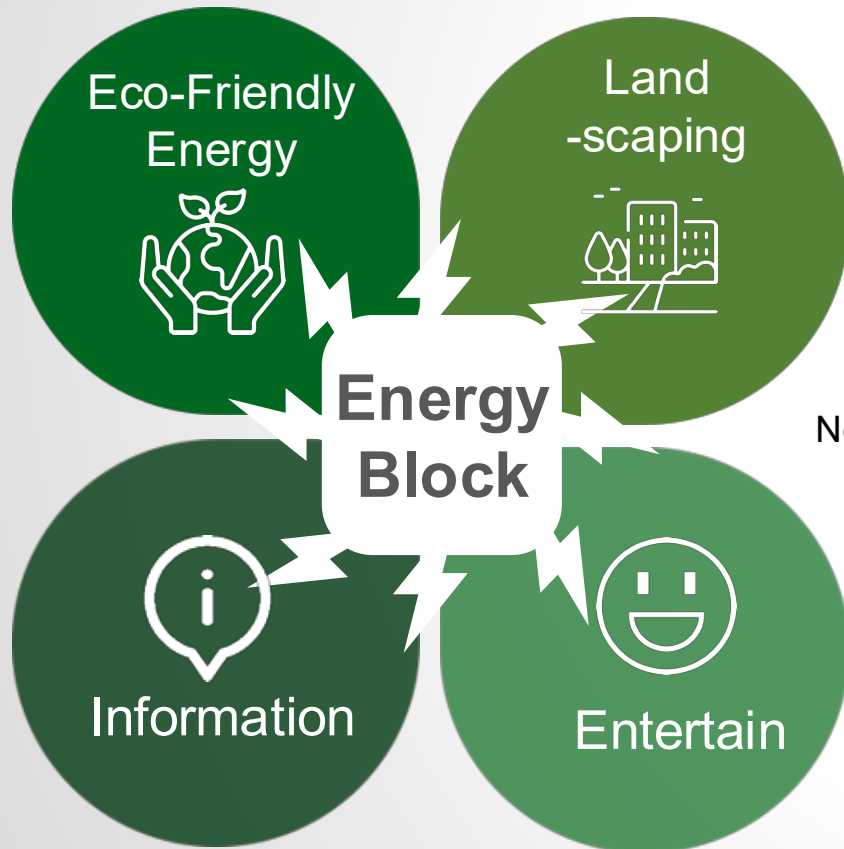


Energy Block generates electricity with **zero carbon emissions**

From a carbon-neutral perspective, **installing an Energy Block is like planting a tree**

Able to **create a forest by installing Energy block territory**

Based on Customer Needs



Hoban Construction for Headquarters Installation

Needs: Zero Energy Building Policy



Deliver Information
Needs: Direction Sign and Advertisement



2.18 million

Supply Contract

Needs: Vertical Garden Landscaping

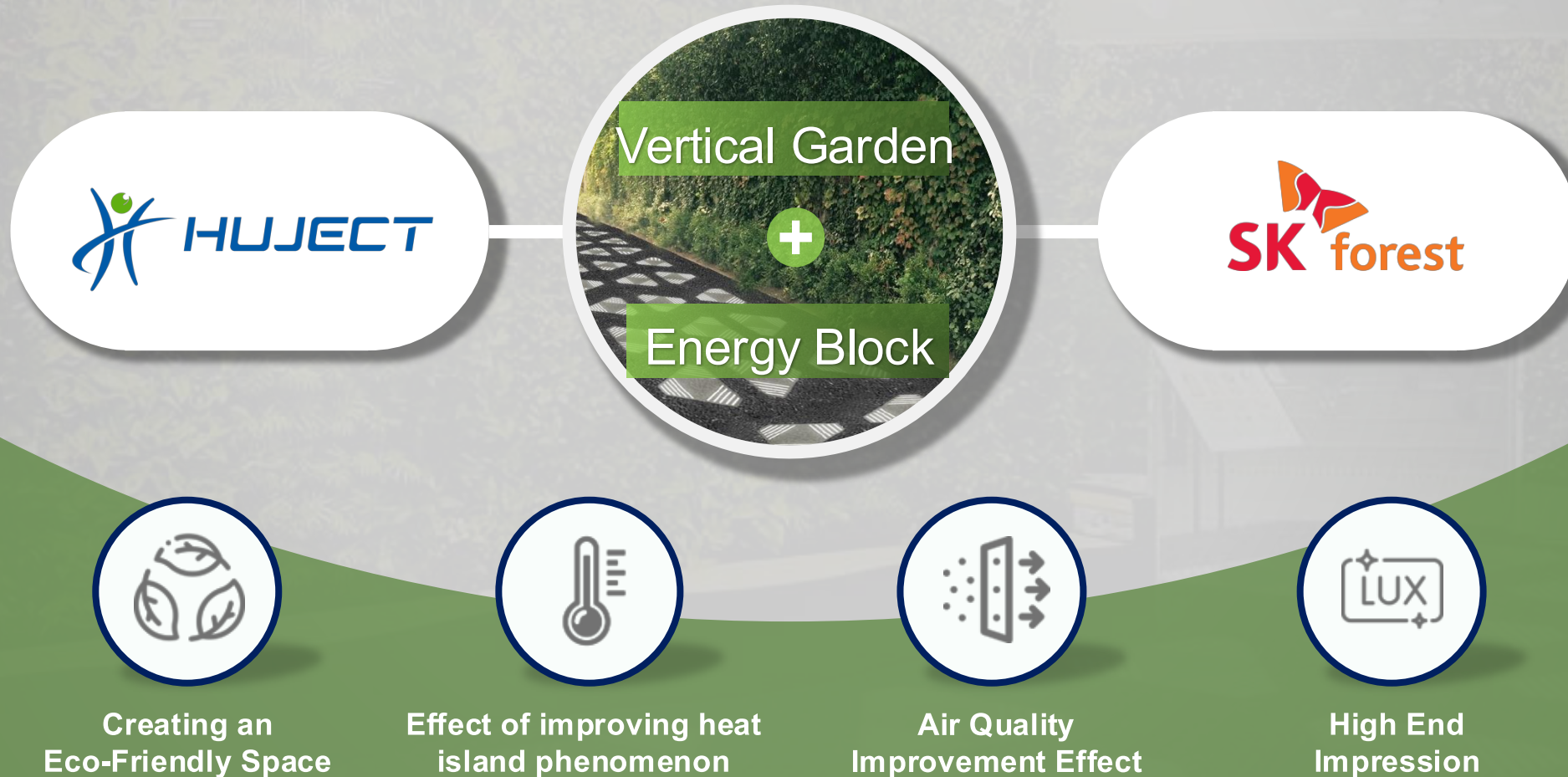


Gwangmyeong Cave Installation

Needs: Customer Enjoyment



“ The module that combines SK Forest **'Vertical Garden' and 'Energy Block'** and ”
can be applied to landscaping areas such as building interior and exterior walls



“ \$2.18 million Supply Contract signed with SK forest ”

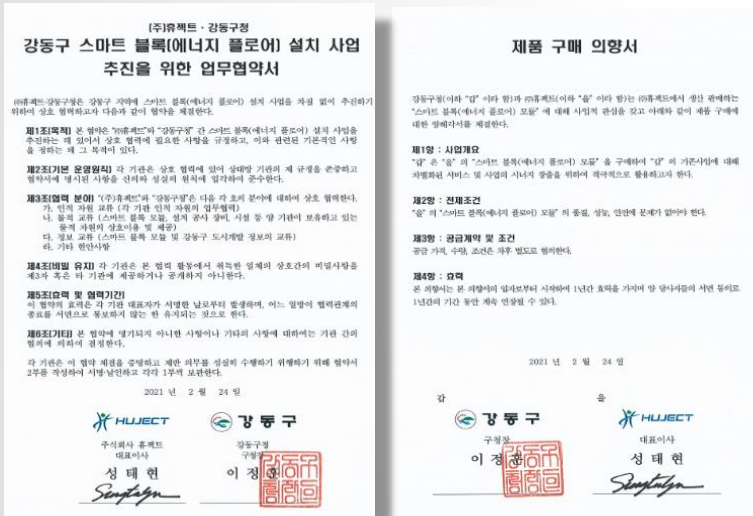


MOU and \$2.18 million Supply Contract signed with SK forest



- Under discussion of installation area

“ MOU and Intent to Purchase with Gangdong-gu ” for Gucheonmyeon Road installation

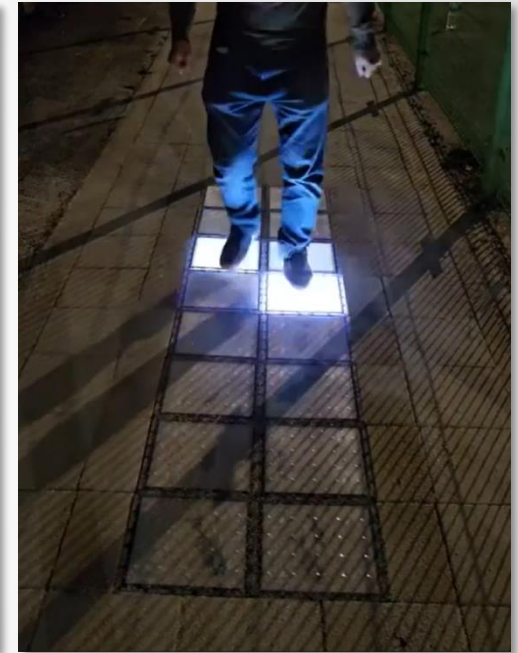


MOU and Intent to Purchase with Gangdong-gu



- Concept plan for Installation on Gucheonmyeon Road
- Renovating an old road to **improve the surrounding landscape**

“Energy Block Installation on the Yangjaecheon Trail in ” Gangnam-gu



- Selected as one of the final 15 companies in Gangnam-gu Open Innovation program (100+ applicants)
- Requested by Gangnam-gu Office to install Energy Blocks on a dark walking path
- Transformed an aging, poorly lit trail at night with Energy Block technology and design

“ Collaborated with world wide garden designer Jihae Hwang to develop ”
Pyeongtaek Agricultural Ecology Park



Aerial View of the Energy Block
Walkway



Walking on the Energy Block Path

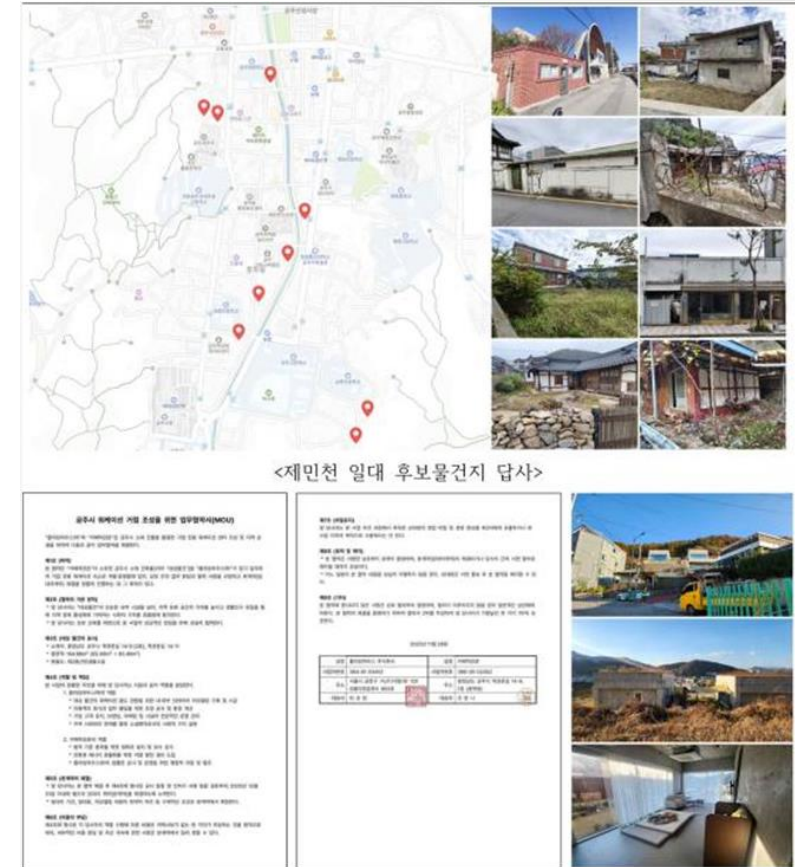
- Completed a 30m(100 feet) Energy Block walkway installation inside the park
- *Jihae Hwang: Chelsea Flower Show Gold Medal (2011), President's Award & Gold Medal (2012)**

“ **Completed installation of Yeongwol Flying House Site 1**
Site 2 planned for 2026 at Jemincheon Stream in Gongju City ”



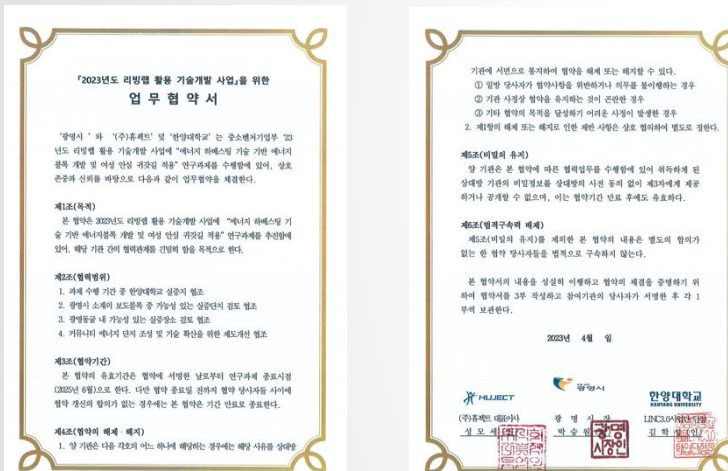
Endangered Animals

Yeongwol Flying House Installation Photos
 (in collaboration with National Geographic)



Potential Sites for Gongju Flying House
 (planned collaboration with IKEA)

“ MOU with Gwangmyeong City for Energy Block Business ”



Signed an MOU with
Gwangmyeong City for
the Energy Block business



- Energy Blocks were installed at Gwangmyeong Cave for entertainment purposes

“ Award and commendation for Energy Block business ”



Daegu Creative Economy Innovation Center
Grand Prize (Minister of SMEs and Startups Award)



National Intellectual Property Committee
Commendation from the Minister of SMEs and Startups

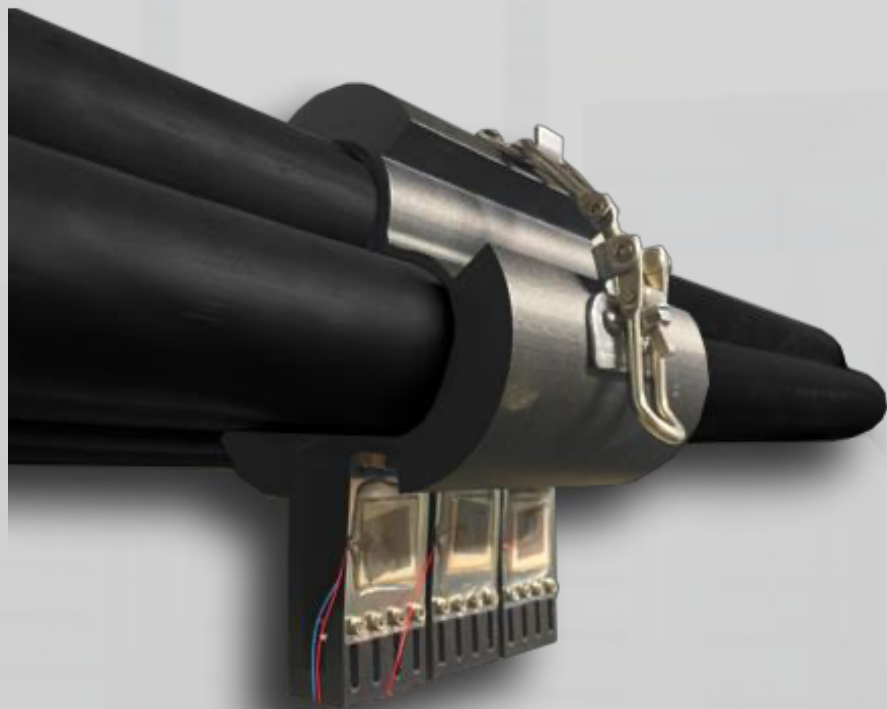


Grand Prize at the Hoban Technology Competition
among 187 tech companies in Korean



Certificate of Commendation
Presented by the Governor of Gyeonggi Province

Independent power industrial/home IoT sensors utilizing energy harvesting



**No power
supply required**



**No battery
replacement
required**



**No risk of
discharge**



**Low maintenance
costs**



**Integrated multi-sensor
operation
(gas/temperature/humidity)**

Problem 1

Rapid increase in accidents due to aging power facilities

- Safety accidents occur steadily due to corrosion, cracks, and heat problems in underground facilities
- 6,104 manhole fire accidents in New York, U.S. in 2021
'more than double compared to 20 years, on the rise'

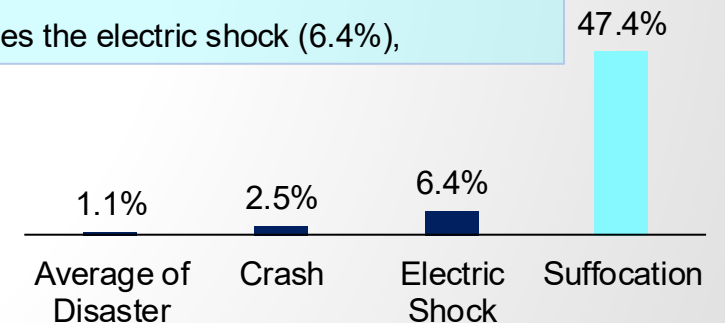


**KT Ahyeon Branch
Communication District Fire**



New York Manhole Explosion

* 44 times the accident average (1.1%),
19 times the number of crashes (2.5%),
7 times the electric shock (6.4%),



**Industrial Accident Fatality
Rate for the Last 10 Years**

Report of the Ministry of Employment and Labor



Problem 1

Rapid increase in accidents due to aging power facilities



NBC New York Report



SBS News Report

Problem 2

Limitations of Current Monitoring System for Growing Underground Facilities

- **Lack of real-time monitoring system** for more than 250,000 underground facilities such as manholes nationwide
- Working with gas masks in environments where **workers are exposed to hazardous conditions**



Worker's underground power grid inspection site



Pipe (manhole) inspection site

Distribution of pipelines nationwide



Problem 3

Huge monitoring system **deployment costs and difficulties in maintenance**

- **Korea Electric Power Corporation** and **Korea Electronics and Telecommunications Research Institute** are developing real-time power district monitoring systems, but cost aspect, it is impossible to apply on **500 power districts** and **250,000 manholes nationwide**

(Source: '20.5, Energy Newspaper)



Power District Immediate Robot System
under development by KEPCO

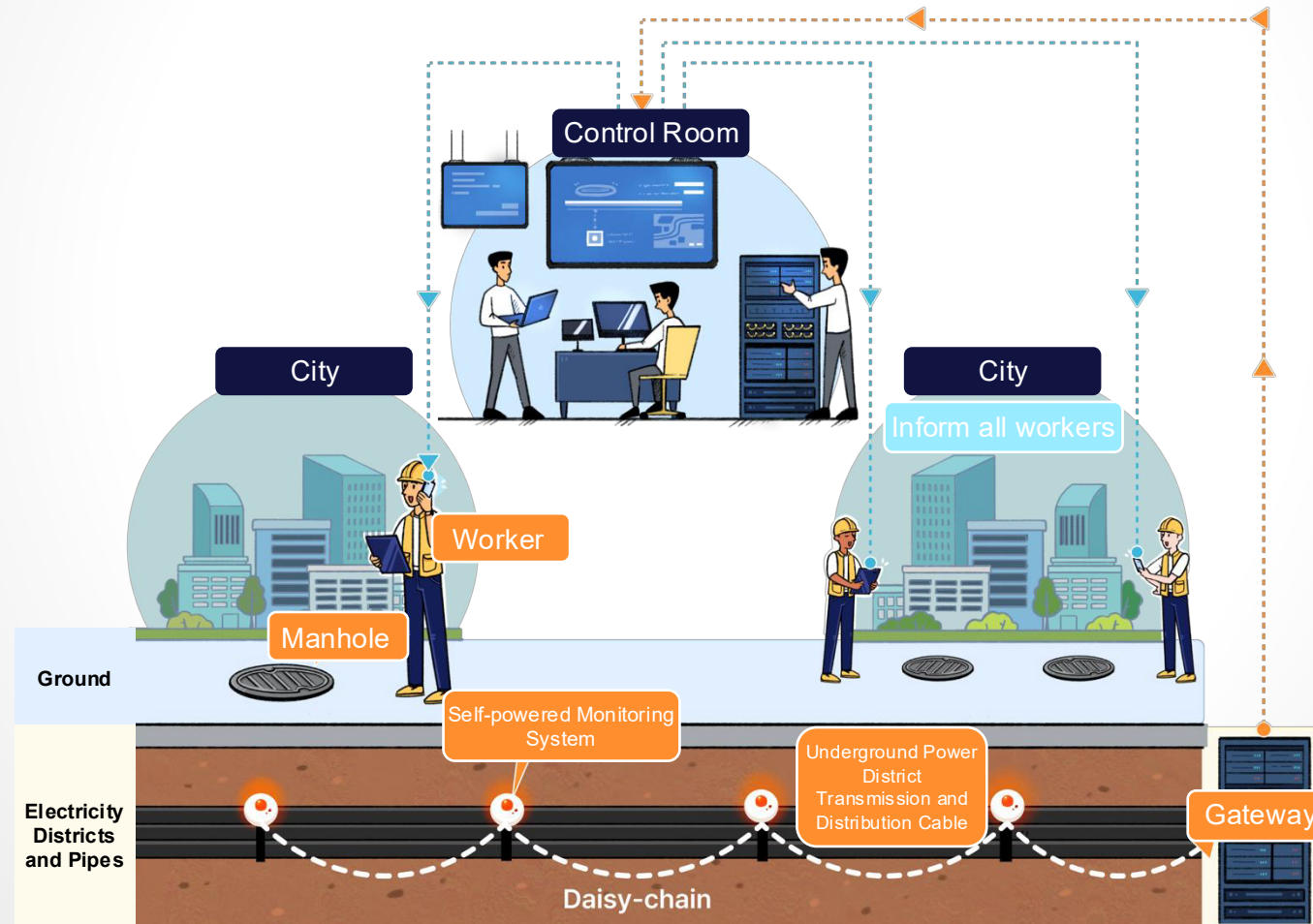
(Source: Korea Electronics and Telecommunications Research Institute)



Electronics and Telecommunications Research Institute's
inspection robot (Ochang Community District)

“ **Energy harvesting independent power safety module** and monitoring system ”

utilizing **self-powered IoT**



TAM

SAM

SOM

TAM

Total Addressable Market

\$365.4B

(4.7 million + 43.2 million) c-km x 10 / c-km x 1 million won /
[(Global transmission line length + distribution line length) X number of
installations per 1 c-km X supply price per unit]

- . Current Status of Global Transmission Lines
- . Current Status of Transmission Line Undergroundization Rate by Major Country/City
- . Assume 100% undergroundization rate of transmission and distribution lines

SAM

Service Available Market

\$4.48B

(57,681 c-km + 525,172 c-km) x 10 / c-km x 1 million won /
[(Domestic transmission line length + distribution line) X 1c-km installed X supply price per unit]

- . Korea Electric Power Corporation's 10th Basic Plan for Electricity Supply.
- . Expansion of transmission lines: (2021) 35,190c-km → (2036) 57,681c-km
- . Assume 100% undergroundization rate of transmission and distribution lines

SOM

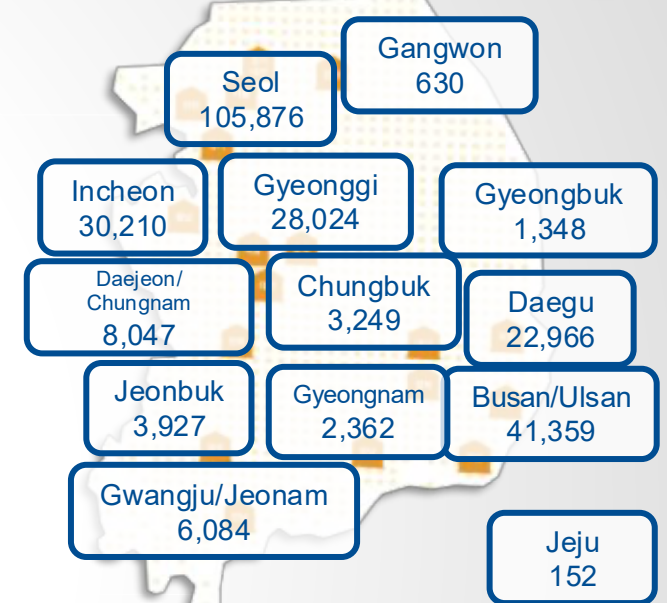
Service Obtainable Market

\$0.19B

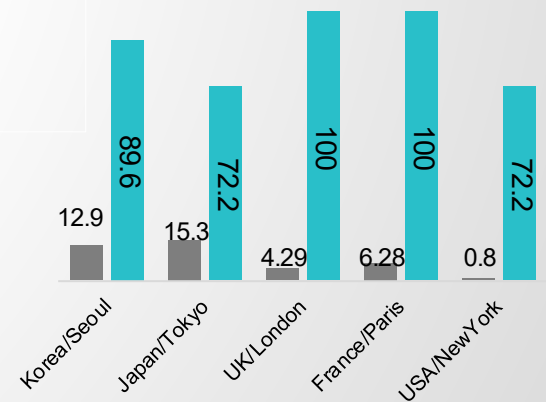
254,234 locations x 1 location x 1 million won /
[Number of manholes x number of installations x supply price per unit]

- . Manhole status of power district by city and province

Manhole status of power district by city and province

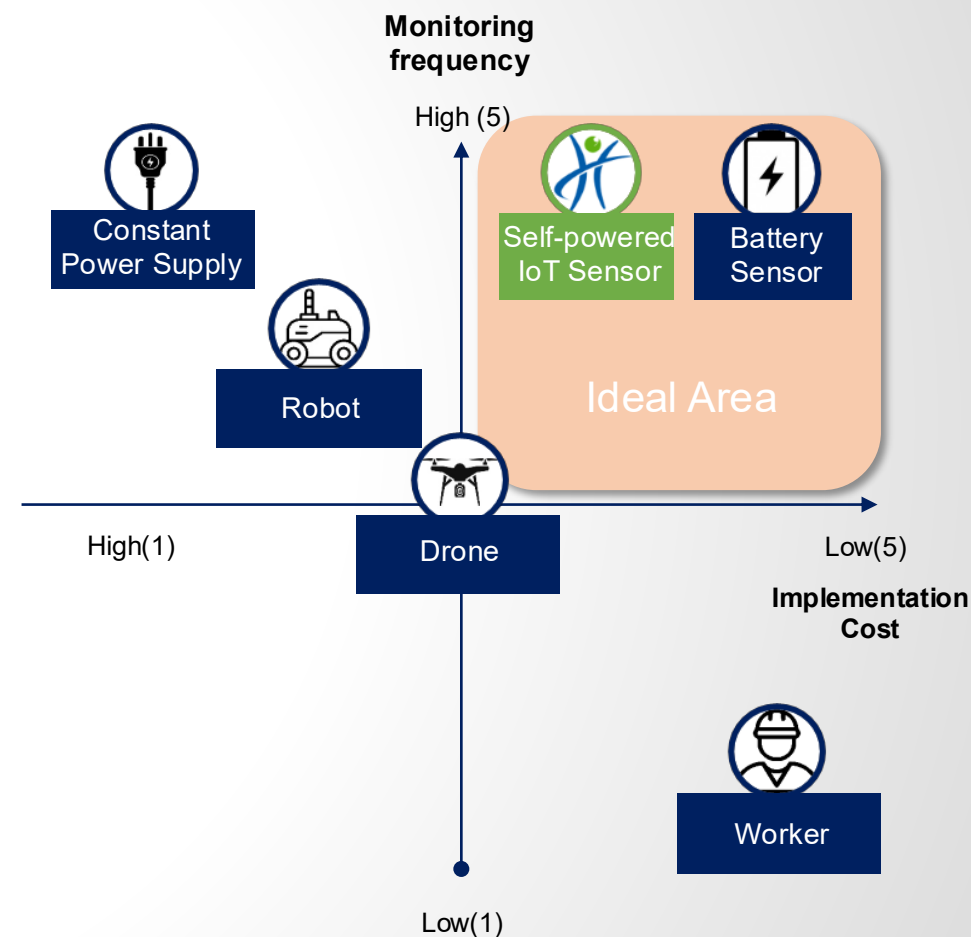


■ Country ■ City

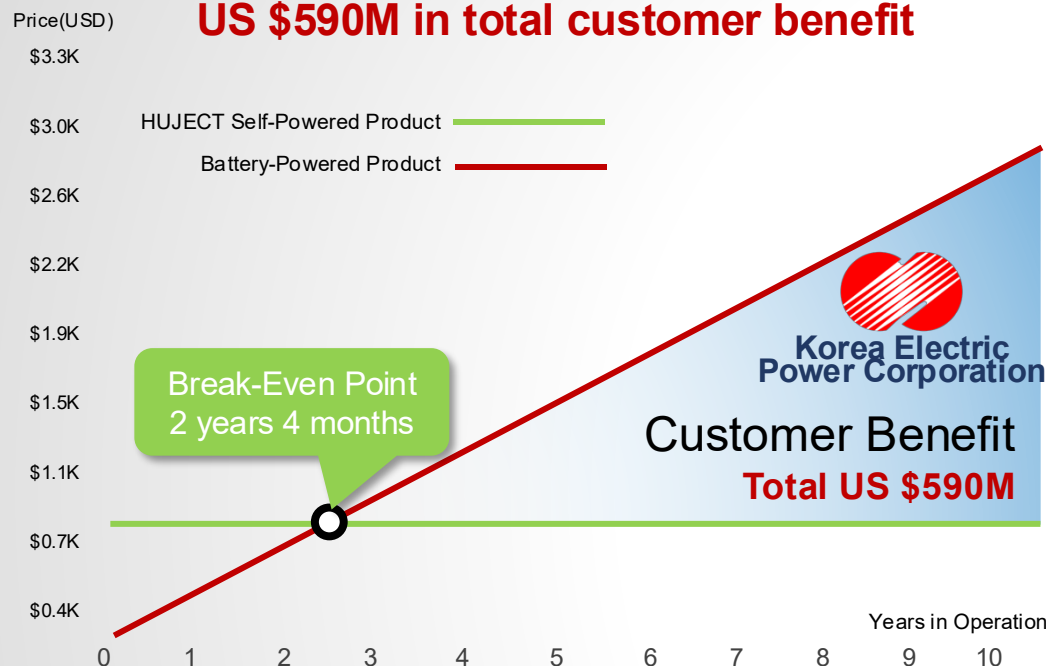


2019 Undergroundization Rate by Major Country/City (%)

Product category	Implementation cost	Monitoring frequency	Total score (Ranking)	Details
Self-powered sensor	Somewhat Low(4)	High(5)	9 Points (2 nd place)	- Strength in high monitoring frequency - Low Implement cost due to high ease of installation as an attachable that can operate without constant power
Battery sensor	Low(5)	High(5)	10 Points (1 st place)	- Self-powered sensors have a higher initial cost than battery sensors due to energy harvester built-in - Comparative analysis of price competitiveness reflecting maintenance costs will be described later
Continuous power sensor	High(1)	High(5)	6 Points (Tied for 3 rd place)	- Strength in high monitoring frequency - High cost for constant power connection electrical work within the manhole of the power outlet - Considering the structure of the facility, electrical work is virtually impossible in the manhole of the power outlet
Monitoring Robot	Somewhat High(2)	Somewhat Low(4)	6 Points (Tied for 3 rd place)	- Has the advantage of slightly higher monitoring frequency - The purchase cost of the robot itself is also high, but it is expensive to build facilities (rails, etc.) for moving the robot
Monitoring Drone	Medium(3)	Somewhat Low(2)	5 Points (4 th place)	- Cost of deployment is not high compared to constant power sensors and monitoring robots - Monitoring is somewhat less frequent due to flight and charging times, etc
Workers	Low(5)	Low(1)	6 Points (Tied for 3 rd place)	- Monitoring frequencies are very low as the worker is monitored only at each power outlet manhole check in the conventional manner - Worker safety issues remain

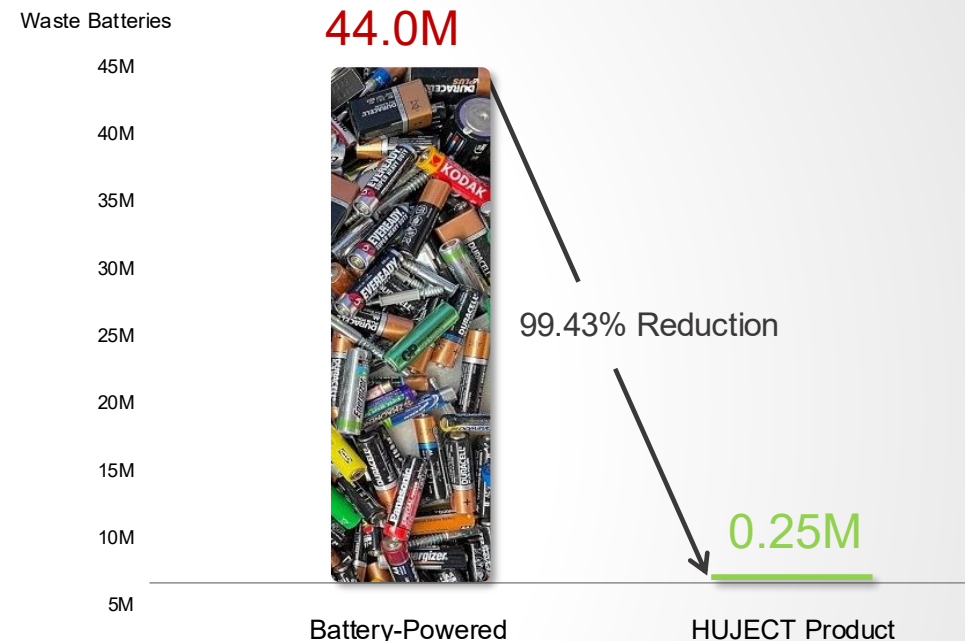


BEP in 2 years 4 months with
US \$590M in total customer benefit



Category		Self-Powered Product	Battery-Powered Product	Notes
Fixed Cost	Installation	KRW 1.0M	KRW 50K	Self-powered product: HUJECT supply price Battery-powered product: equivalent-function product
	Battery	-	KRW 3,520	Based on one Duracell alkaline 9V battery
Variable Cost	Labor	-	KRW 20K	2023 KEPCO full-time base salary: ~KRW 59M/year = ~KRW 160K/day Labor per manhole: KRW 160K / 8 = KRW 20K/unit
	Battery Replacement Cycle	-	21 days	$(9\text{ V} \times 0.625\text{ Ah} \times 3,600\text{ [Wh} \rightarrow \text{Ws]}) \div (40\text{ Ws per operation} \times 24\text{ operations/day}) = 21\text{ days}$

43.75M fewer waste batteries over 10 years



- **254,234 manholes in underground power tunnels nationwide**
- **Battery-powered products would use ~44 million batteries over 10 years**
- **HUJECT can reduce battery use to once every 10 years**
- **Significantly reduces large-scale battery waste**

1. Mitigating Risks under the Serious Accidents Punishment Act



- July 7, 2025, A 52-year-old worker was found dead after a manhole accident in Incheon.
- A coworker suffered cardiac arrest from toxic-gas exposure and was treated in intensive care.
- President Lee Jae-myung called for stronger measures to prevent workplace deaths.



- Under **Korea's Serious Accidents Punishment Act**, companies may face **finest of up to US\$3.7M** and damages of up to 5× the victim's losses.
- **Many industrial sites in Korea have underground power infrastructure.**
- As a public enterprise, **KEPCO is expected to meet particularly high safety standards.**

2. Preventing Power Outages and Fire Damage from Manhole Explosions

맨홀 뚜껑 갑자기 '들썩들썩'...고양시 일대 순간 정전 '아찔'

입력 2023-06-26 18:42:27 수정 2023.06.26 18:42:27 황민주 인터넷기자



- June 26, 2023: **A manhole cover in Goyang was lifted by an apparent underground explosion.**
- The incident caused a **power outage** affecting about **5,000 households and nearby businesses.**

- February 7, 2025: **A manhole explosion** occurred in Gwangjin-gu, Seoul, sending the cover into the air.
- Firefighters extinguished a fire inside the manhole.
- The incident **caused a fire and nearby power outages.**

3. Preventing Losses from Large-Scale Incidents



<KT Ahyeon Branch Underground Cable Fire (2018)>

- **Property Damage**
KT estimated losses at **US \$34.9M**.
- **Compensation**
US \$26.0M paid to 115,000 small businesses.
- **Impact**
Internet outages **across central Seoul** disrupted services, including card payments.

**Property
Damage**
US\$34.9M

+

Paid
US\$26.0M

+

α



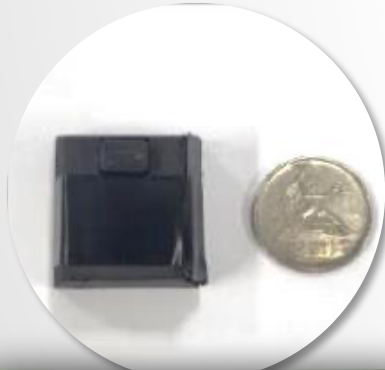
1. Energy Bump

Bump that activates the floor traffic light by converting the vehicle's movement and sunlight into electrical energy



2. EH Safety Clothes

Converts movement to electrical energy to provide power to LED lights on clothing/shoes



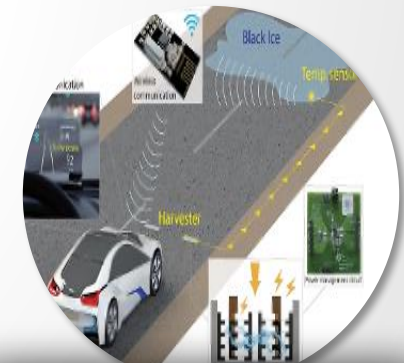
3. Batteryless Switch

Wireless switch that converts button pressure into electrical energy and operates without a battery



4. Smart Cane

Cane for the visually impaired to help detect obstacles in advance



5. Piezoelectric Road

Road that converts the car movement into electricity and operates devices installed on the road

1. Energy Bump

Bump that activates the floor traffic light by converting the vehicle's movement and sunlight into electrical energy



Energy Bump



Crosswalk floor Traffic Light
(Daytime)



Crosswalk floor Traffic Light
(Night)



2. EH Safety Clothes

Converts movement to electrical energy
to provide power to LED lights on clothing/shoes



Product Photo



Minister of Science and ICT
Award



Intention to Purchase from
Gangdong District Office



Product Image



3. Batteryless Switch

Wireless switch that converts button pressure into electrical energy and operates without a battery



Small Size Product



Batteryless Switch demonstrating 100m distance operation



Product Image

s working

100m

90m

80m



4. Smart Cane

Cane for the visually impaired to help detect obstacles in advance



Smart Cane Design Description



Lee Jung-min and Choi Kwang-geun won the bronze medal in the Tokyo Paralympics



5. Piezoelectric Road

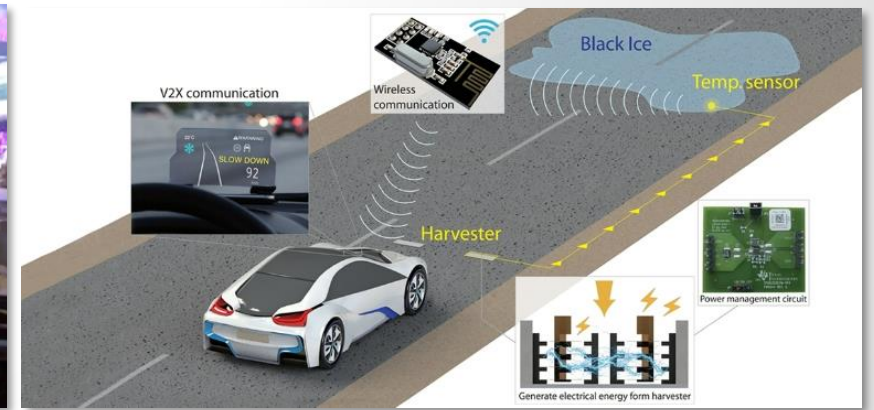
Road that converts the car movement into electricity and operates devices installed on the road



Piezoelectric power generation road



Energy Harvesting Road Installation at Manghyang Rest Area on Gyeongbu Main Highway



Vehicle Accident Prevention System Construction Diagram



5. Piezoelectric Road

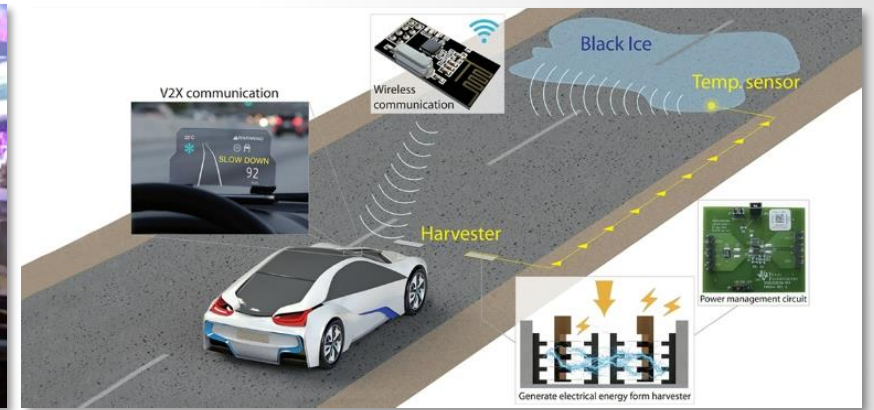
Road that converts the car movement into electricity and operates devices installed on the road



Piezoelectric power generation road



Energy Harvesting Road Installation at Manghyang Rest Area on Gyeongbu Main Highway



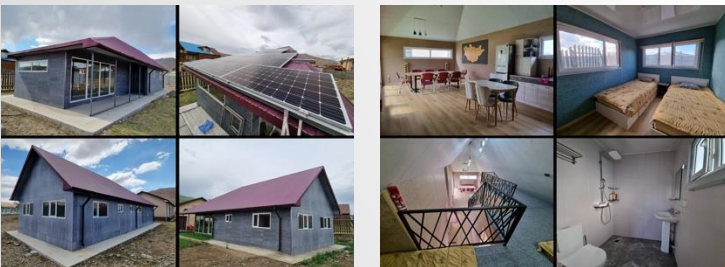
Vehicle Accident Prevention System Construction Diagram



Graduated with Honors



Managed business with 50+ overseas partners while working at a KT-affiliated advertising agency



Led a two-story housing project in Ulaanbaatar, Mongolia, using Korean eco-friendly materials

HUJECT CEO

Education

- Graduated from the **University of Illinois** at Urbana-Champaign
- Graduated from **KAIST MBA** program (**President of Student Council**)

Career

- **Wohrk Reco** Startup in US(Urbana-Champaign, Illinois) - Co-founder
- **TYKL Partners** in US (AUSTIN, TEXAS) – Marketing Team
- **KT Group Company PlayD** – Mobile Platform Team
- **Chinese conglomerate Focus Media Korea**
 - New Business Department
- **Eco-friendly Mongolian Housing BringJoy** – CEO
- **Huject Corp.** – CEO



Holding 102 Energy Harvesting Technology Patents

Self-Owning 59 patents / Royalty-free Using from Hanyang University 43 patents

Awarded Global Tech & Design Awards

CES 2020 / Red dot 2020, 2024 / IDEA 2020, 2024 / IF 2020, 2023



Visit by the Minister of Small and Medium-sized Enterprises and Startups



- On February 1, 2024, Minister Oh Young-joo from the **Ministry of SMEs and Startups** visits the Huject office
- Huject is a **nationally recognized startup** attracting attention for its innovative technology



Start-up Promotion Agency's
\$190K Leap Package

May. 2023 ~ Dec. 2023 (6 months)

Contract Details :

Energy Block Business Funding



Start-up Promotion Agency's
\$438K Leap Package

May. 2024 ~ Jul. 2027

Contract Details :

Energy Block Business Funding

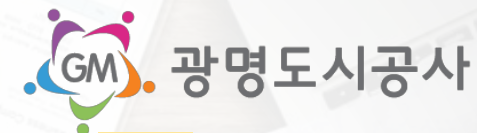


\$10K Energy Block
Installation Project

Installation completed by May. 2024

Consultation Details :

Energy Block development



\$15K Energy Block
Installation Project

Installation by Dec 2023

Consultation Details :

Discussing the installation site of
Gwangmyeong Cave



SK Forestry Signs a
Supply Contract of \$2.3M

Sep. 2022~ Aug. 2024 (2 year renewal)

Contract Details :

Supply two thousand energy blocks



Hyundai Motor Chungmong-Koo
Foundation
\$500K Project

Nov. 2023 ~ Oct. 2026 (3 year)

Contract Details :

Research and commercialization of energy
blocks



Korea Intellectual Property
Strategy Agency
\$46K project

Nov. 2023 ~ Dec. 2023

Contract Details :

Patent analysis and patent application
support



Korea Electric Power Corporation's
\$77K project

Sep. 2023 ~ Mar. 2024

Contract Details :

Development of Energy Harvesting
Independent Power IoT Sensor



Deep Tech Tips
\$1.15M Projects

Oct. 2023~Sep. 2026

Contract Details :

Development of Energy Harvesting
Independent Power IoT Sensor



National Research Foundation of Korea's
\$1.91M Project

Oct. 2021 ~ Oct. 2024

Contract Details :

Development of products for the blind
using energy harvesting technology

Healthy Earth, Happy Us!



Become The First Climate Tech
Unicorn Company in Korea, HUJECT



Linkedin QR code



Email : mosessung@huject.com

Phone : +82-10-9930-2886

Whatsapp QR code



GFM BESS Technology Development and Demonstrations

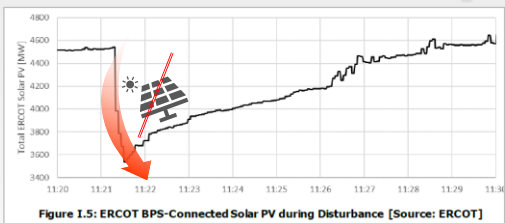
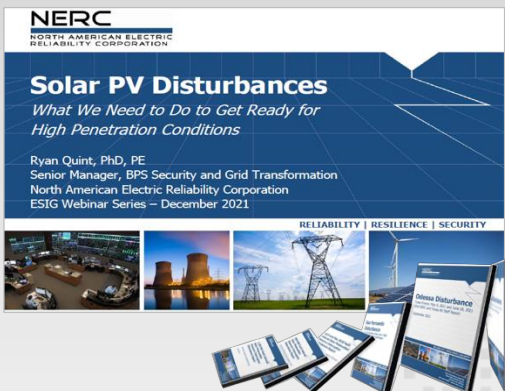
2026. 9. 2.



Pion Electric

Increasing RE and Voltage Instability

Voltage instability issues arising from the expansion of renewable energy, and grid separation problems caused by unexpected inverter shutdowns



US: PV inverter cascading trips

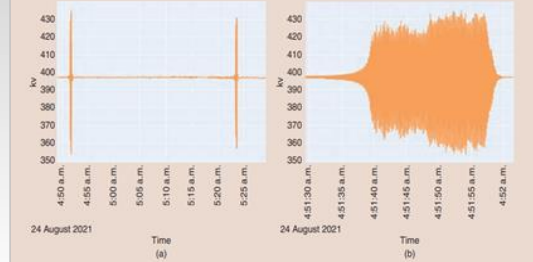
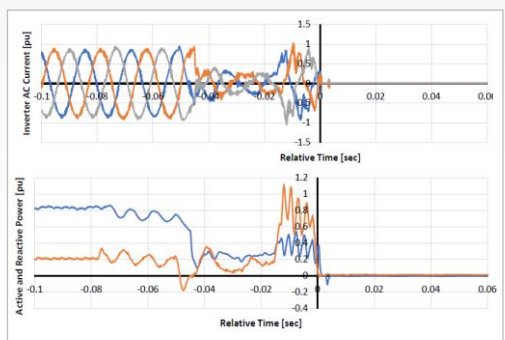


Figure 1. Voltage oscillations recorded during low system strength (Scotland). (a) Longer duration view. (b) Shorter duration view.



Figure 2. The oscillations transfer through a line-commutated converter HVdc line from Great Britain to Northern Ireland.

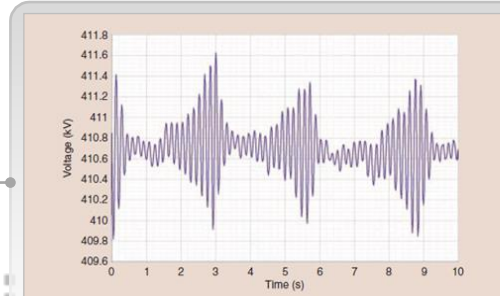


Figure 3. Observed voltage oscillations in a 400-kV bus in the West Coast region (Finland).

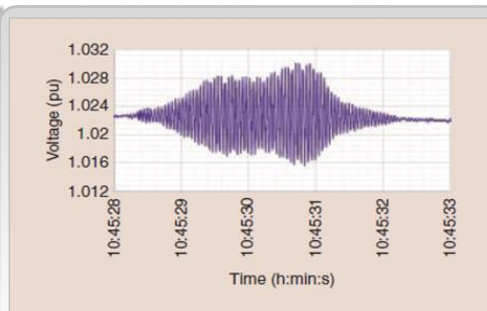
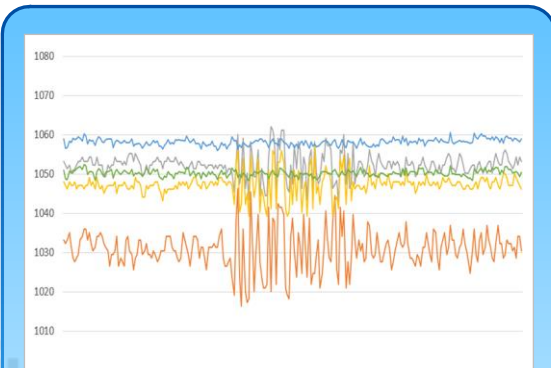
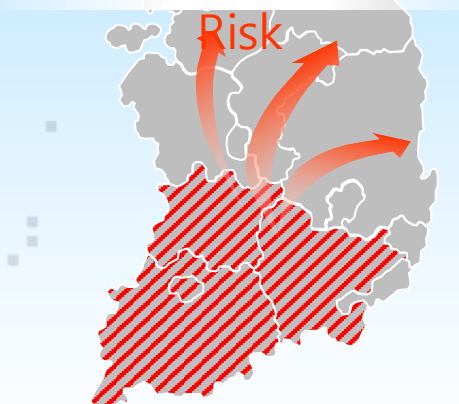


Figure 4. Observed voltage oscillations in a 220-kV bus in the West Murray area (Australia).



Korea: RE-dense voltage instability

Wide-Area Blackout



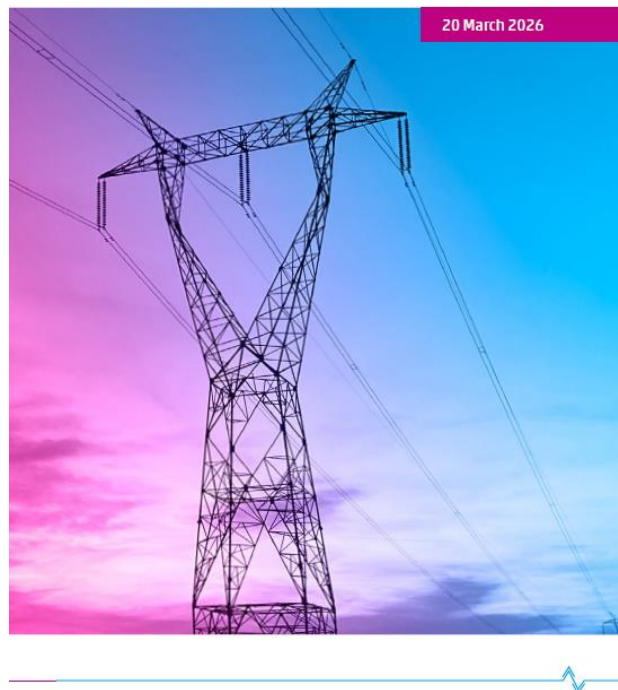
"Odessa Disturbance", NERC, 2021

Increasing RE and Voltage Instability

The massive blackout on the Iberian Peninsula (April 28, 2025) was triggered by insufficient voltage stability in a grid with high renewable energy penetration

» Grid Incident in Spain and Portugal on 28 April 2025

ICS Investigation Expert Panel
Final Report



2.5.6.3 Oscillation at 12:03–12:08

Oscillatory behaviour with a frequency around 0.63 Hz appears visually discernible in a time series plot at around 12:00:30 in the voltage plot below from PMU in Carmona (Figure 2-44).

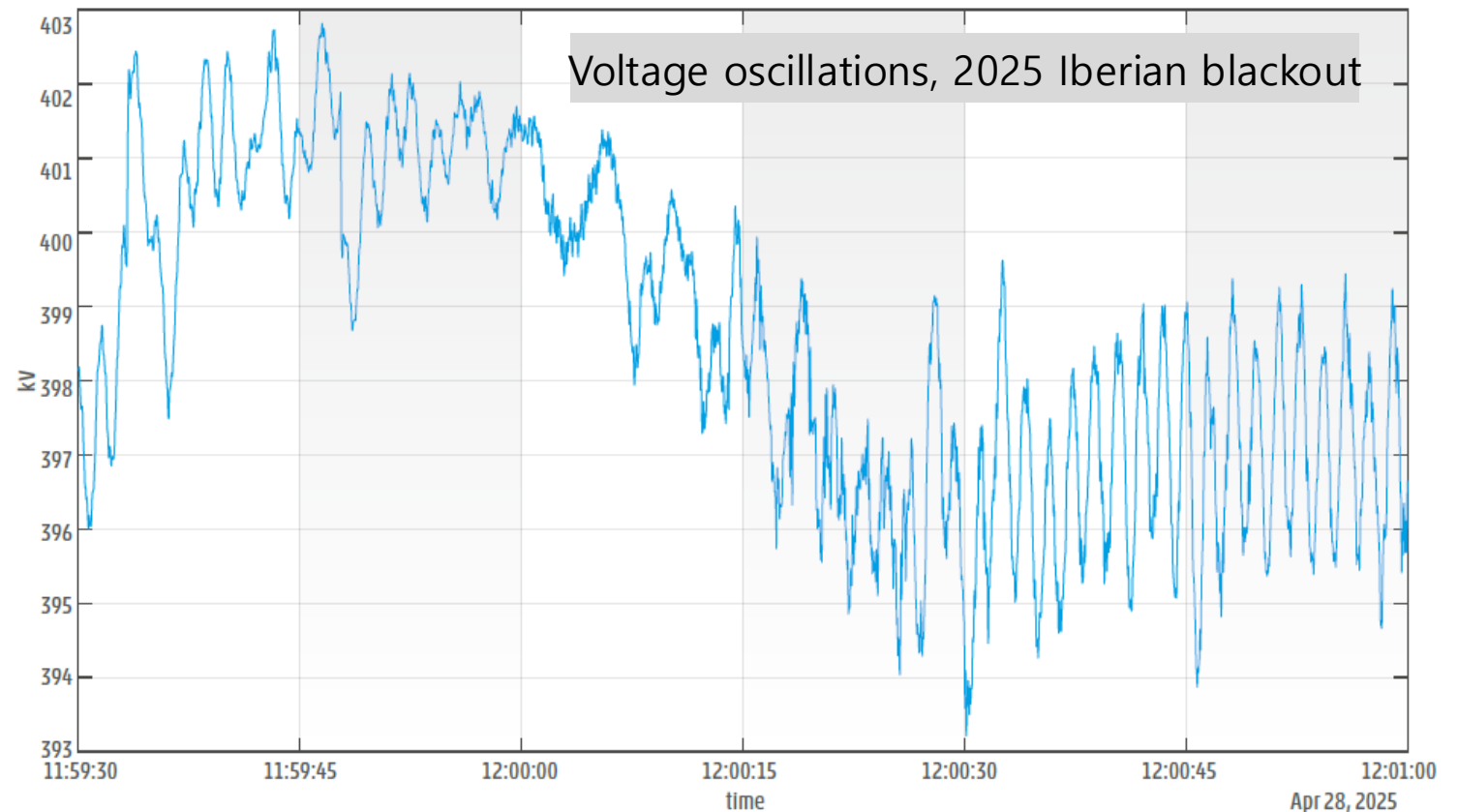
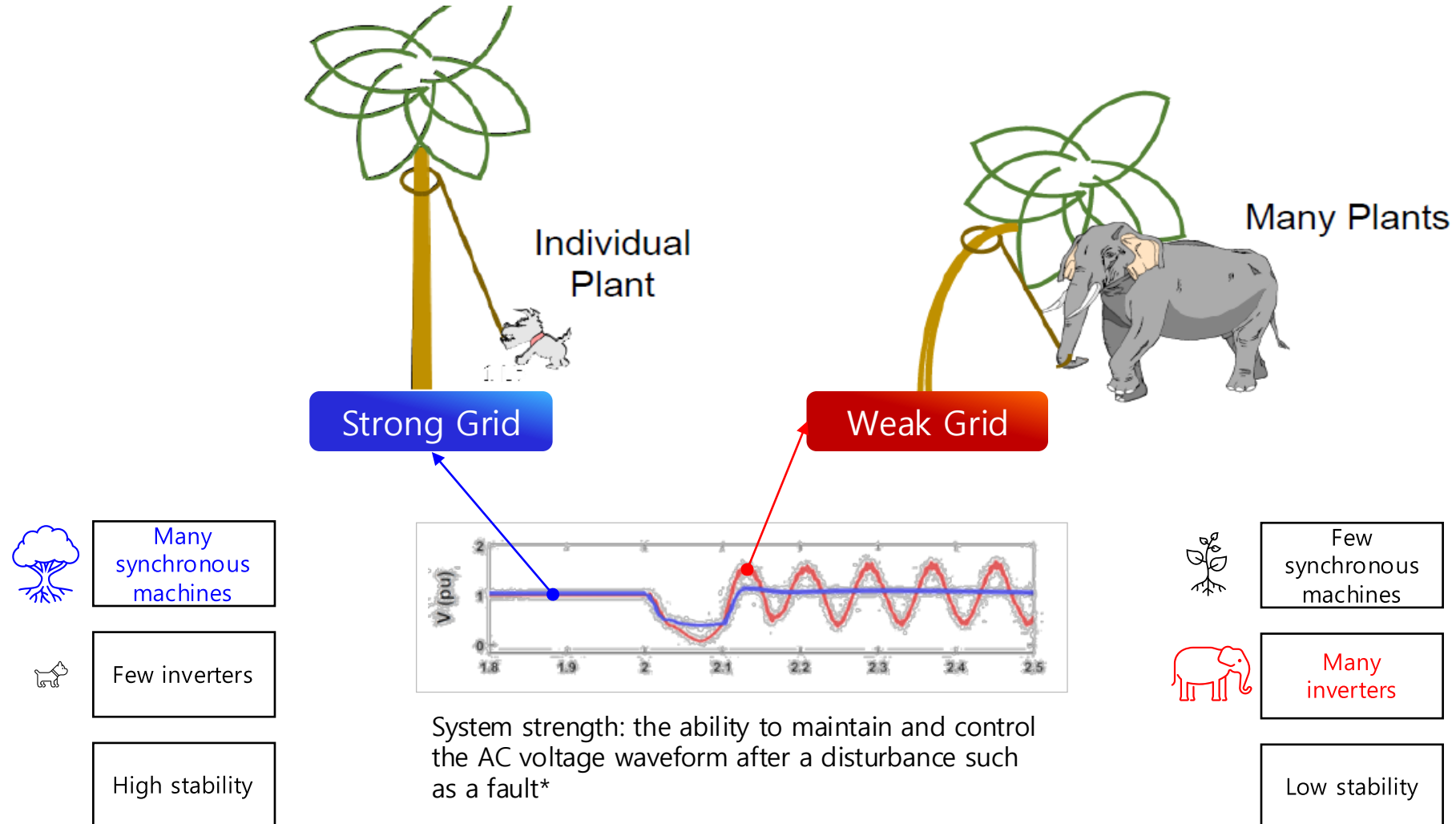


Figure 2-44: Voltage at PMU ONA4DRO, 11:59:30–12:01:00 Grid Incident in Spain and Portugal on 28 April 2025, Final Report ¹³⁶

System Weakness in Renewable Grids

Weak grid, leading to a decline in stability; the inherent characteristic of conventional inverters, unlike synchronous machines, cannot provide frequency/voltage stability

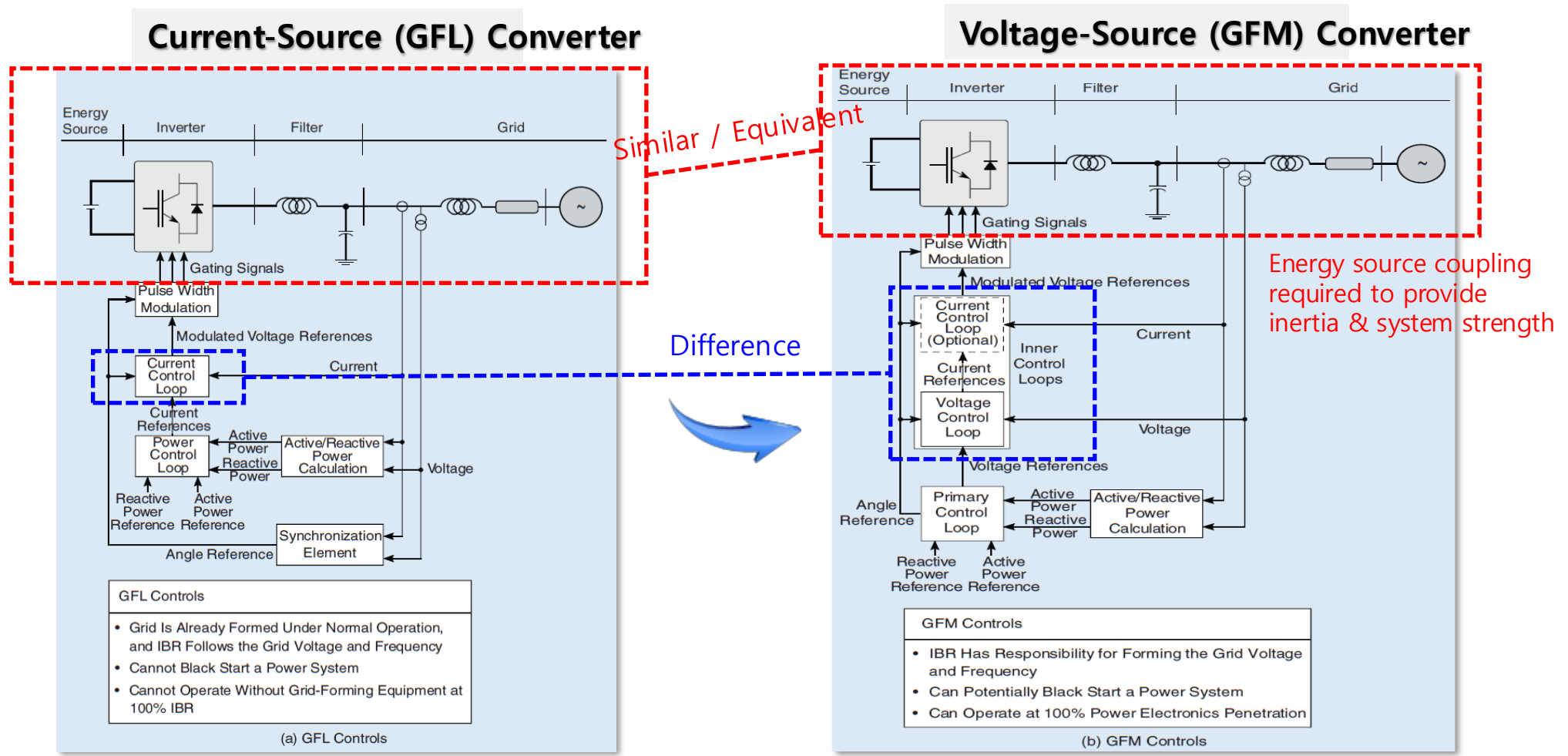


"Grid Forming Inverters Tutorial", EPRI, 2022

* "System Strength Requirements Methodology and System Strength Impact Assessment Guidelines", AEMO, 2022¹³⁷

Grid Forming (GFM) Inverter Concept

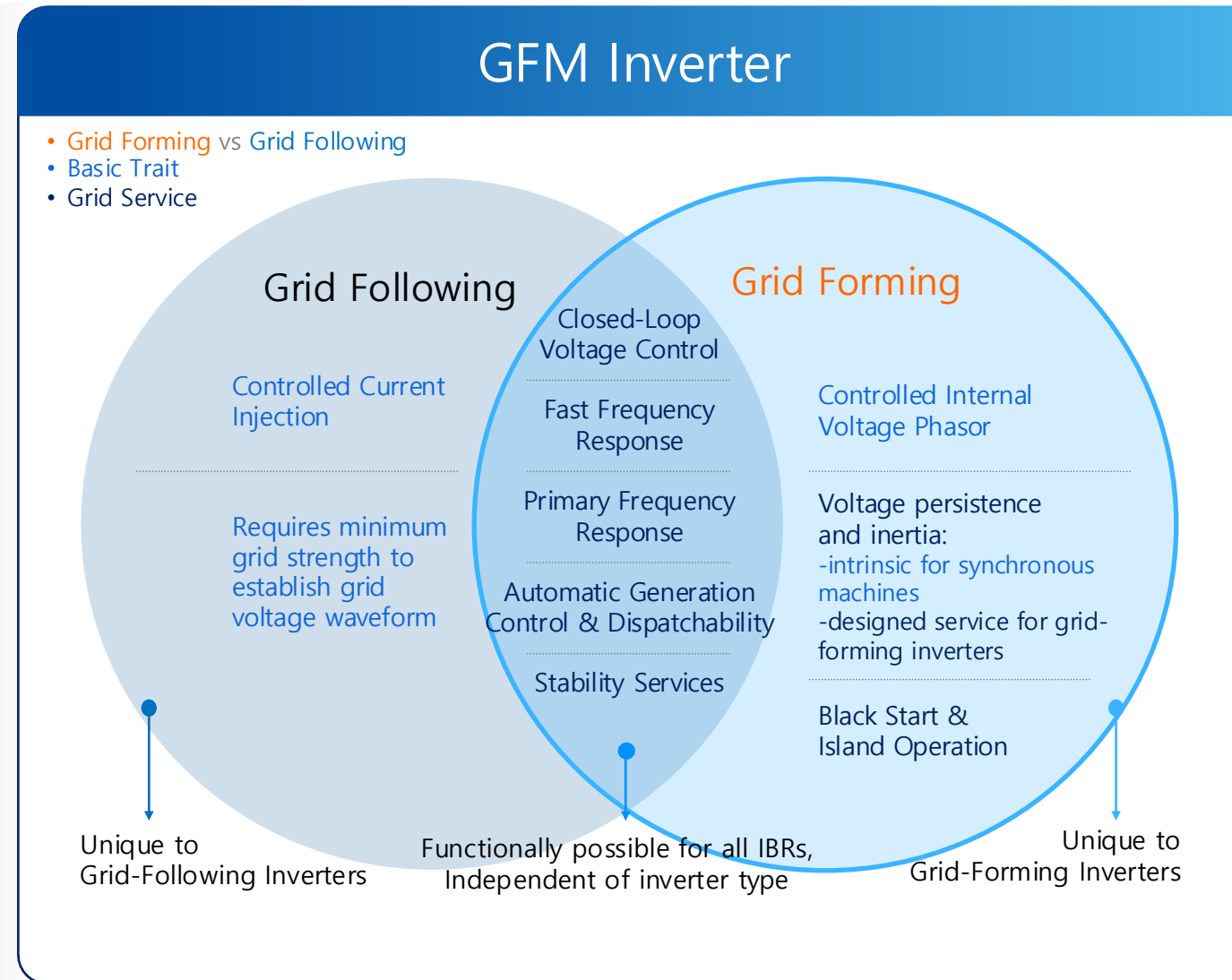
Voltage Source Control Strategy, Control Loop Difference, Self-Sustaining Reference



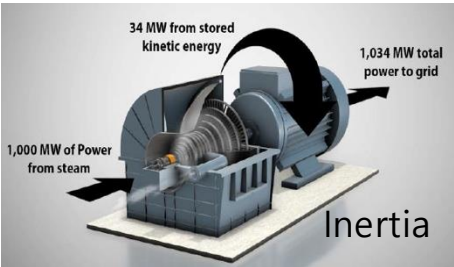
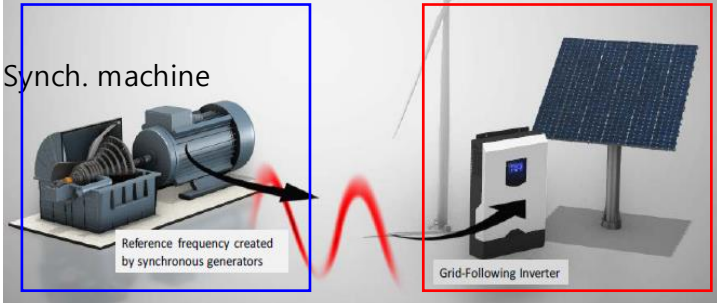
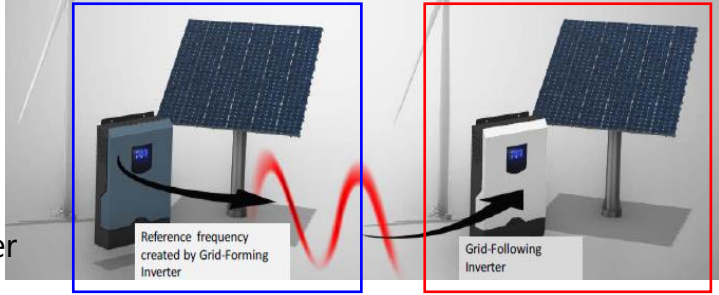
* Energy sources for GFM operation: battery, super capacitor, PV, WT, etc.

GFM vs. GFL Inverter Comparison

Grid Voltage Provision, Delivers synthetic inertia, system strength, black start, and islanded operation capabilities.



Functional Equivalency to Synchronous Machines

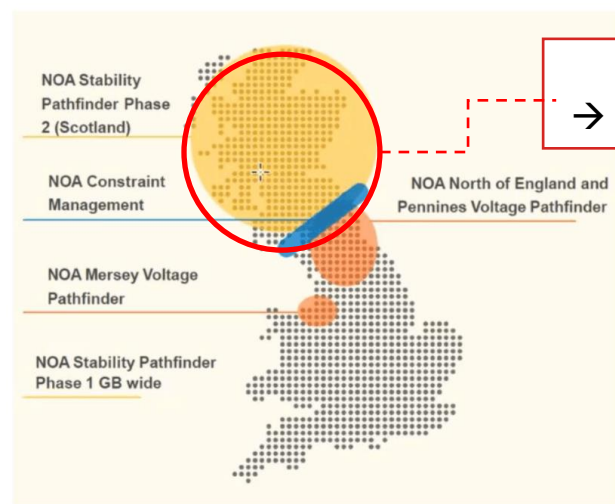
< Synch. Machine > Forms its own AC voltage and produces current (active/reactive)	< Synch. Condenser > Forms its own AC voltage and produces current (reactive)	< GFL Inverter > Produces current (active/reactive) based on the grid AC voltage	< GFM Inverter > Forms its own AC voltage and produces current (active/reactive)
Stability Energy	Stability Energy	Stability Energy	Stability Energy
 34 MW from stored kinetic energy 1,034 MW total power to grid 1,000 MW of Power from steam Inertia  Governor		GFL  Synch. machine Reference frequency created by synchronous generators Grid-Following Inverter GFM A GFM inverter forms its own voltage and, like a synchronous machine, provides a voltage source to other GFL inverters  Reference frequency created by Grid-Forming Inverter Grid-Following Inverter GFM GFL	Conventional inverters follow an external voltage, so they need a separate voltage source such as a synchronous machine

UK National Grid ESO Tender Analysis

GFM BESS secured projects in Stability Pathfinder Phase 2, with 30% Lower Short-Circuit Cost, 88% Lower Inertia Cost

<Cost: Synch. Condenser vs. Grid-Forming>

Resource	Projects	Total Cost (National Grid)	SC Current (SCL MVA)	Inertia (MW-sec)	Cost/SCMVA	Cost/MWsec
Synch. Con.	5	KRW 487.5B	8,943	2,397	0.55	2.03
GFM BESS	5	KRW 102.0B	2,611	4,360	0.39 (-30%)	0.23 (-88%)



UK Stability Pathfinder 2
→ SCMVA procurement case in Scotland

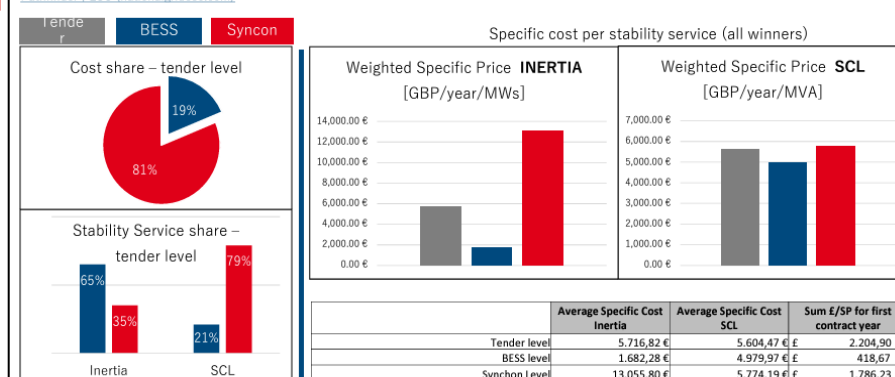


Stability Pathfinder Phase 2 – Technology agnostic tender Commercial Results and Analysis



Data Source: NOA Stability

Pathfinder | ESO (nationalgrideso.com)



Out of 225 projects 5 with Syncons and 5 with BESS have been selected!
BESS is the most competitive solution!

22

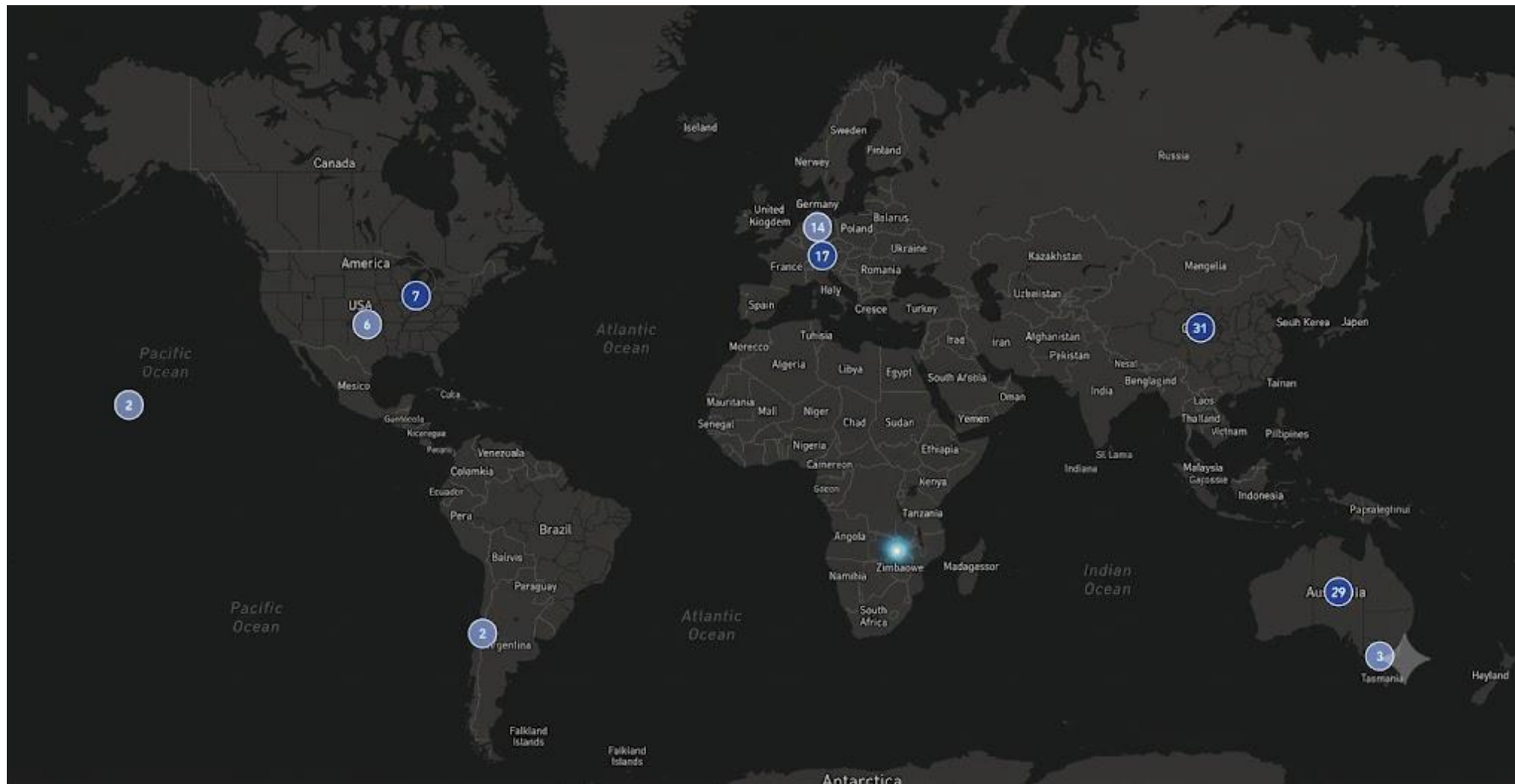
Global GFM Deployment Status

Numerous grid-forming BESS facilities deployed worldwide, backed by national RE funding

Project Name	Location	Operator/Utility	GFM Tech Size (MW)	OEM	Technology	Year
Swanbank BESS	Australia	AEMO	250	Tesla	GFM BESS	2026
Tarong BESS	Australia	AEMO	316	Tesla	GFM BESS	2026
Alpiq GFM BESS	Finland	Fingrid	30	Merus Power	GFM BESS	2025
Blackhillock, Phase II	Great Britain	NESO	100	SMA	BESS	2025
Blyth Battery	Australia	AEMO	238	Power Electronics	BESS	2025
Brendale BESS	Australia	AEMO	205	Tesla	GFM BESS	2025
Cleve Hill Solar Park	Great Britain	NESO	150	SMA	BESS	2025
Eurimbula Solar Farm and BESS	Australia; Queensland	AEMO	666	SMA	BESS	2025
Greenbank BESS	Australia	AEMO	200	Tesla	GFM BESS	2025
Heilongjiang Duobaoshan Static Self-synchronous Compensator Project	China; Heilongjiang	SGCC	90	NR Electric	GFM SSC	2025
Heilongjiang Kedong Static Self-synchronous Compensator Project	China; Heilongjiang	SGCC	50	NR Electric	GFM SSC	2025
Koorangie BESS	Australia	AEMO	185	Tesla	GFM BESS	2025
KPM Copper Mine New Energy Project	Democratic Republic of Congo		20	NR Electric	Solar+GFM BESS	2025
Limondale BESS	Australia	AEMO	50	Tesla	GFM BESS	2025
Mehrum's E-Statcom Project	Germany	TenneT	300	Siemens Energy	GFM STATCOM	2025
Melbourne Renewable Energy Hub	Australia	AEMO	600	Tesla	GFM BESS	2025
Neilston Greener Grid Park	Great Britain	NESO	50	SMA	BESS	2025
Ningxia Longyuan Mengjiawan	China; Ningxia	SGCC	295	NR Electric	GFM BESS	2025
Shallow Basket project	USA; New Mexico; Jicarilla Apache Nation	National Renewable Solutions	50	Tesla	GFM BESS, transmission-connected	2025
Smithfield BESS	Australia	AEMO	65	Tesla	GFM BESS	2025
Western Downs Battery	Australia	AEMO	510	Tesla	BESS	2025
Xinhua Hydropower GFM Fluoride Flow Energy Storage	China; Xinjiang	SGCC	250	NR Electric	GFM BESS	2025
Xinjiang Lixin Mulei Static Self-synchronous Compensator Project	China; Xinjiang	SGCC	50	NR Electric	GFM SSC	2025
Xinjiang Shache GFM BESS	China; Xinjiang	SGCC	200	NR Electric	GFM BESS	2025
Xinjiang Tuokexun Static Self-synchronous Compensator Project	China; Xinjiang	SGCC	50	NR Electric	GFM SSC	2025
Yunnan Wenshan Qubei Project	China; Yunnan	CSG	50	NR Electric	GFM BESS	2025
Amaala Project	Saudi Arabia		160	Sungrow	BESS	2024
Blackhillock, Phase I	Great Britain	NESO	200	SMA	BESS	2024
China First Grid-Forming ESS+PV Project	China; Yanweijuyan, Gansu		10	Sungrow	BESS	2024
China Resources Electric Power Hami	China; Hami		25	Huawei	BESS	2024
Golmud Leuneng	China; Qinghai		25	Huawei	BESS	2024
Grid-Forming ESS Project	China; Luopu, Xinjiang		250	Sungrow	BESS	2024
Grid-Forming ESS Project	Tibet; Ihsasa		40	Sungrow	BESS	2024
Guoneng Ningdong Shuguang Project	China; Ningxia	SGCC	65	NR Electric	GFM BESS	2024
Huadian Jinchuan Hongyuan Grid-forming ESS	China; Sichuan		50	Sungrow	BESS	2024
Huadian Rikaze Sanzuzi Qumei PV+ESS	Tibet		18	Sungrow	Solar+BESS	2024
Huadian Shannan Naidong Cai Peng Phase II	Tibet		20	Sungrow	BESS	2024
Jilin Bamian Static Self-synchronous Compensator Project	China; Jilin	SGCC	50	NR Electric	GFM SSC	2024
Jilin Xiangrong Static Self-synchronous Compensator Project	China; Jilin	SGCC	50	NR Electric	GFM SSC	2024
Kupono Solar	USA; Hawaii	HECO	42	Tesla	BESS	2024

(Reference) Global Grid-Forming Landscape

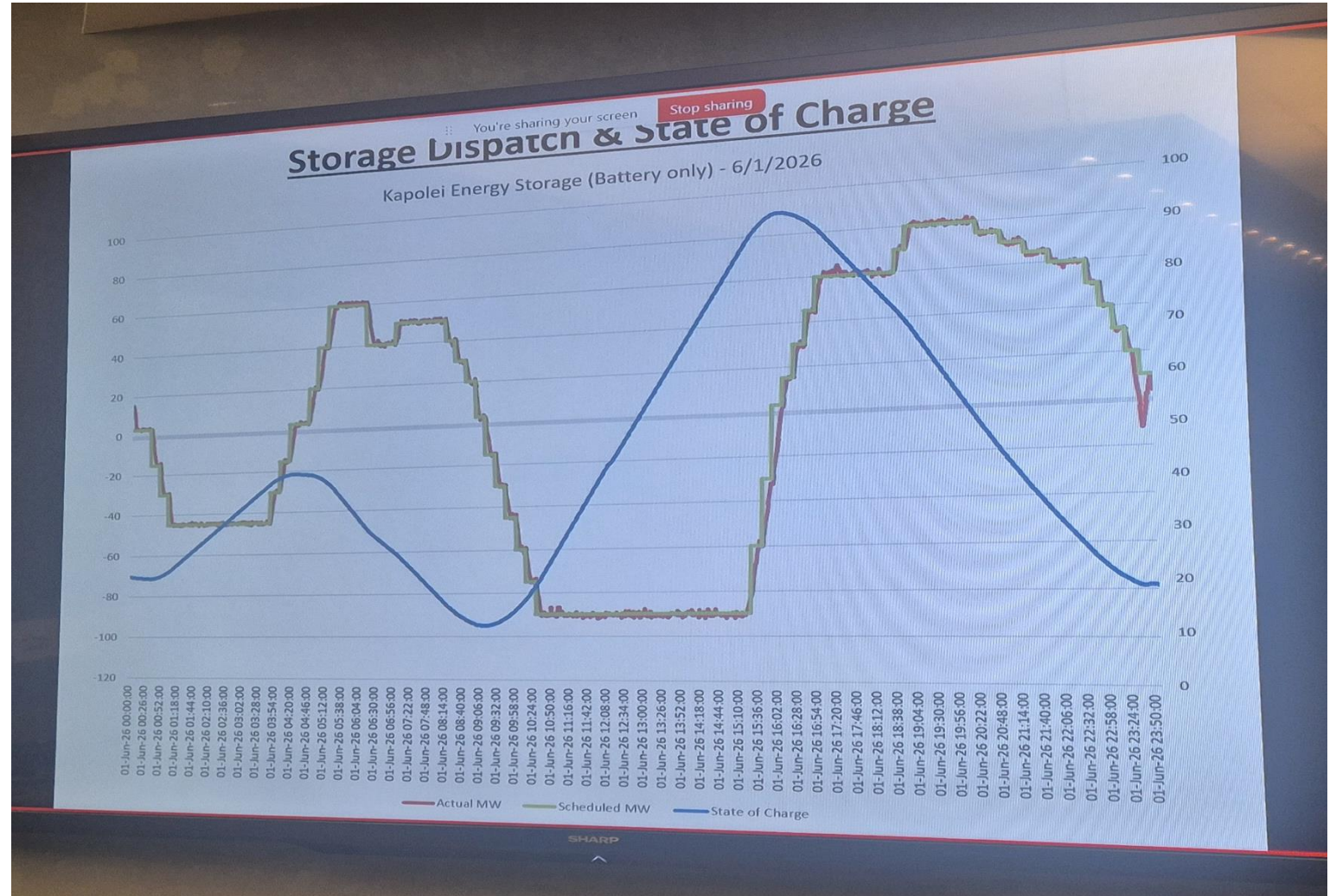
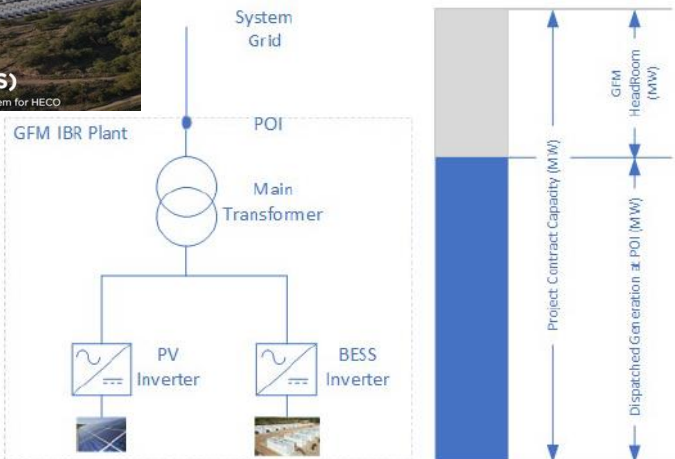
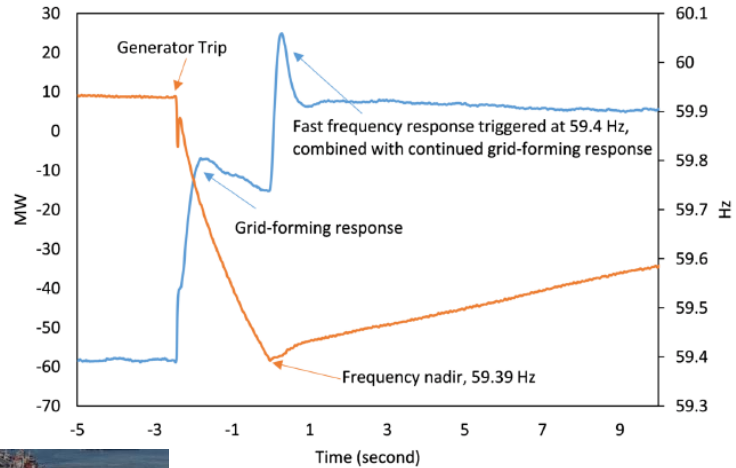
GFM Projects Deployed or Under Construction - ESIG Status Update



Hawaii HECO Field Demonstration

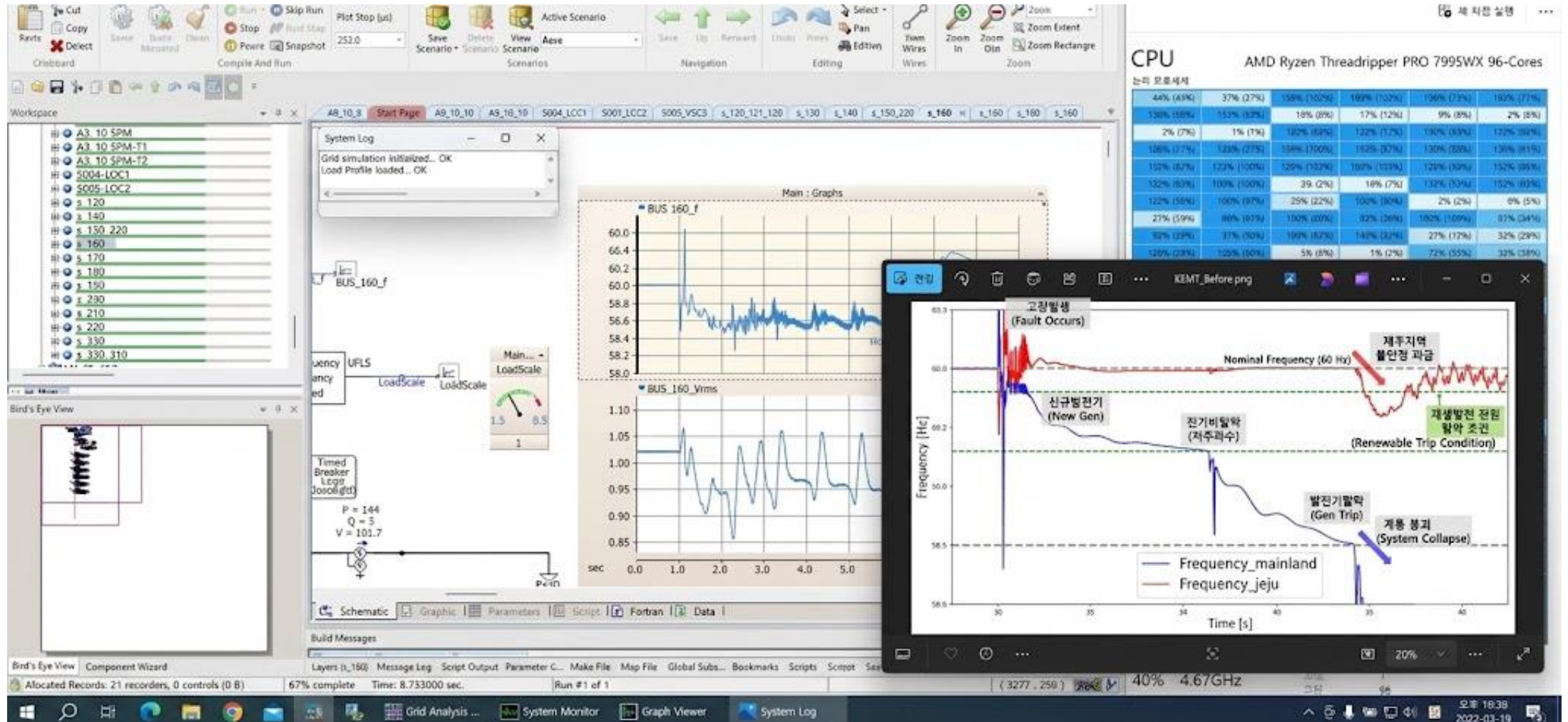
HECO: continuous GFM-mode operation averted two grid-collapse events as of May 2026 (largest thermal unit trip; storm-related line and load trip)

- Maximizes grid benefit by combining long-duration BESS use (RE backup) with an inertia role



Wide-Area Transmission Network EMT Modeling

High-Performance Computing, Cascading Failure Analysis, GFM Mitigation Verification
Large Scale Transmission Network EMT Simulation (39 Parallel Network Interface)



P-HILS Stabilization Verification

Established a test environment equivalent to the actual grid installation and verified GFM stabilization performance at the level of leading bodies such as NERC (US) and AEMO (Australia) by applying diverse grid disturbances

P-HILS Test Site

Real Time Simulator



200kVA Amplifier



500kVA GFM Inv.



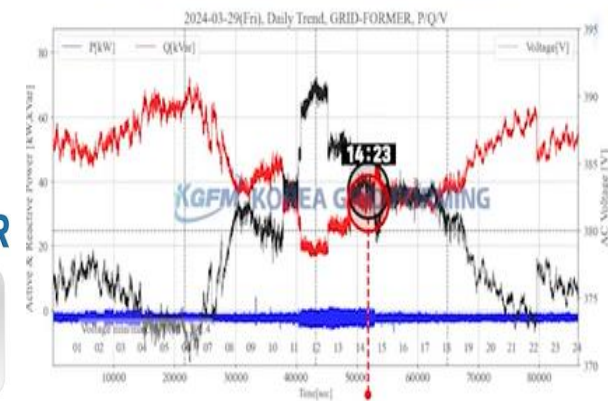
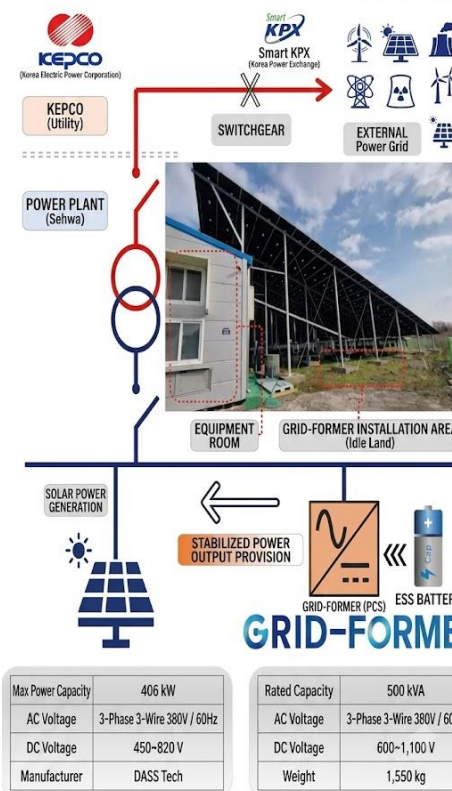
90kWh VIB Battery

40kVA GFL Inv.

110kVA GFM Inv.

Actual Installation Site

SEHWA SOLAR POWER PLANT OVERVIEW



P-HILS Stabilization Verification

Oscillations under high RE penetration were reproduced with P-HILS; the grid-forming solution kept the system stable

SCR=1.9, without GFM inverter

SCR=1.9, with GFM inverter

Frequency

Generator 1

Generator 2

GFM

GFM
disabled

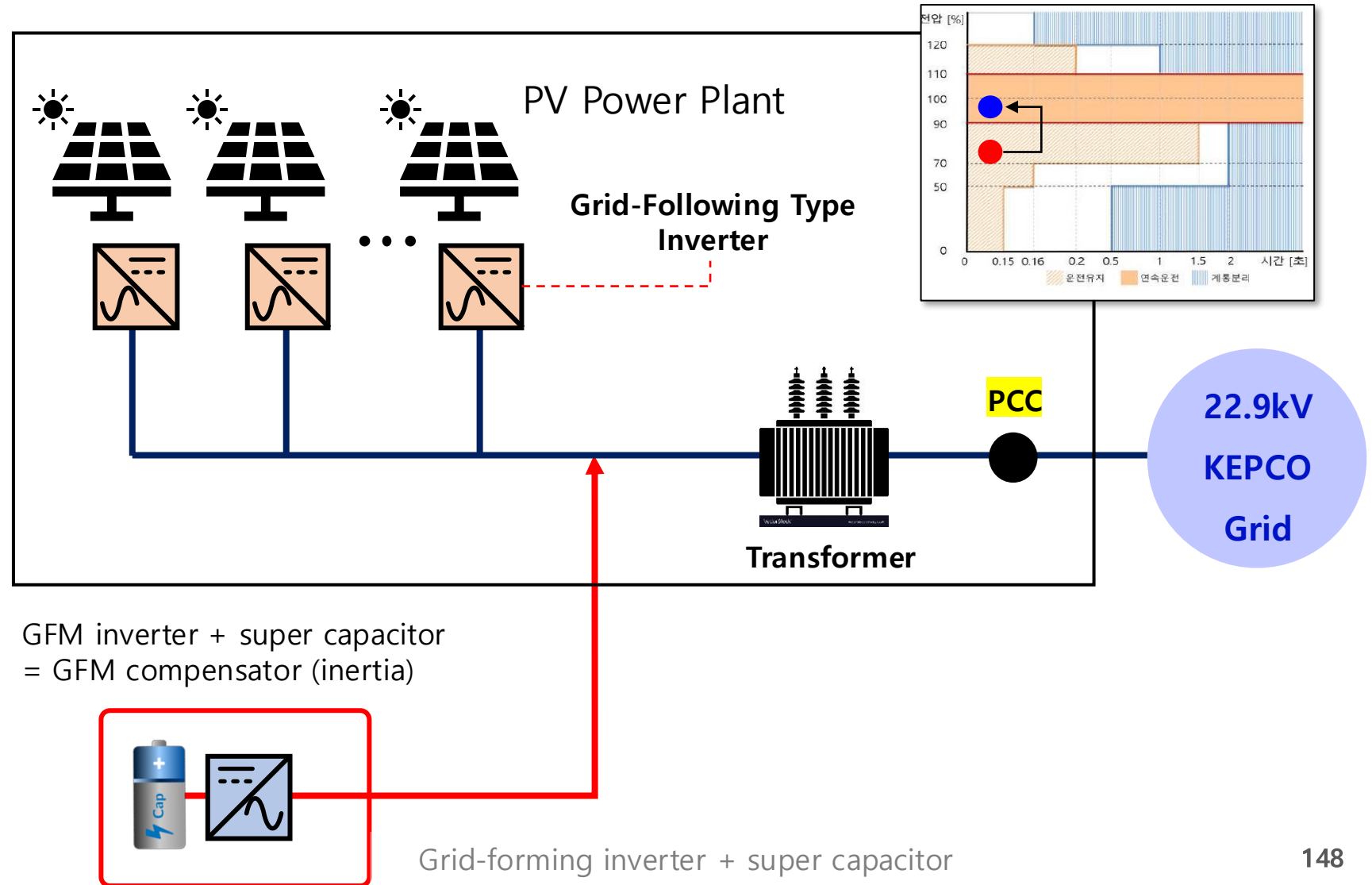
GFM
enabled

P-HILS emulation of a weakened grid with high RE

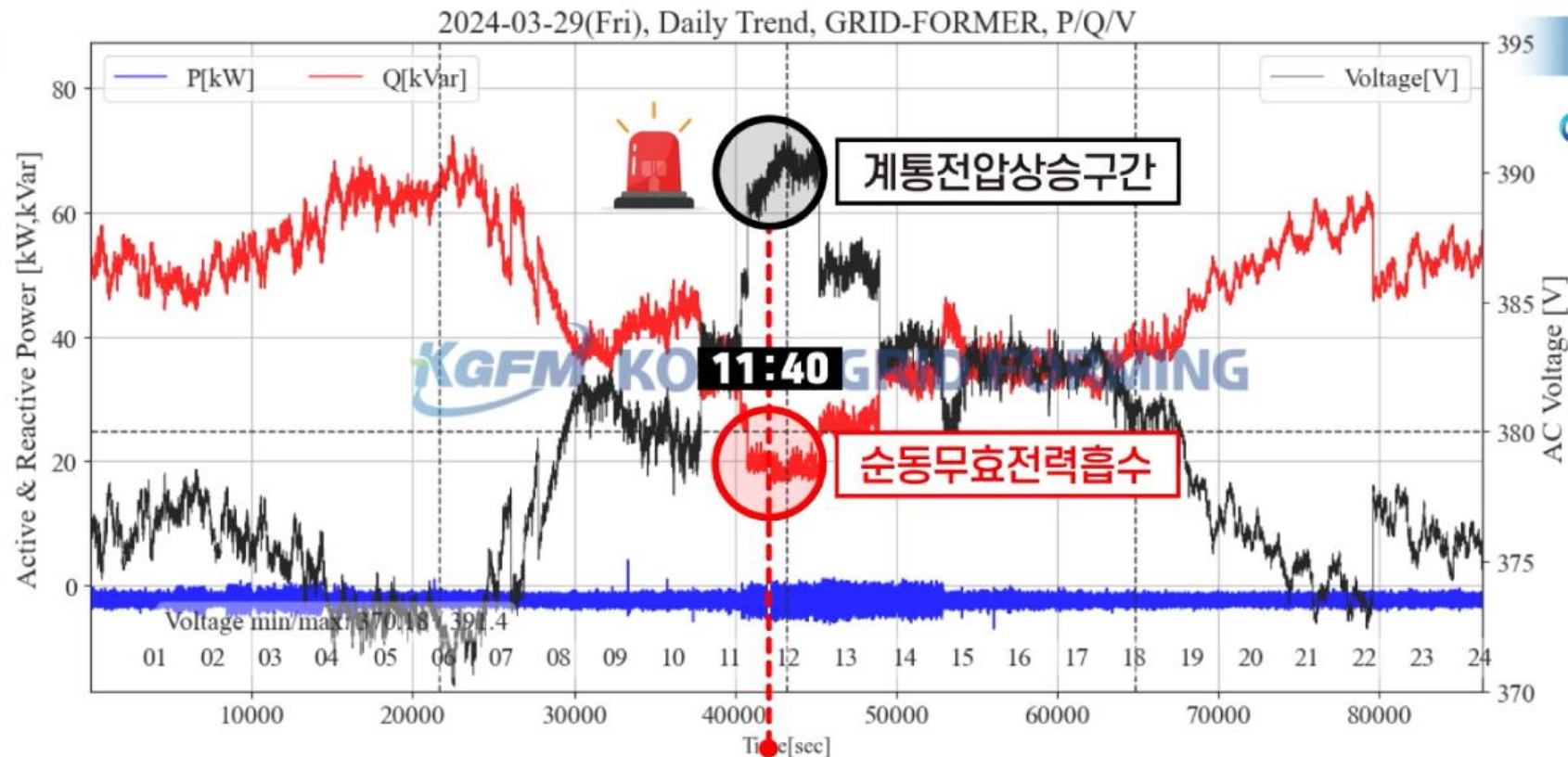
Stabilization with grid-forming

Jeju Island GFM Installation Case

Successfully installed a supercapacitor-based grid-forming compensator in parallel with the existing PV inverters, significantly improving the stabilization capability of the PV plant

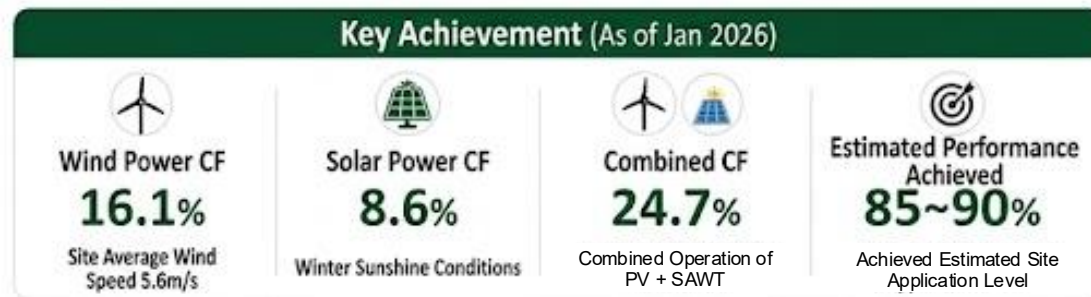
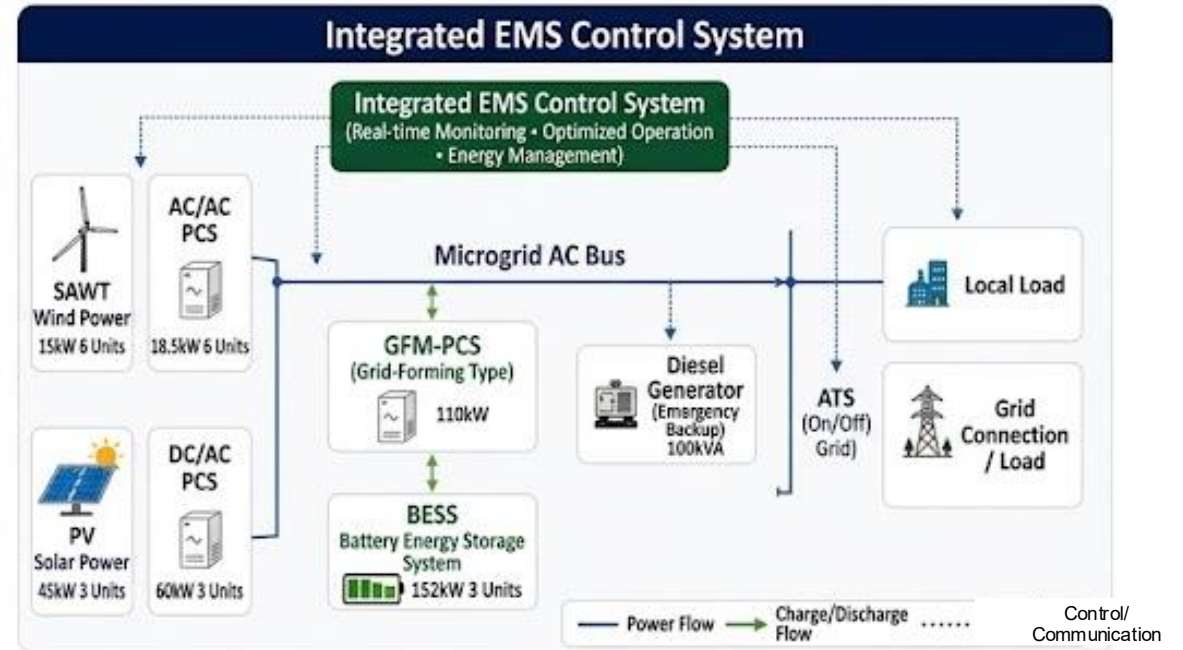


Jeju Island GFM Installation Case



Gwangyang Port Commercial Microgrid

Microgrid with our grid-forming PCS operating at a reclaimed-land site



Gwangyang Port Commercial Microgrid

Grid-forming BESS installed for the Gwangyang Port microgrid supplying reclaimed-land pump loads; grid restoration testing performed



Renewable energy site



Installed GFM inverter

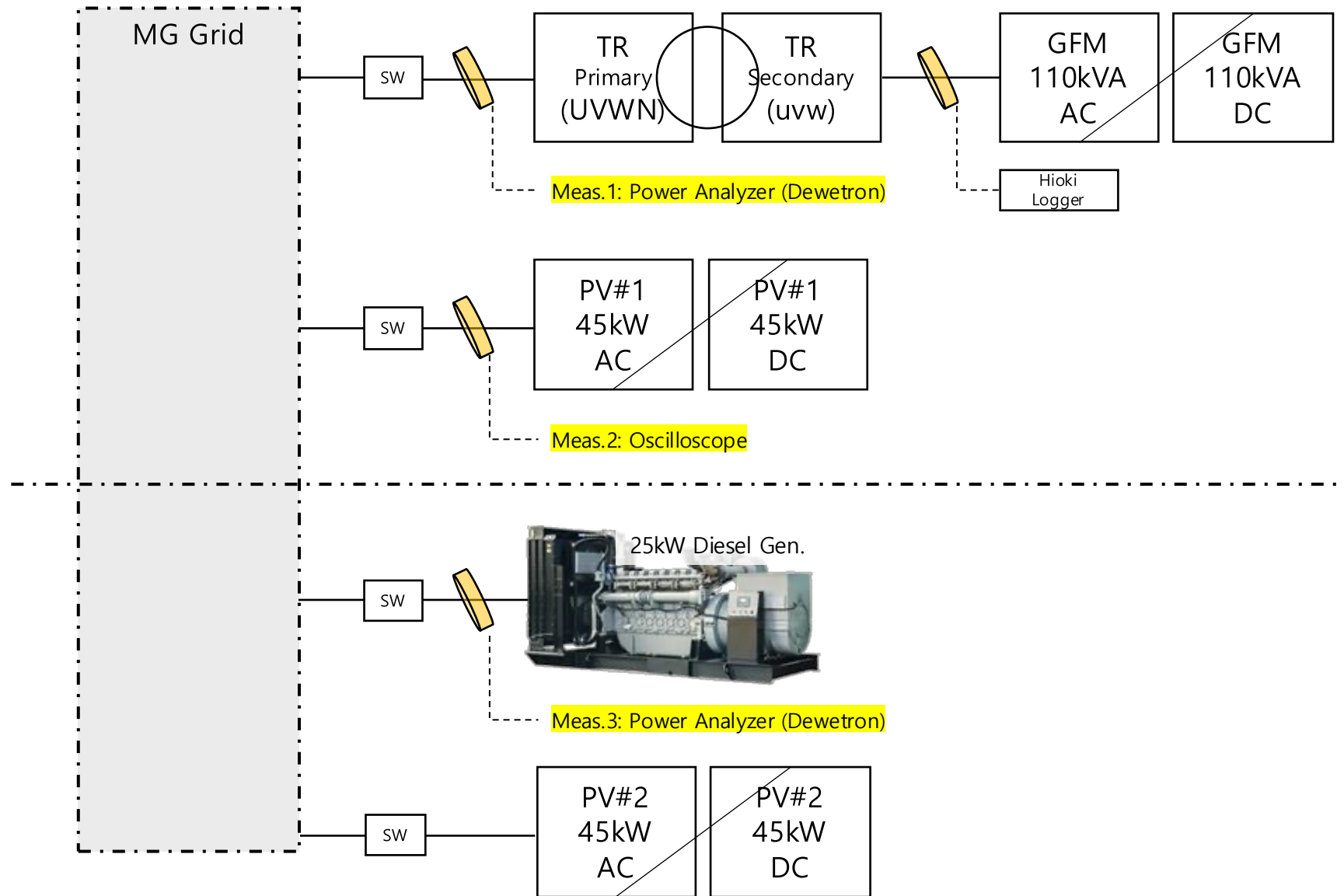


GFM black start energization



RE generation after restoration

Microgrid Field Test

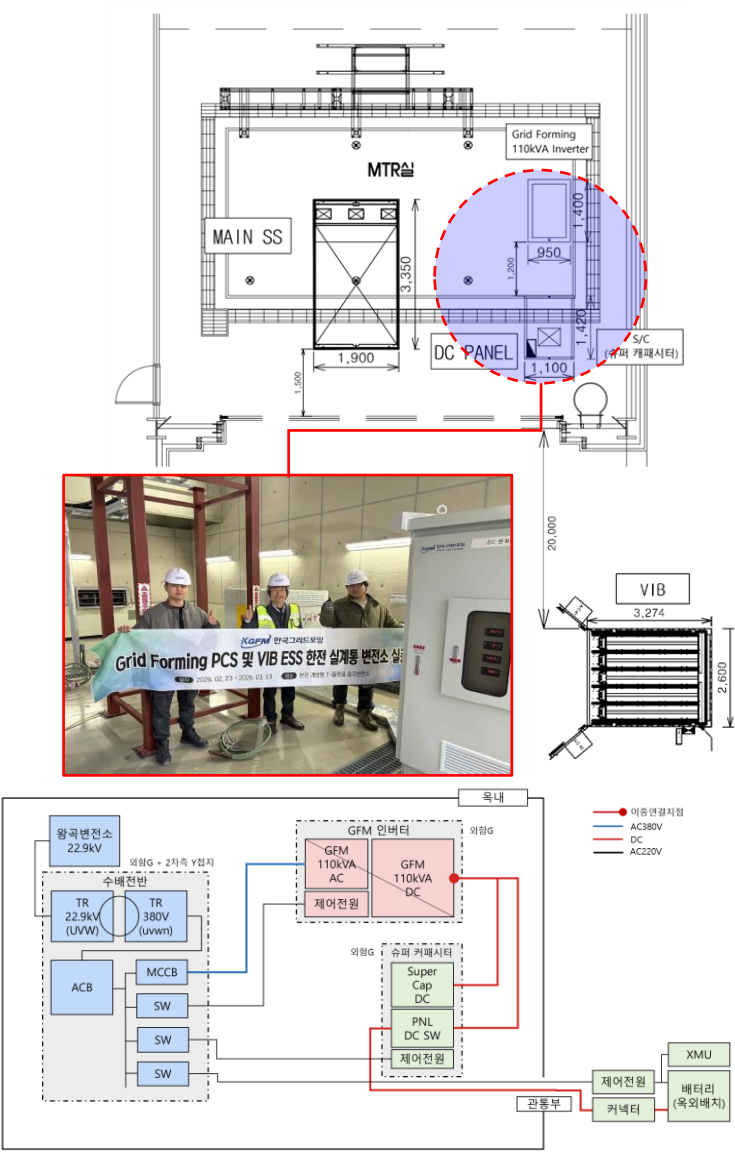


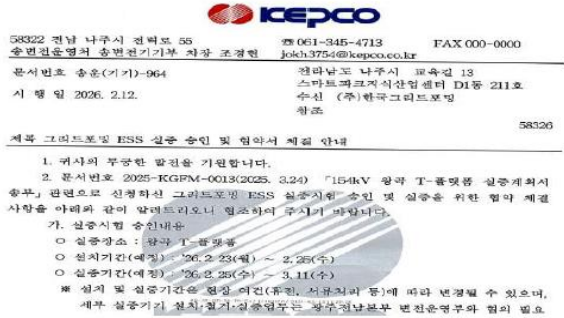
<Test Sequence>

- ① Full system shutdown
- ② Start diesel generator
- ③ Black start, min. load supply
- ④ Start PV (start-up failed)
- ⑤ Stop PV
- ⑥ Stop and disconnect generator
- ⑦ Start GFM
- ⑧ Black start, min. load supply
- ⑨ Start PV, add units in steps
- ⑩ Stop/disconnect PV in sequence
- ⑪ Start diesel generator
- ⑫ Synchronize and connect
- ⑬ Disconnect diesel generator

GFM Test at KEPCO Substation

GFM BESS at KEPCO's Wanggok substation: charge/discharge, fast frequency reserve, and GFL-GFM mode transition tests verified frequency and voltage stability gains

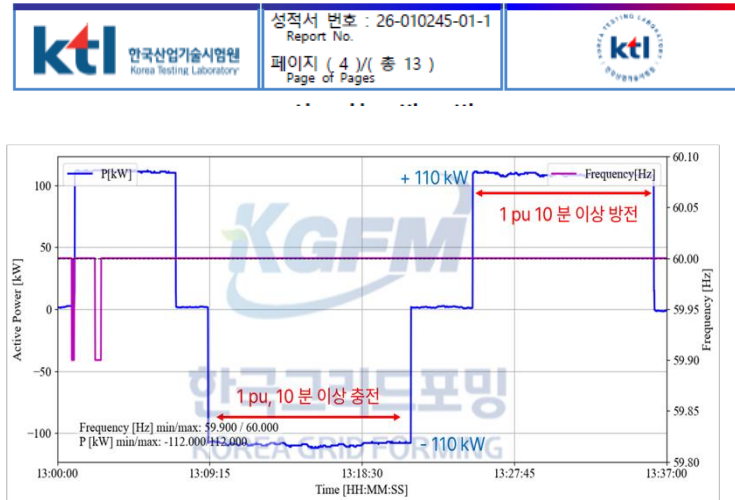
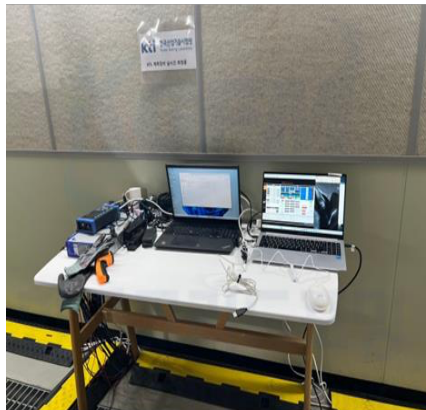


일시	추진내용
2024. 12.	- 그리드포밍 실계통 실증을 위한 한전 본사, 사업소 협의 - 사전검토 사이트: 서안성 변전소(경기), 전력연구원(고창), 나주 지역 변전소 
2026.2.9.	- 최종 승인 심의위원회 통과, 한전과 협약 체결  58322 전남 나주시 전력로 55 송변전운영부 송변전기기부 차장 조경현 061-345-4713 FAX 000-0000 문서번호 송운(기기)-964 전라남도 나주시 포곡길 13 스마트에너지사업팀 DI동 211호 시행일 2026. 2.12. 수신 (주)한국그리드포밍 차장 58326 제목 그리드포밍 BESS 실증 승인 및 협약서 체결 안내 1. 귀사의 무궁한 발전을 기원합니다. 2. 문서번호 2025-KEGFM-0013(2025. 2.24) 「154kV 왕각 T-폴렛용 실증계회차 송부」 관련으로 신청하신 그리드포밍 BESS 실증시험 승인 및 실증을 위한 협약 체결 사항을 아래와 같이 알려드리오니 일조하여 주시기 바랍니다. 가. 실증시험 승인내용 ○ 실증장소 : 왕각 T-폴렛용 ○ 설치기간(예정) : '26.2.23(월) ~ '26.2(수) ○ 실증기간(예정) : '26.2.28(수) ~ '3.11(수) ※ 설치 및 실증기간에 현장 여건(휴일, 설날 등)에 따라 변경될 수 있으며, 세부 실증기일 및 설치/실증절차는 송변전본부 변전운영부와 협의 필요.
2026.2.12.	한전 본사, 사업소와 시공 및 운영방안 회의 
2026.2.23.	- 설치공사 개시 - 한전, 한국그리드포밍, 파이온일렉트릭, 스탠다드에너지의 인력, 노하우, 장비를 투입하여 강화된 안전기준을 극복

일시	추진내용
	 
	준공완료, 운전개시 
2026.3.6.	

GFM Test at KEPCO Substation

GFM BESS at KEPCO's Wanggok substation: charge/discharge, fast frequency reserve and GFL-GFM mode transition tests verified stability gains



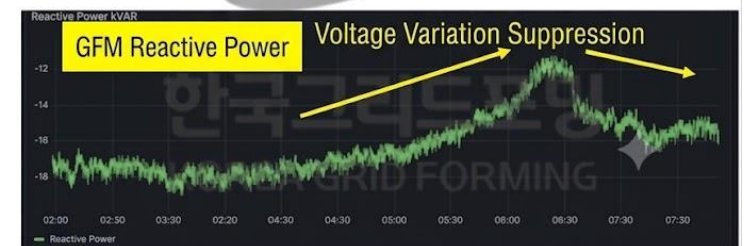
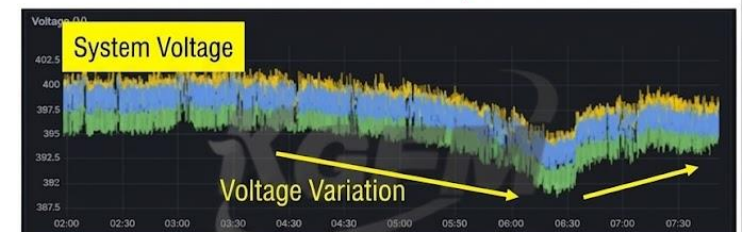
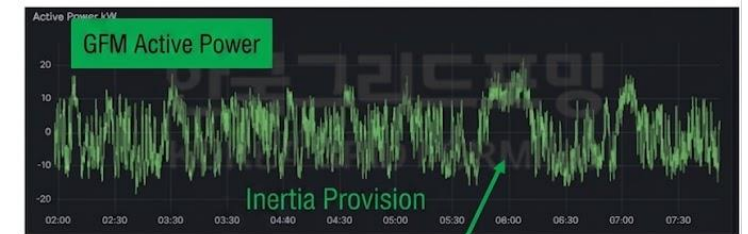
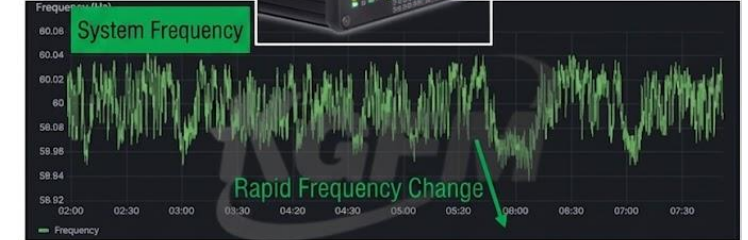
GFM Charge/Discharge Test



GFL-GFM Mode Transition Test

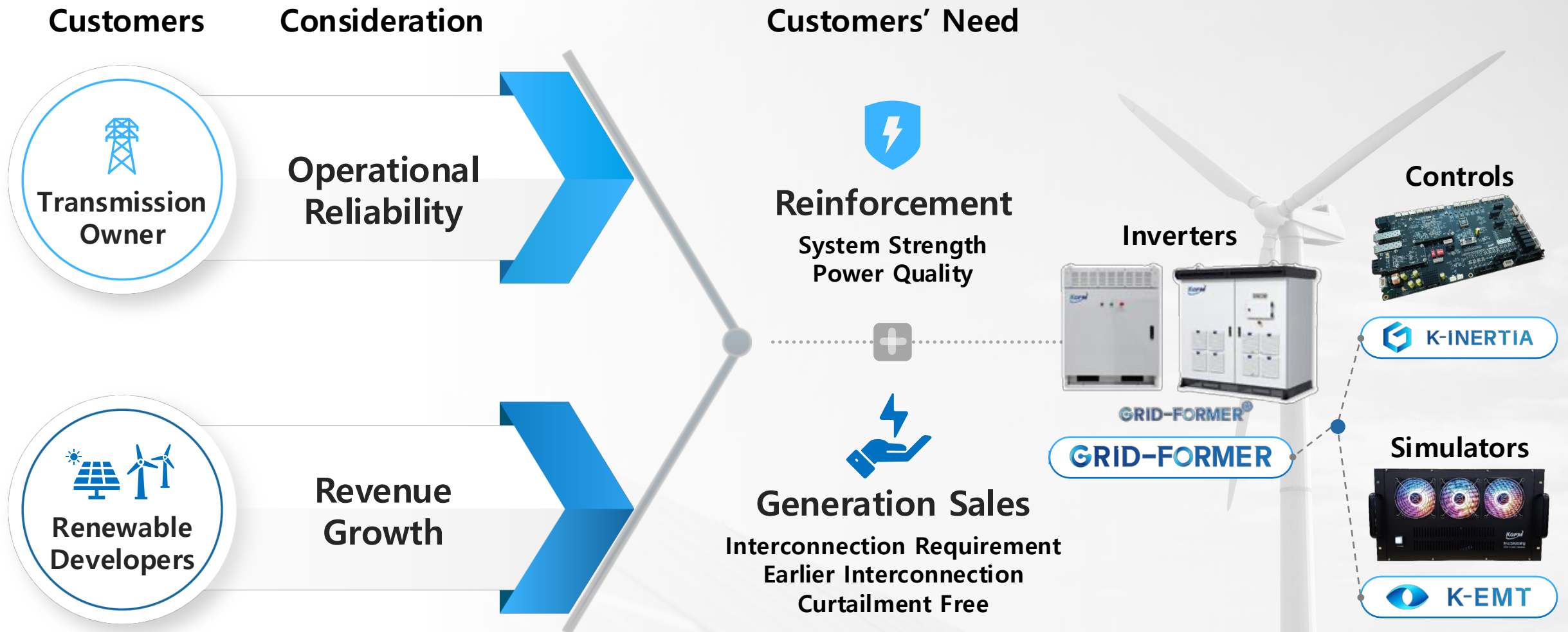


XMU Records



GFM Commercial Business Models

Provides Reliable Grid-Forming Solutions to Customers



GFM Commercial Business Models

Grid-Former®

- ① Grid-forming compensator (SuperCap)
- ② Grid-forming PCS (BESS)

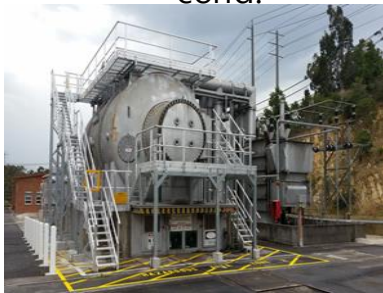
Dynamic Reactive Power

- ✓ Replaces STATCOM
- ✓ Replaces shunt reactor



Voltage + Inertia

- ✓ Replaces synch. cond.

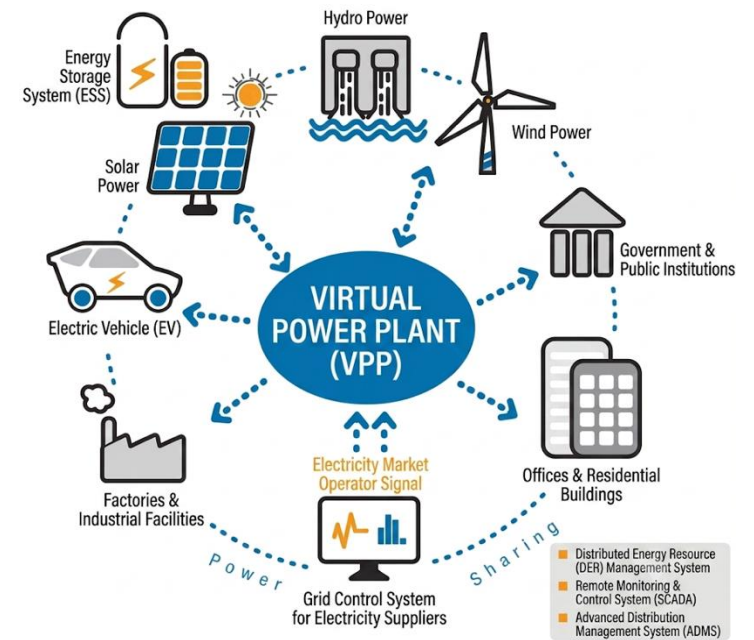


Voltage + Inertia + Storage

- ✓ Replaces synch. gen.
- ✓ Replaces ESS
- ✓ Provides fast reserve



GRID-FORMER®



GFM BESS PCS Supply for VPP

Thank you
Q & A



High-Resolution real-Time Diagnostic Platform (realTPA) for Forest Fire and Landslide Early Warning

Woo-Kyun LEE, Minwoo ROH, Sujong Lee, Sunwoo KIM, Uichan KIM,
Heunwoo CHO, jihun KANG

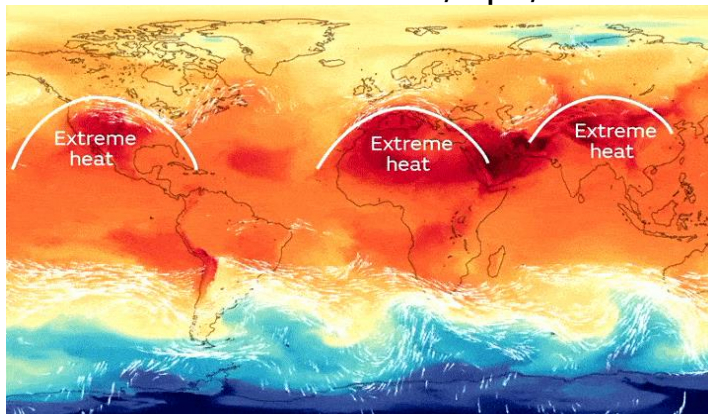
Background: The New Normal of Climate Disasters

- High Risk in Forest Fire and Landslide due to extreme climate in Mid Latitude and S. Korea

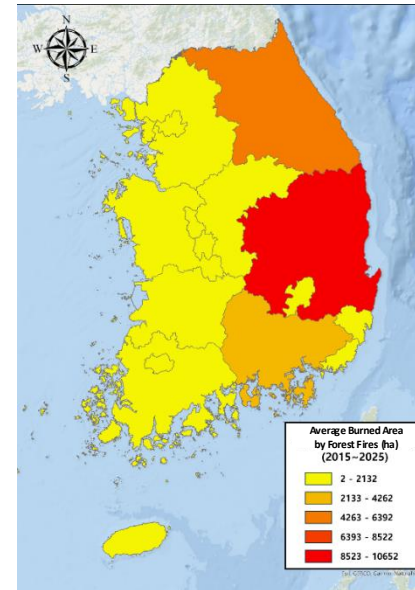


Ongoing Extreme Weather Events, Damage Spreads to Mid-latitude Regions

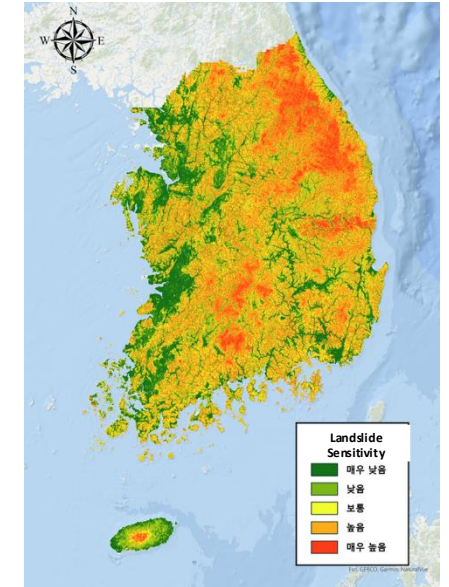
Source: KBS The World Now, Sep. 9, 2023



A Stagnant Polar Jet Stream and Extreme Heat in the Mid-latitude Region
Source: Yale Environment 360



Average Burned Area by Forest Fires
Source: Korea Forest Service



Landslide Sensitivity Level
Source: OJER@Resilience Institute



Background: The New Normal of Climate Disasters

Why it matters

Climate change is intensifying forest fire and rainfall-induced landslides in mountainous regions.

In South Korea, forests cover **~63%** of the territory — year-round forest fires and landslides are increasing.

Disaster impacts are shifting from rare events to a recurring, system-wide risk.

Limits of conventional forecasting

Spatial resolution

Administrative District-level forecasts cannot identify individual slopes, stands, or facilities at risk.

Surface condition

Ignition & slope failure vary with vegetation, fuel load, soil and terrain — even under similar weather.

Operational linkage

Response & recovery budgets dominate; little capacity remains for prevention-oriented field action.

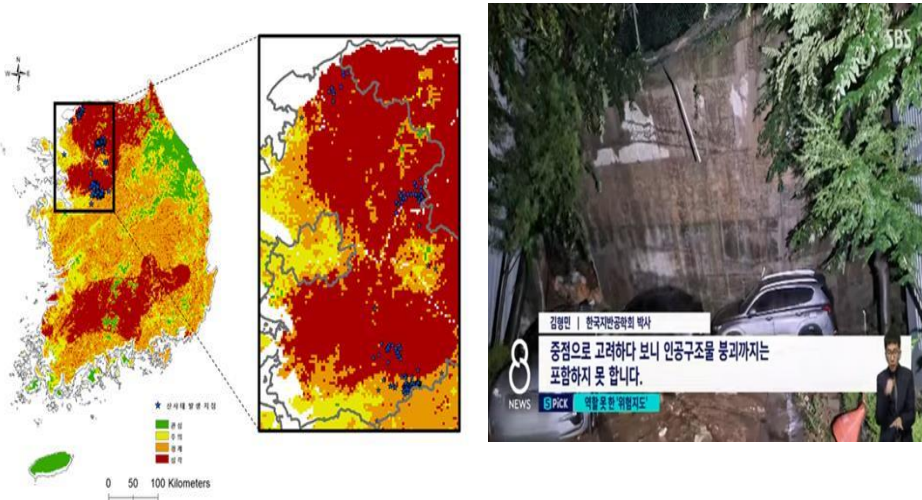
Research Objective: From Forecasting to Diagnosis

CONVENTIONAL

Forecasting

Administrative-scale risk, estimated mainly from weather data.

[Limitations of Weather-Based Forest Disaster Prediction Model]



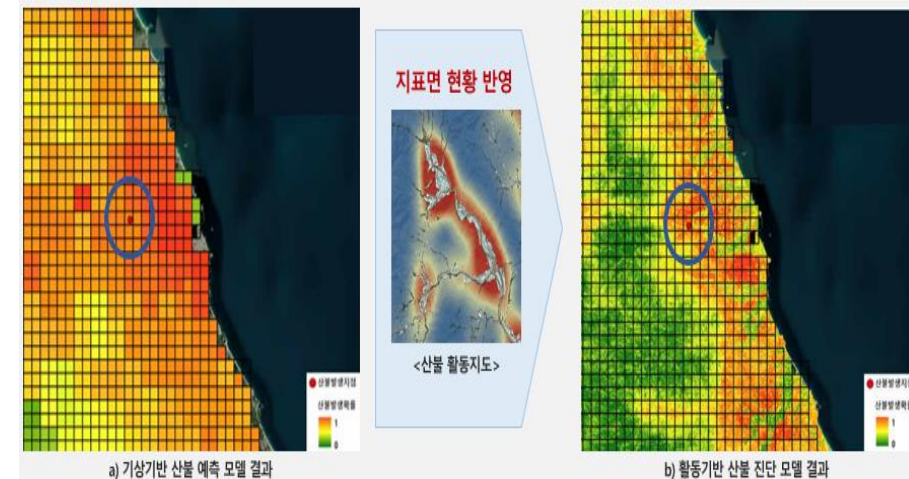
- Based mainly on broad-scale weather forecasts
- Predictions are limited to regional-scale disaster risk assessment.

realTPA

Diagnosis

Weather + ground data (vegetation dryness, fuel load, slope) & human activity to pinpoint high-risk locations.

[Need for a Forest Disaster Diagnosis Model]



- Integrates broad-scale weather information with surface data.
- Enables place-based diagnosis of forest disaster risk

Toward prevention-oriented disaster management through **real-Time monitoring, Place-based diagnosis, and targeted Action.**

realTPA Data & System Architecture

Meteorological

Temperature, humidity, wind,
precipitation (ASOS / AWS)

Remote sensing

VTCI & NDVI from GK-2A/AMI and GEMS
imagery

Topographic / env.

Slope, TRI, soil type & depth, forest
structure (1:5,000)

All inputs standardized to a **100 m grid** via coordinate transformation & spatial resampling for spatiotemporal consistency.

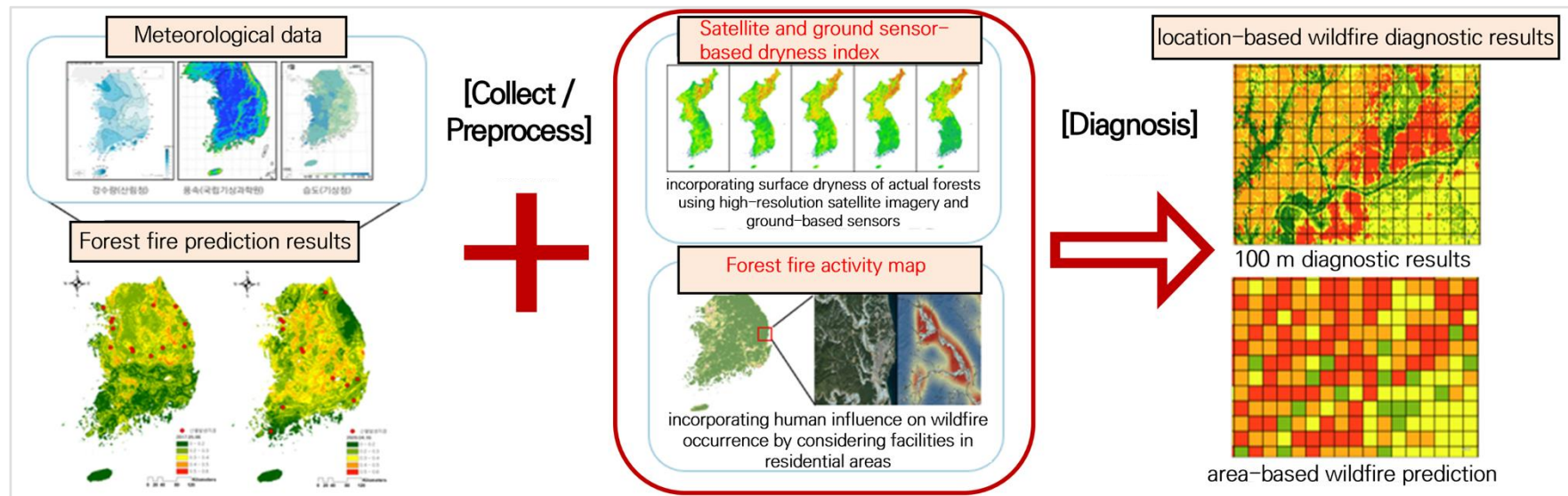
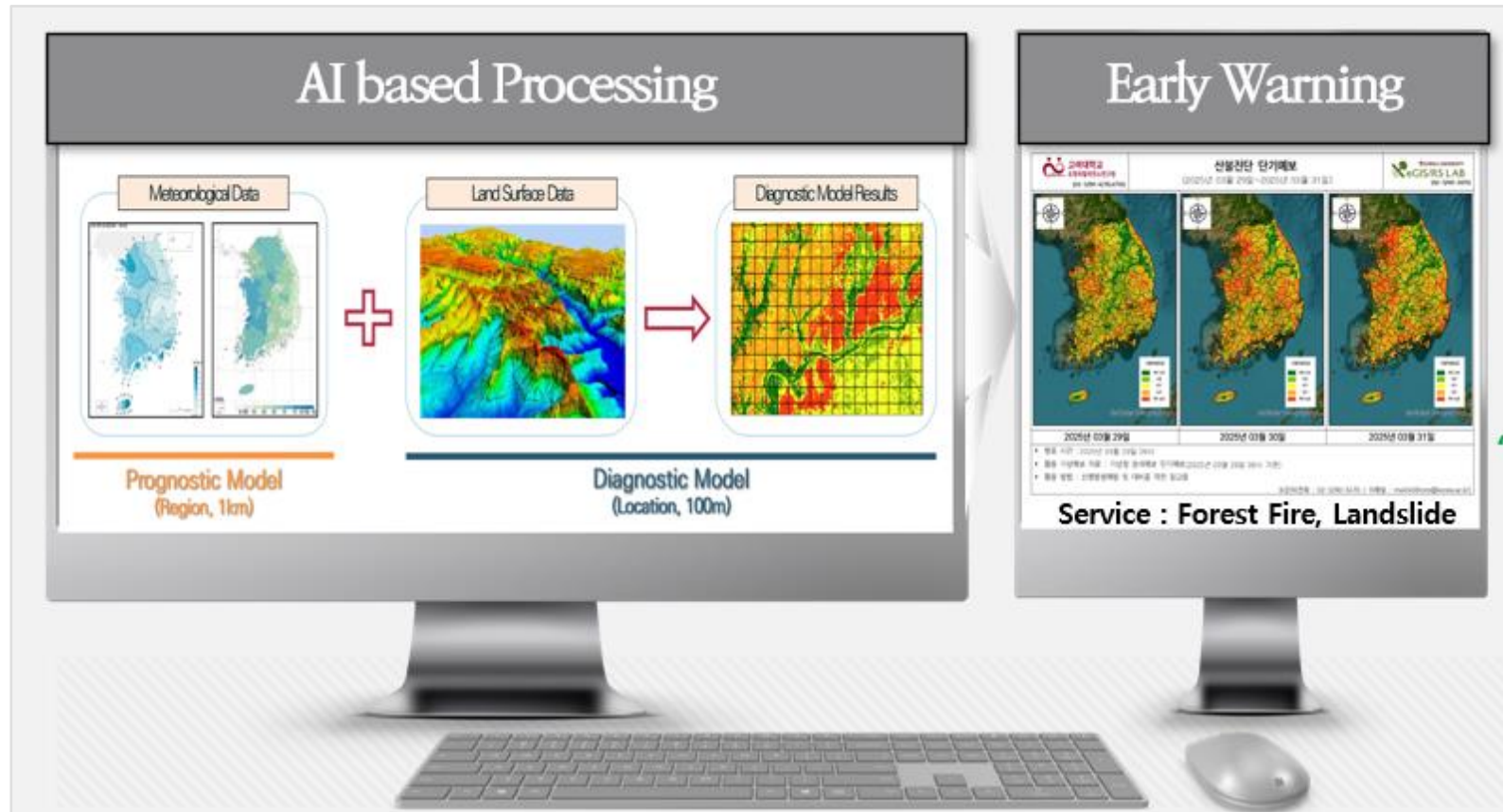


Figure 1. realTPA integrates meteorological, satellite, and anthropogenic data to produce 100 m resolution diagnostics.

Real-Time Processing Pipeline



100 m

High Resolution

0.5 hour

Short-term

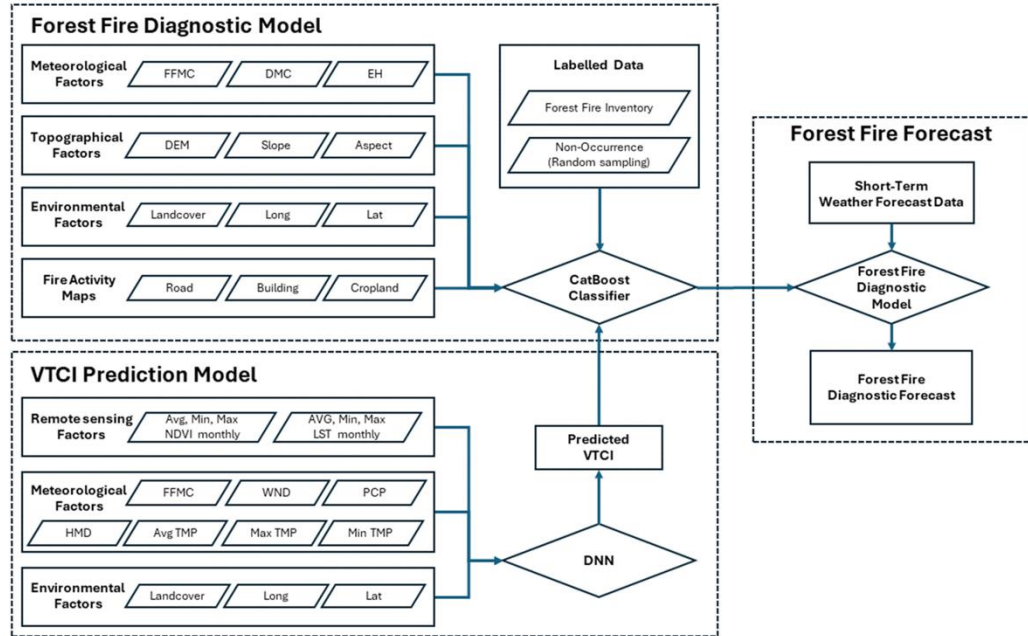
1 hour cycle

Update

Figure 2. AI-based processing of meteorological & land-surface data into 100 m diagnostic maps for forest-fire and landslide services, enabling near real-time monitoring.

realTPA enables near **real-time monitoring** and **short-term** risk forecasting through **0.5-hour** map generation and **1-hour update cycles**.

Forest Fire Risk Diagnosis – CatBoost



Model choice

CatBoost handles categorical & mixed geospatial variables, with strong wildfire-risk performance.

Key input variables

- Effective Humidity (EH) – cumulative drying effect on fuel
- VTCI – satellite-derived surface dryness
- Population density & road proximity – ignition risk

Weather-Based Forecasting VS realTPA-Based Diagnosis

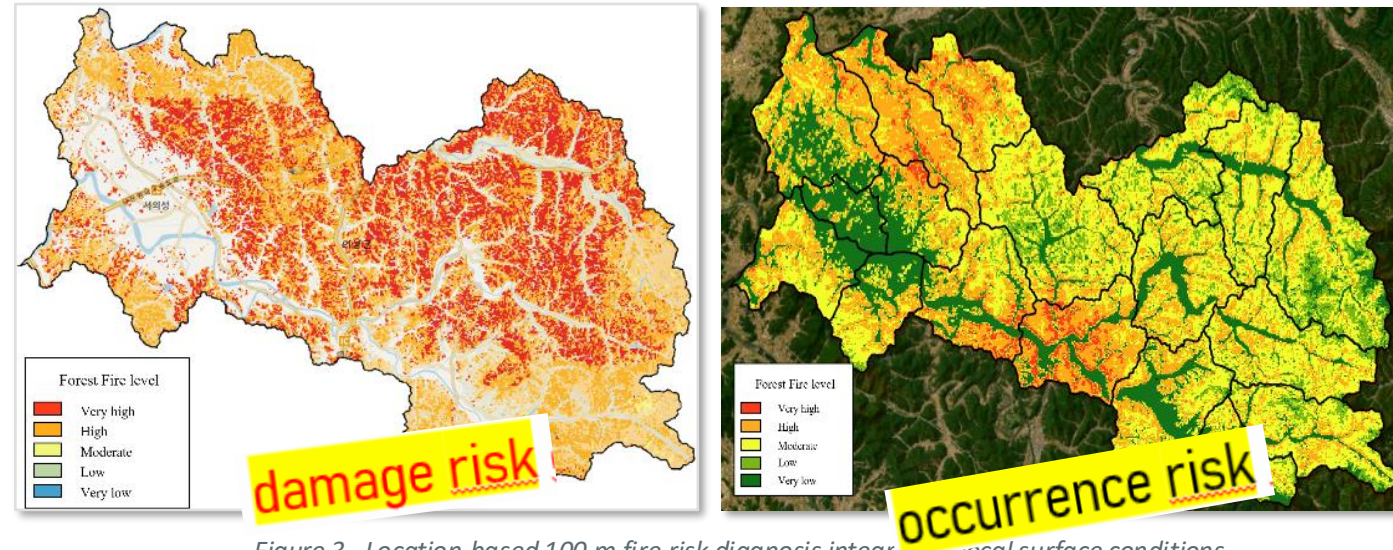
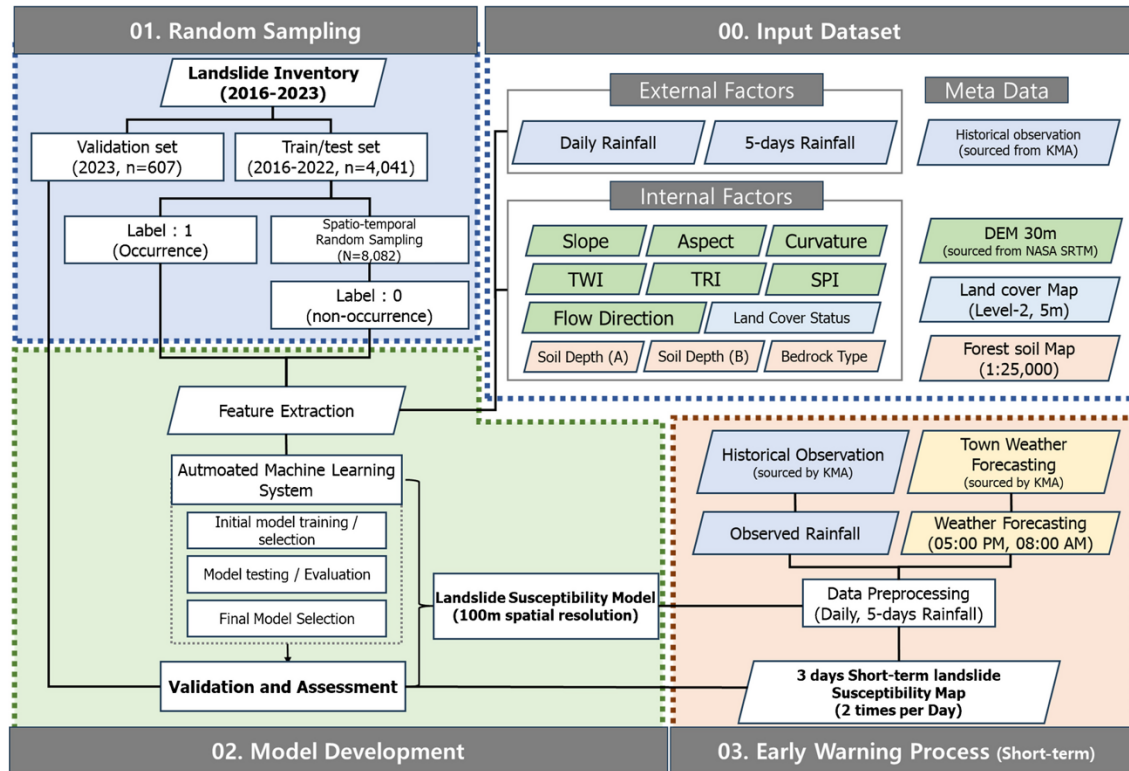


Figure 3. Location-based 100 m fire-risk diagnosis integrating local surface conditions.

1. Weather-based forecasting provides wildfire **damage risk** estimates at a regional scale.
2. realTPA integrates weather and surface data to diagnose wildfire **occurrence risk** at specific locations.
3. This approach offers enhanced **spatial specificity** compared with conventional forecasting methods.

Landslide Susceptibility — Random Forest



1

Controlling factors

Susceptibility is controlled by terrain and short-term rainfall.

2

Model selection

Random Forest selected via PyCaret AutoML + hierarchical k-fold cross-validation; outperforms conventional statistical approaches.

3

Forecast output

72-hour forecasts at 100 m resolution across the Korean Peninsula.

Results – Algorithm Performance

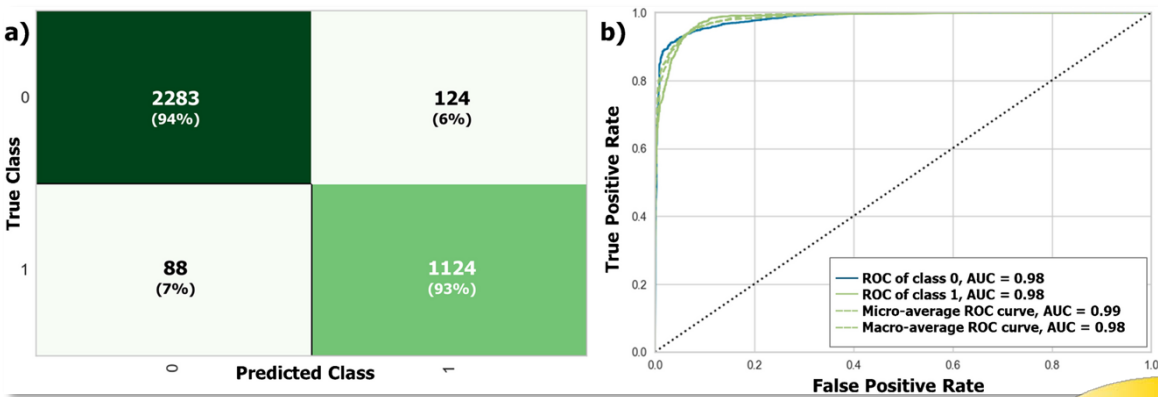


Table 1. Performance metrics for the forest-fire and landslide diagnostic models.

Model	Accuracy	AUC	Recall	Precision	F1	Kappa	MCC
CatBoost Classifier	0.8899	0.9524	0.8423	0.8324	0.8372	0.7541	0.7543
Light Gradient Boosting Machine	0.8875	0.9502	0.8414	0.8272	0.8340	0.7490	0.7493
Random Forest Classifier	0.8844	0.9473	0.8281	0.8280	0.8279	0.7408	0.7410
Extreme Gradient Boosting	0.8840	0.9480	0.8319	0.8248	0.8282	0.7407	0.7408

Table 1. Performance metrics for the forest-fire and landslide diagnostic models.

Metric	Forest Fire (CatBoost)	Landslide (Random Forest)
Accuracy	0.89	0.93
Precision	0.87	0.95
Recall	0.88	0.92
AUC (ROC)	0.94	0.98
Kappa	0.81	0.85

Table 1. Performance metrics for the forest-fire and landslide diagnostic models.

- The model was trained using data from 2016–2022.
- Independent validation was conducted using 2023–2024 data with a 7:3 train–test split.
- PyCaret AutoML selected CatBoost for wildfire prediction and Random Forest for landslide prediction.
- Both models performed well, with the landslide model (Accuracy = 0.93, AUC = 0.98) outperforming the wildfire model (Accuracy = 0.89, AUC = 0.94)

Operational Validation (1. 2025 – 3. 2026)

Risk Category	Count	Ratio
Very Low	27	5.3%
Low	52	10.3%
Moderate	43	8.4%
Dangerous	263	51.5%
Very Dangerous	125	24.5%
Total	510	100%

Table 2. Distribution of 510 observed fire events across realTPA risk categories (Jan 2025 – Mar 2026).



The results demonstrate that realTPA provides operationally meaningful early warnings for the majority of observed wildfire events.

Case Study 1 – Uiseong-gun Fire, Mar 2025

Classified **Very Dangerous at 9:00 AM** — 2 hours before ignition (11:00 AM, 22 Mar 2025).

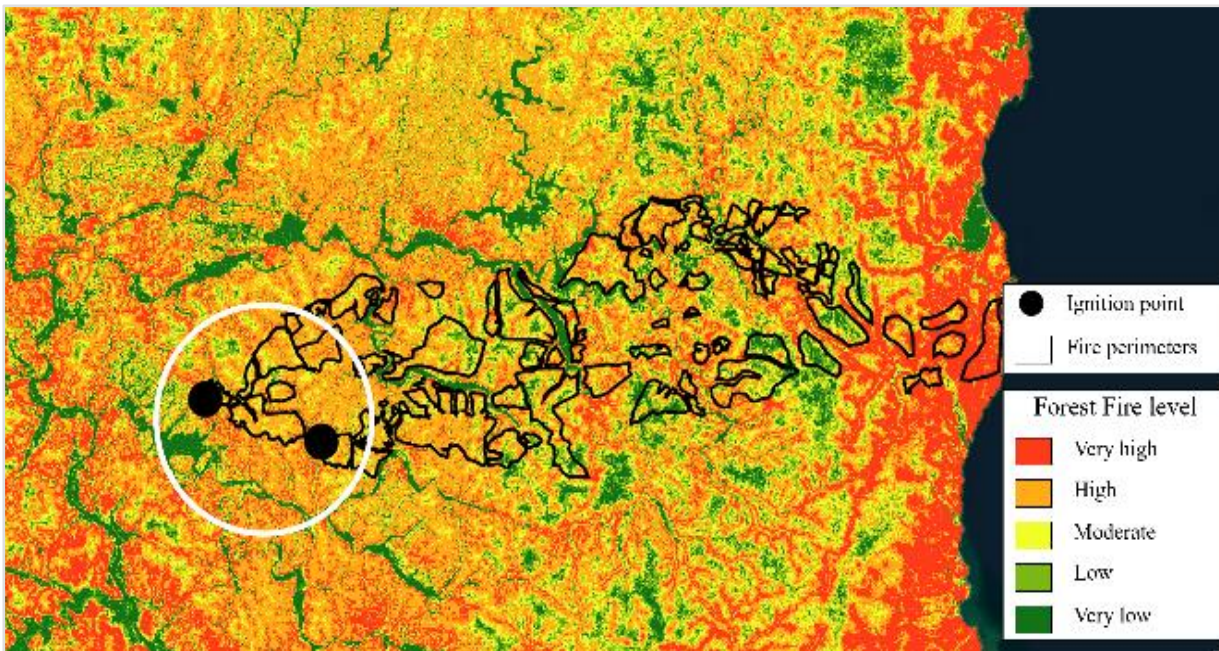


Figure 4. 100 m fire-risk diagnosis overlaid with the actual fire perimeter & ignition points.

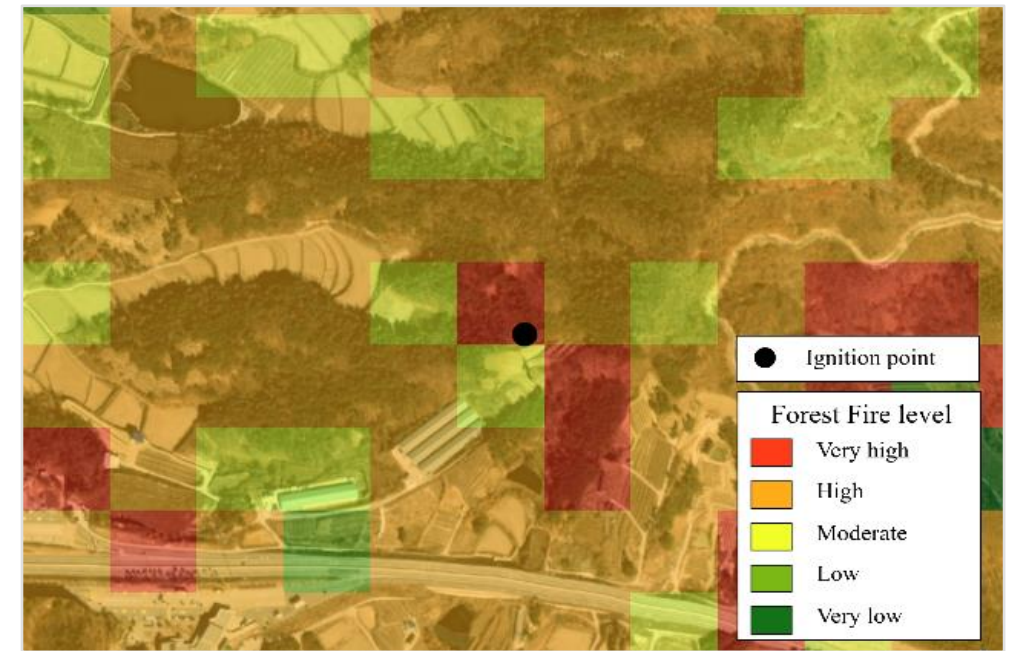


Figure 5. Ignition point 1 (Angye-myeon, Yanggok-ri) — grid-level risk prior to the fire.

realTPA identified the Uiseong wildfire area as **“Very Dangerous”** two hours before ignition, demonstrating its capability for location-specific early warning.

Case Study 2 — Buyeo-gun Landslide, Jul 2024

Classified **Very High risk -13 hours** before reported landslides;
>95% of slides fell in high / very-high cells.

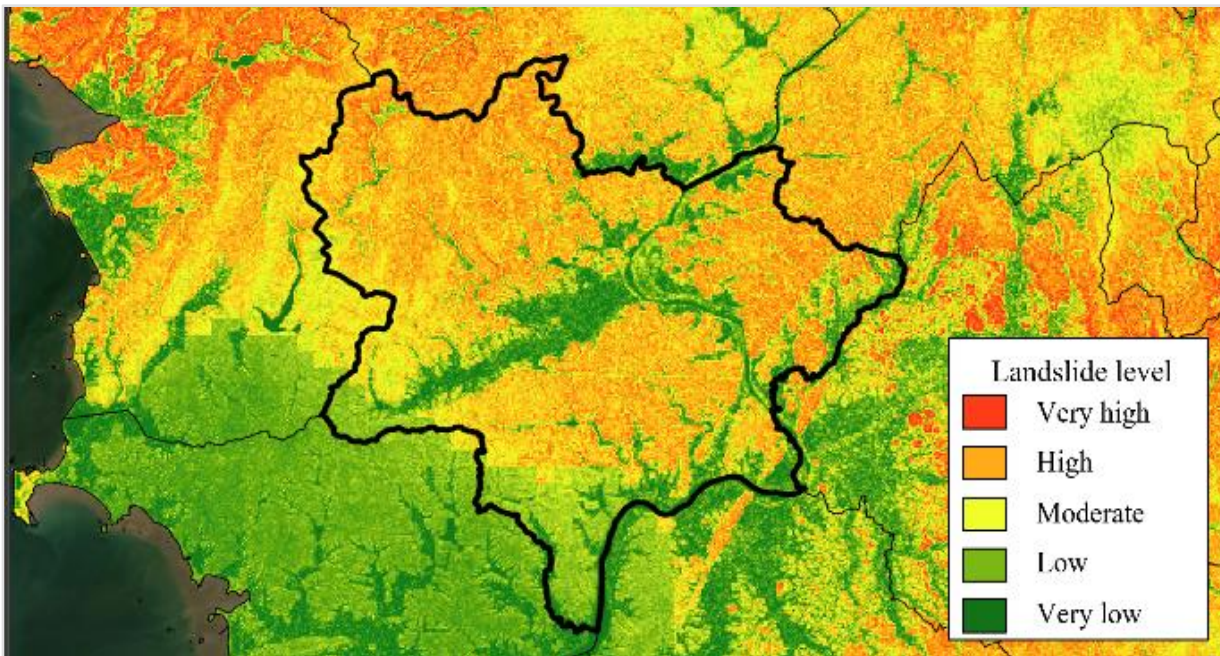


Figure 6. Overall 100 m landslide-risk classification across Buyeo-gun.

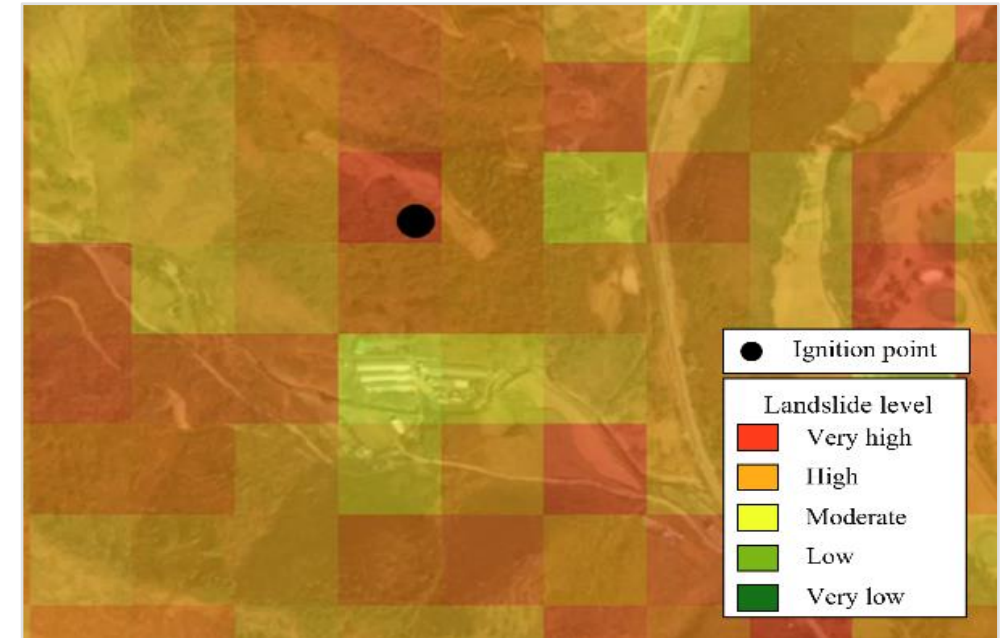


Figure 7. Detailed view of the affected point — grid-level risk prior to the landslide.

Over 95% of observed landslides were accurately identified as **“Very high”**-risk areas, confirming the model's reliability.

The Disaster Prevention Industry

1

Prevention management services

Fuel management (thinning, litter removal), species conversion & drainage — from one-off projects to ongoing services.

2

Local job creation

Training residents in aging rural areas as 'Climate Disaster Prevention Experts', building regional resilience.

3

Operational infrastructure

Digital-twin systems that optimize patrol routes and give real-time response guidance from diagnostics.

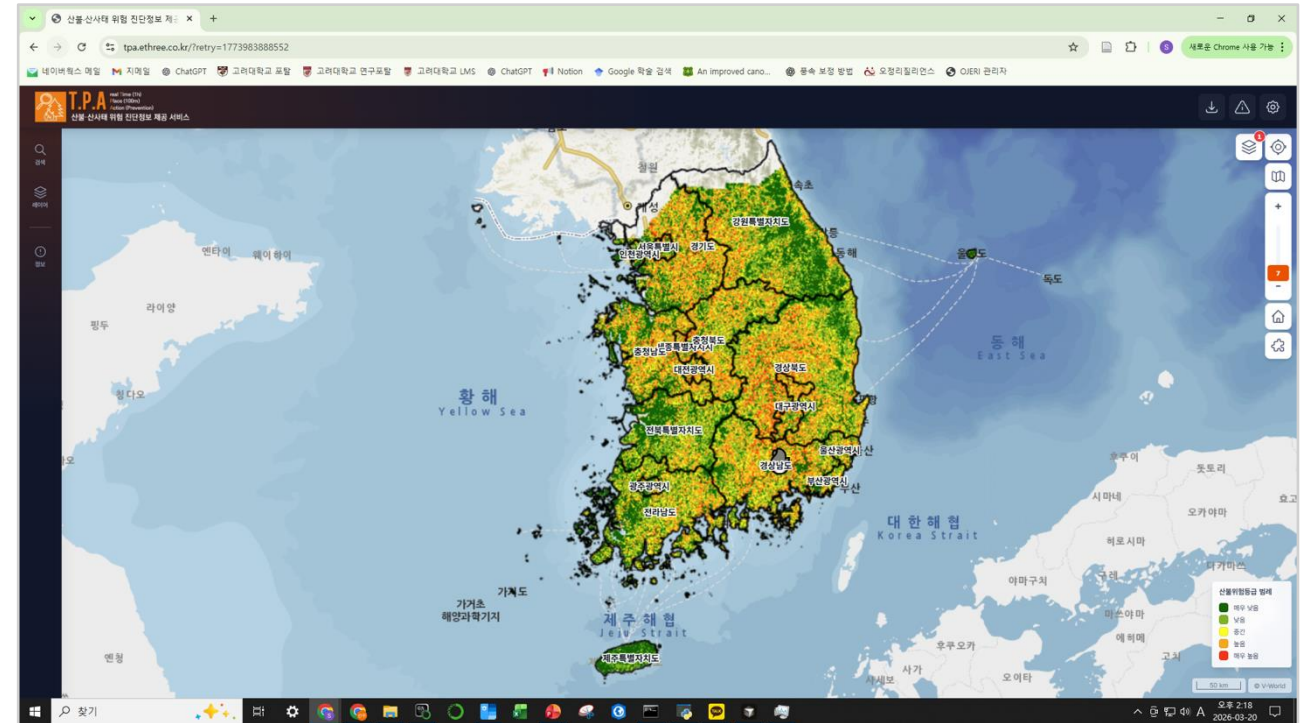


Figure 8. The realTPA web platform (tpa.ethree.co.kr) — real-time fire-risk visualization.

<https://tpa.ethree.co.kr/map>

Carbon Neutrality & Economic Viability

Disaster prevention also prevents carbon emissions.
Protected forests can be valued as **Avoided Emission Credits**.

1.11 M tons

excess sequestration across 5 carbon-neutral counties (incl. Uiseong)

≈ USD 245 million

estimated value + broader avoided-recovery social benefits

MRV-based **carbon trading supports** both
climate neutrality and **rural development**.

carbon-neutral counties -> emitter

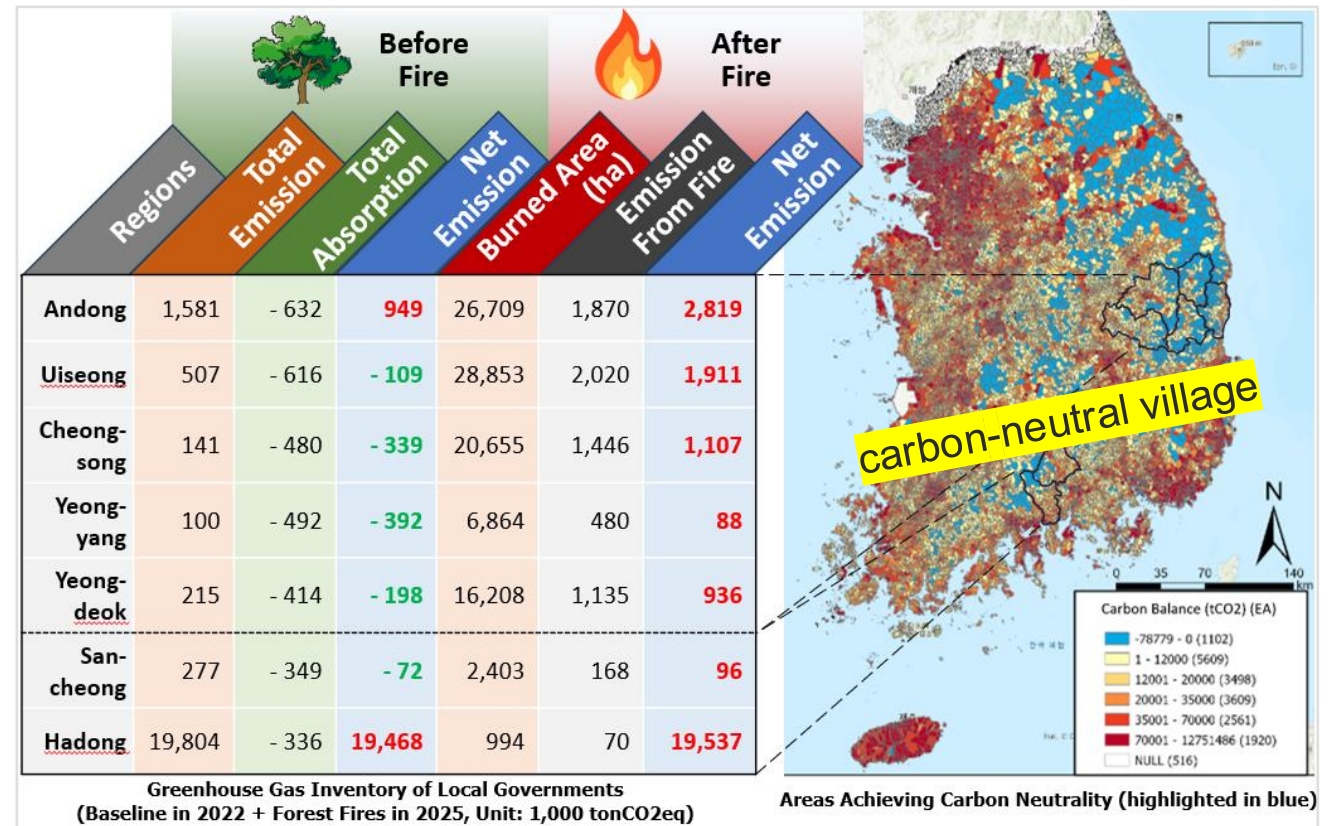
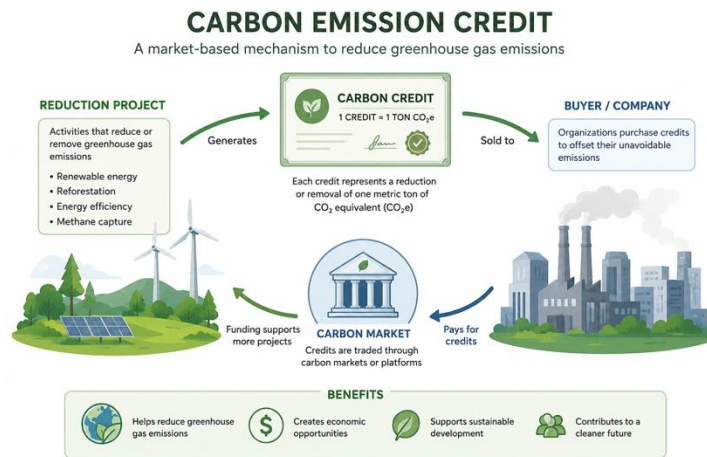
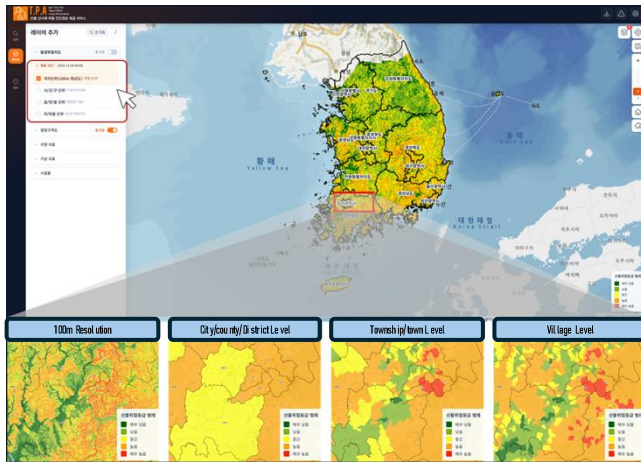


Figure 9. Carbon emission / absorption change before & after the Mar 2025 fire — neutral municipalities shifting to net emitters.

Conclusion & Three-Stage Roadmap

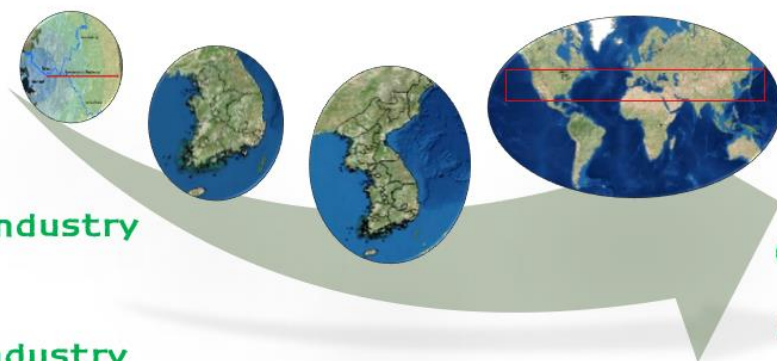
realTPA classified **76–80%** of observed events as high-risk in advance, with case studies confirming **2–13 hour lead times**.
Disaster management should shift from forecasting to diagnosis, and from recovery to prevention.



Now National realTPA deployment; prevention-focused local KPIs. **1–3 yrs** Integrate avoided-emission credits; Disaster Prevention Industry special law. **4–5 yrs** Cross-ministerial platform; global standardization.

Prevention should be recognized as a strategic industry for climate adaptation, carbon neutrality, and regional equity.

Thank you for your listening



Land based
Carbon Sink Industry

AI based
Prevention Industry

Carbon Neutrality
Local Development

Carbon Neutral Village

Woo-Kyun LEE, Minwoo ROH, Sujong Lee, Sunwoo KIM, Uichan KIM,
Heunwoo CHO, jihun KANG



Code of {Nature.}

Code of Nature Investor Relations Presentation

CEO | Jaehong Park · hong@c-of-n.com

Website ↗

Media ↗

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By 2050, Soil Degradation Could Put the Global Food Supply at Risk

“ The UNCCD warned that **a sixth of the world's food supplies was at risk** from the deterioration of the world's rangelands ... ”

@The UNCCD's report

—— Today, one-sixth of the world’s food supply is already at risk.

Current Share of Degraded Land Worldwide 40%
Projected Share by 2050 Over 90%

* Source: UNESCO(2024), UNCCD

• Global soil degradation status and projections (2019–2050)



* Source: Map of degraded land over total land area in 2019. Data: UNCCD. Image: Save Soil.

Annual Degraded Land Area 120,000 km²

Equivalent to 198 times the size of Seoul

Annual Loss of Fertile Soil 2.4 billion tonnes

Equivalent to an 8 cm layer of topsoil across the entire Korean Peninsula (~220,000 km²)

Population Directly Affected by Soil Degradation 3.2 billion

—— Impacts: livelihood, food security, and ecological risks

[Four Global Soil Crisis Indicators]

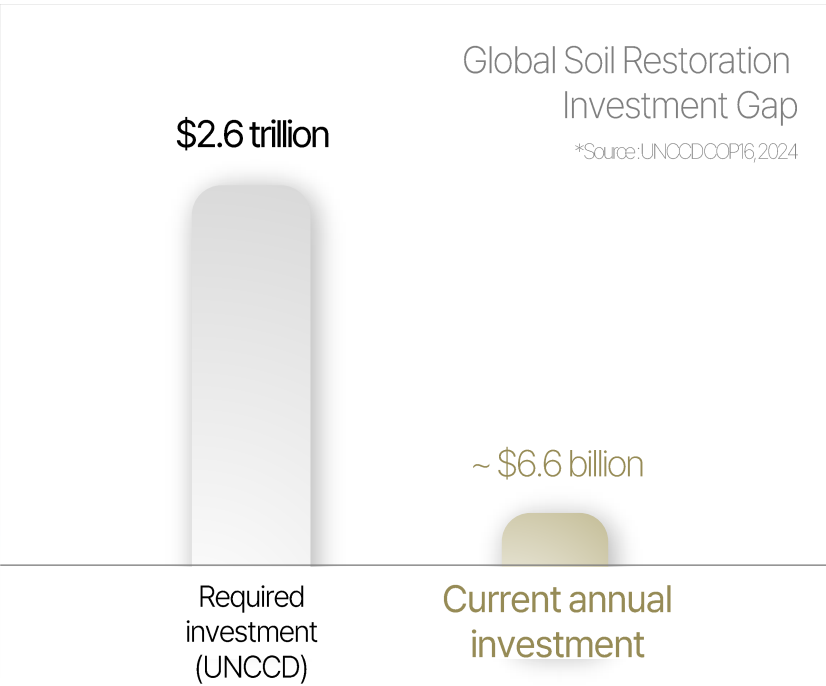
* Source : UNCCD(United Nations Convention to Combat Desertification) / FOD / UNESCO

Rising Demand, Stagnant Technology

1 Growing Restoration Demand, Lack of Private-Sector Solutions

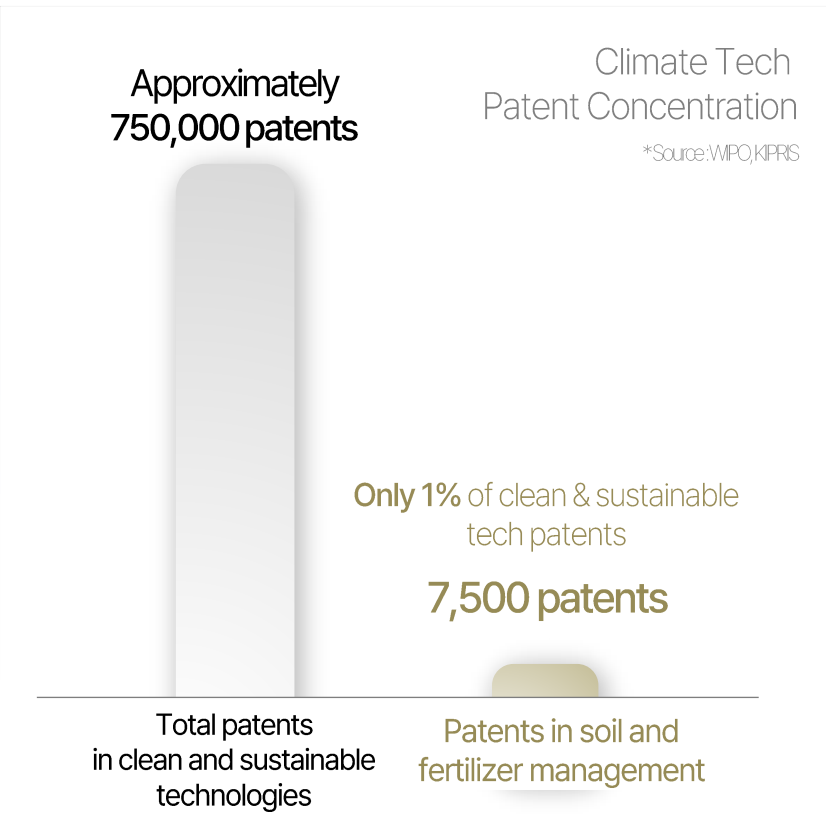
UN Calls for \$2.6 Trillion Investment to Restore Degraded Land.

-Ibrahim Thiaw, Executive Secretary, UNCCD-



- The UN Decade on Ecosystem Restoration (2021–2030), led by UNEP, warns that the pace of land degradation is outstripping nature’s ability to recover.
- Achieving the 2030 targets will require solutions that go beyond the capabilities of current technologies.

2 Climate Investment Focuses on Carbon, —Soil Remains Undervalued



- Patent filings for carbon capture (CCUS) vastly outnumber those for soil restoration, with a much higher international concentration.
- Climate tech funding flows to carbon; soil restoration remains underfunded.
- Opportunity: First movers can set standards and secure market leadership.

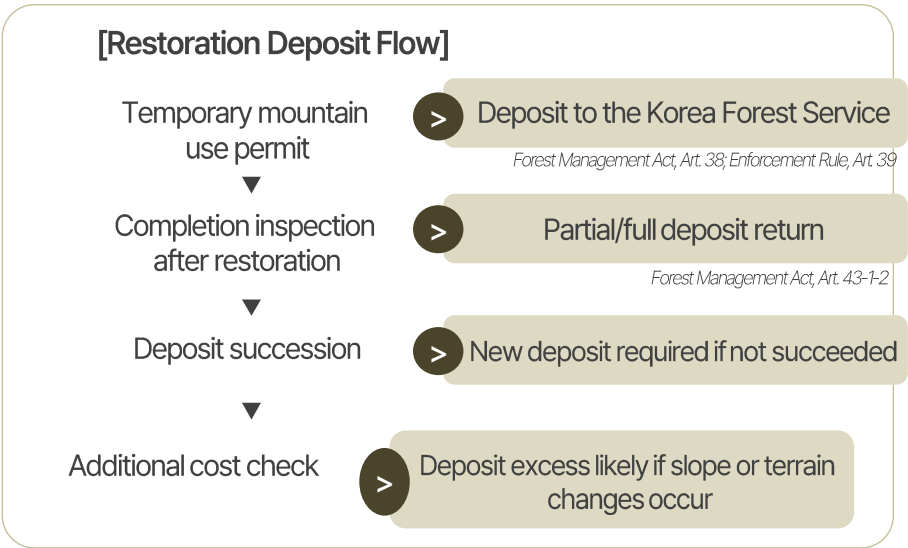
3 Rising Restoration Costs and Tightening Regulations

In 2025, the official cost benchmark for mountain restoration is nearly three times higher than in 2008.

- Slope under 10° : ₩84.9M → ₩216.4M / ha
- Slope over 30° : ₩249.6M → ₩673.0M / ha
 - Restoration costs rise sharply with steeper slopes.
 - Post-mining terrain changes can cause actual costs to exceed initial deposits.
 - “Even with deposit returns, total costs may not be fully covered.”

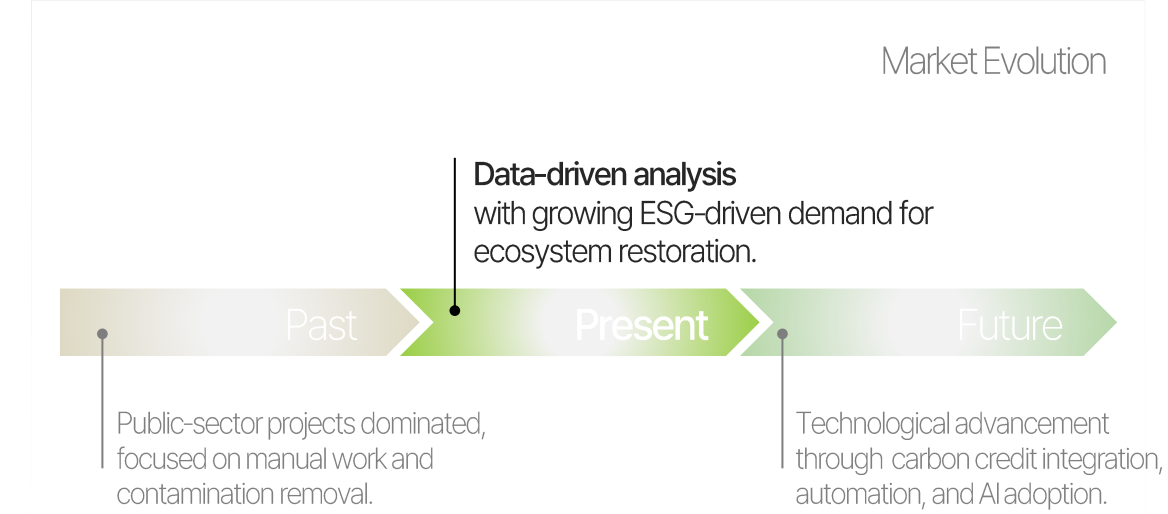
Limestone Mine Restoration Cases

- Sampyo Cement 92ha / Halla Cement 75ha / Ssangyong C&E 93ha
- Average restoration area: 87 ha (≈122 football fields)



Market Opportunity (Domestic)

A USD 19 Billion Soil Restoration Opportunity,
Unlocked by Technology



Total Addressable Market	USD 19.0B
Serviceable Available Market	USD 11.0B
Serviceable Obtainable Market	USD 0.4B

*Source: EY-Parthenon Analysis, 2023

• COFN's Position in the Domestic Soil Restoration Market

		Code of Nature	Beautiful Environmental Construction Co.,Ltd.	Nature & Environment Inc.
Business	Primary Method	Moss / Microorganisms	Physical / Chemical	Physical / Chemical
	Service lifespan	Long	Short	Medium
	Coverage	Large-scale	Medium-scale	Medium-scale
	Treatable Contamination Level	Low	Medium-High	Medium
	Cost	Low (USD 55K-117K)	High (~USD 438K)	High (~USD 438K)
	Workload	Low-intensity, aerial spraying	Heavy equipment & high manpower	Heavy equipment & high manpower
	Labor Requirement per Unit Area	Low	High	High
Treatment Method	Ecosystem Stability	O	X	△
	Physical Treatment	X	O	O
	Chemical Treatment	X	O	O
	Thermal Treatment	X	O	O
	Biological Treatment	O	X	X
Results	Evidence base	100% quantitative, data-based (on-site measurement, drone imaging)	Quantitative + qualitative (visual inspection, legal criteria)	Quantitative + qualitative (visual inspection, legal criteria)

Restoration Is Science, Not Intuition

Mossy is a soil restoration solution powered by advanced moss spore cultivation technology.

01 Moss: The Foundation of Scalable Ecological Restoration

A breakthrough approach to restoring ecosystems from the ground up, using moss as the catalyst for soil revival.

02 Proprietary Technology System for High-Impact Restoration

Integrated platform combining nutrients, hormones, and microbes for faster, more effective restoration.

03 Proven Performance Across Diverse Environmental Conditions

Proven stability and scalability, even under drought, salinity, and extreme heat.

A technology platform that integrates restoration philosophy, engineered design, and scientific validation.



How It's Used

- 1 Dilute Mosby in a measured amount of water.
- 2 Diluted Mosby is applied over degraded soil using drones and helicopters.
- 3 Observe the transformation of degraded land into healthy soil.

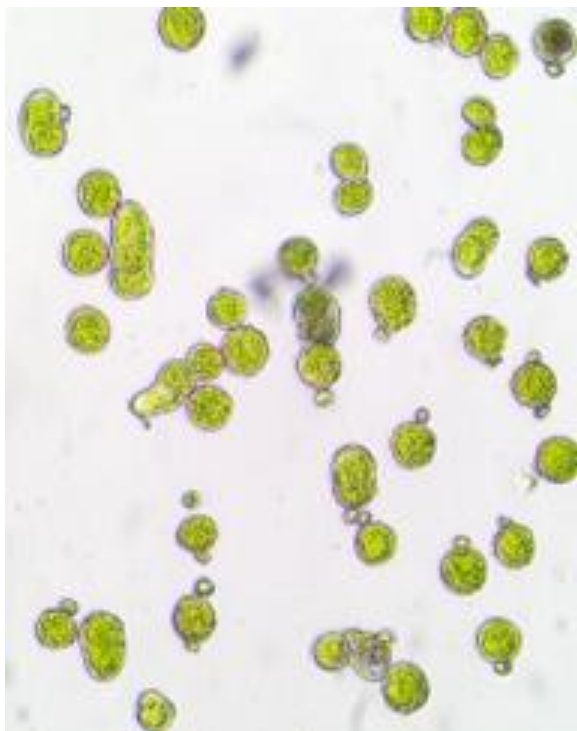


Moss Spore Cultivation Technology

A proprietary technology that enables a single moss spore to multiply into thousands of viable growth units.

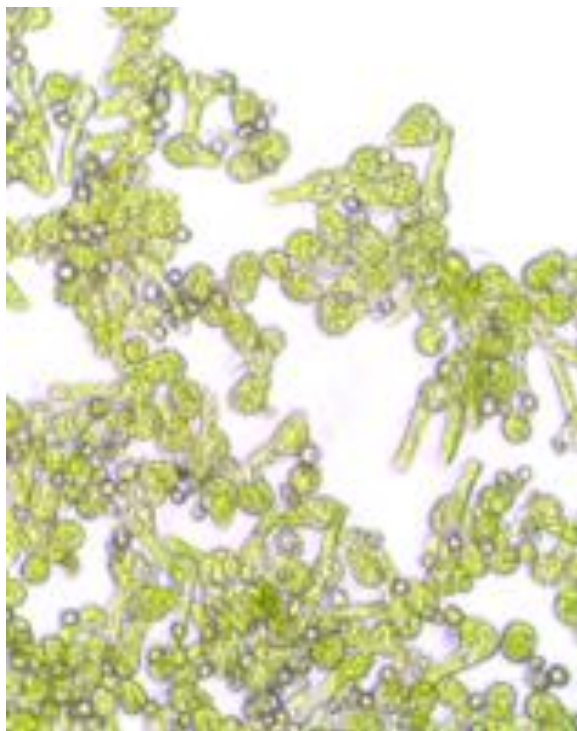
• Spore Cultivation Process

Step1
Spore Selection & Germination



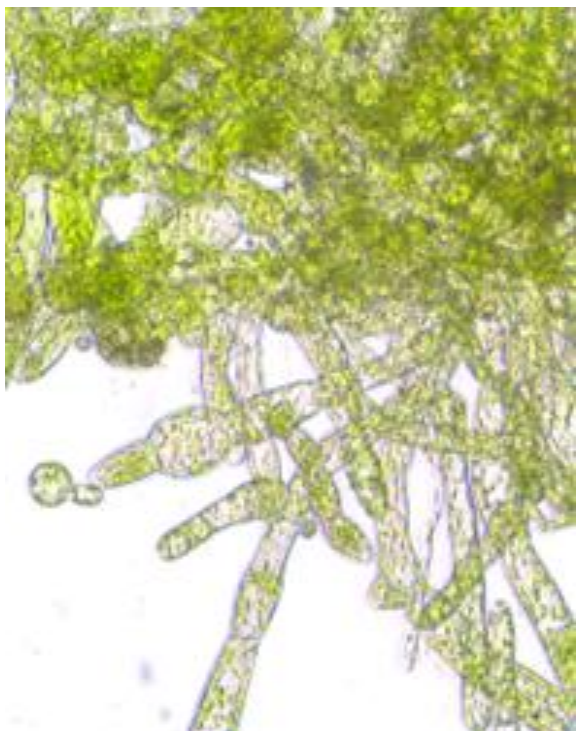
► Healthy spores are selected, induced to germinate, and converted into protonema.

Step 2
Protonemal Proliferation



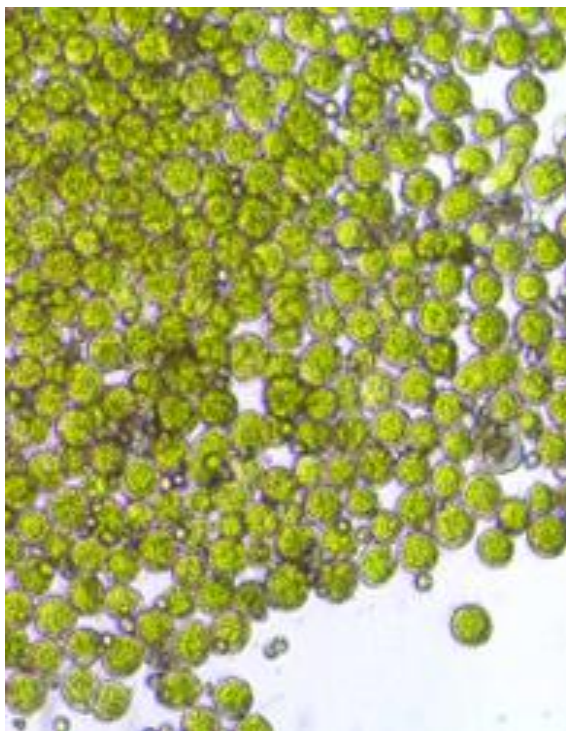
► Protonema are cultured and mass-proliferated under growth-promoting conditions.

Step 3
Protonemal Fragmentation



► The proliferated tissue is finely cut and separated into new individual units.

Step 4
Re-cultivation & Cycling



► The fragmented tissue is re-cultivated and reverted into spores, establishing a continuous exponential proliferation cycle.

Technological Innovations of COFN

- 1 **Unmatched Production Efficiency**
Thousands of times more efficient than natural cultivation, enabling large-scale production without spatial limitations.
- 2 **Non-Destructive Proliferation**
Stable moss propagation without genetic alteration or harm to biodiversity.
- 3 **Growth Rate Optimization**
A high-precision cultivation system that allows precise design and timing of moss growth.

*Source:COFN internal data



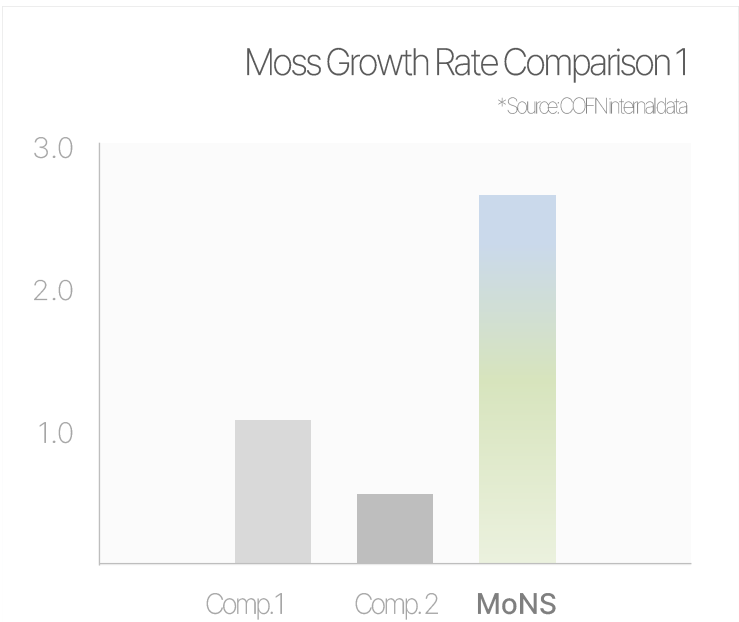


Moss-Specific Nutrient Solution Technology

A specialized nutrient solution proven to accelerate moss growth and improve establishment

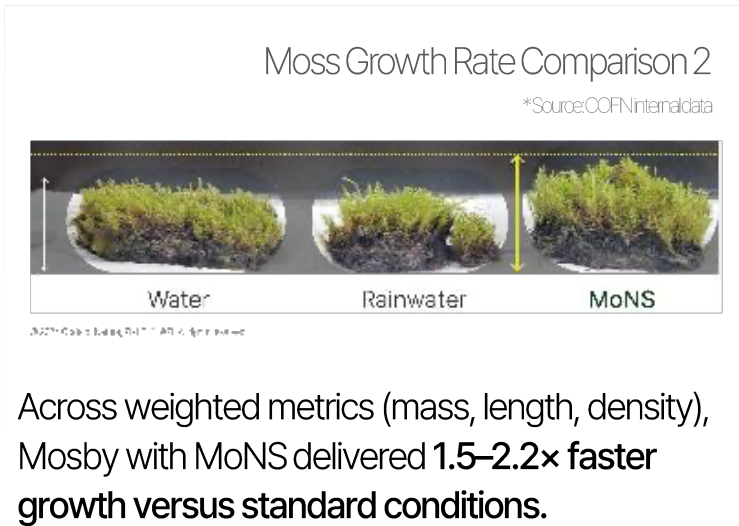
• Nutrient Solution Development Process

Significantly Accelerated Growth

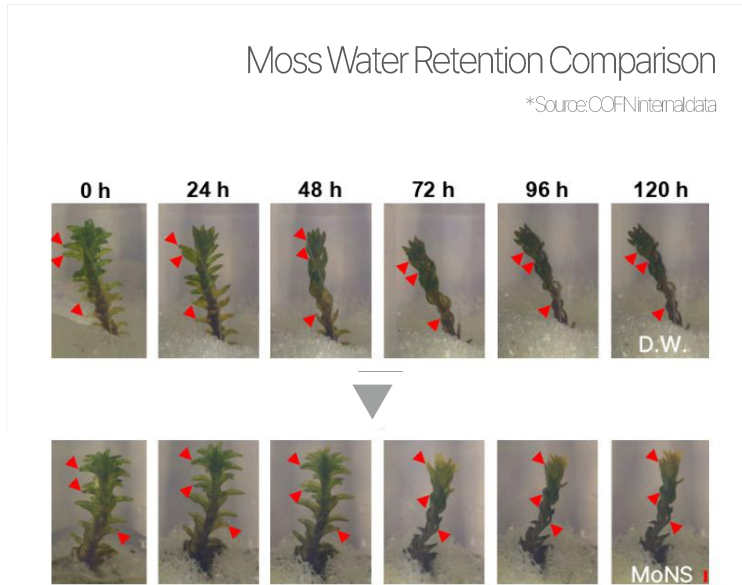


MoNS demonstrated more than twice the growth rate compared to the control group, outperforming commercial nutrient solutions and other formulations.

1.5–2.2x Improvement in Growth Performance



Enhanced Tissue Recovery and Long-Term Moisture Retention



Moss cultured with MoNS showed superior long-term water retention, greatly improving survival and establishment stability in restoration sites.



Commercialization
Completed in Early 2025

MoNS

Technological Innovations of COFN

1 A Verified Moss-Specific Nutrient Solution

The only nutrient formulation proven effective in global restoration projects.

2 Proprietary Formula Based on Moss Physiology

A specialized formulation designed to match the unique physiological structure of moss.

3 Resilient Composition Against Drought and Salinity

A survival-focused formula that enhances water retention and tissue stability, ensuring high establishment rates even under extreme conditions.



Technology for Enhancing Moss Adaptability

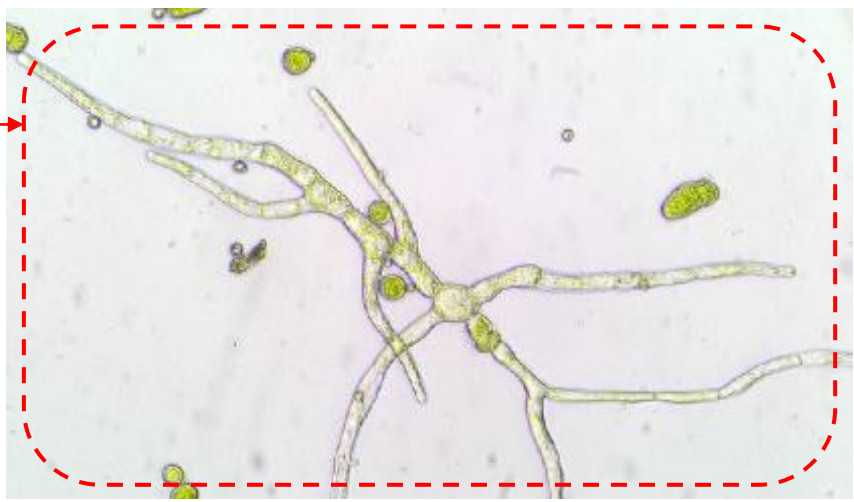
A hormone application technology that enables moss to establish and restore vegetation even under extreme conditions.

Improved Spore Germination and Early Establishment

When MoNS was combined with hormones, spore germination rates increased, cell expansion was promoted, and **early establishment speed improved significantly** compared to conventional methods.



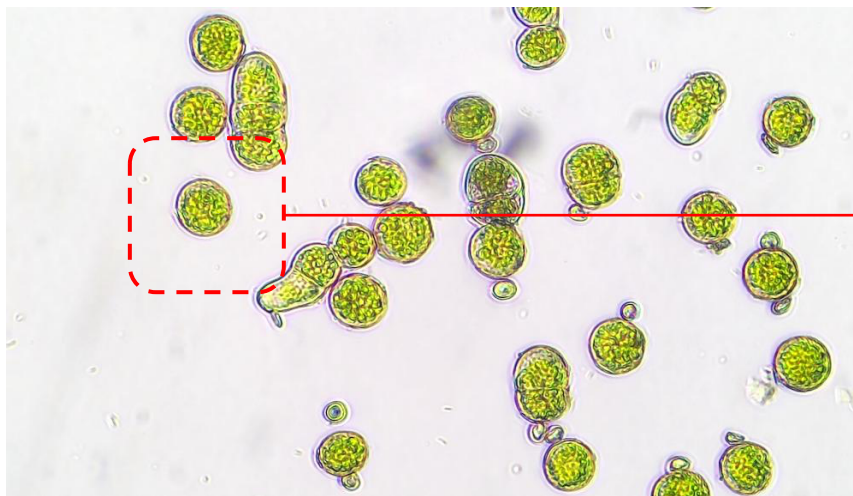
• with MoNS only



• With MoNS + Plant Growth Hormones

Successful Establishment and Growth Under Extreme Conditions

The combination of MoNS and hormones **enabled stable moss establishment and growth** even in conditions previously unsuitable for germination, such as drought, intense UV radiation, and environmental stress.



• With MoNS Nutrient Solution



• With MoNS + Plant Growth Hormones

Technological Innovations of COFN

1 Precision Hormone Control Technology

A high-accuracy method that regulates only moss growth with exact concentration and timing.

2 Nutrient-Hormone Synergy Design

An integrated approach that enhances establishment and resilience through the synergy of nutrient solution and hormones.

3 Non-Disruptive Hormone Technology

Exclusively targeted to moss, safely designed with no impact on surrounding ecosystems.





Microbial Application Technology

Restoring Soil Fertility Through Symbiosis: COFN's Microbial Application Technology

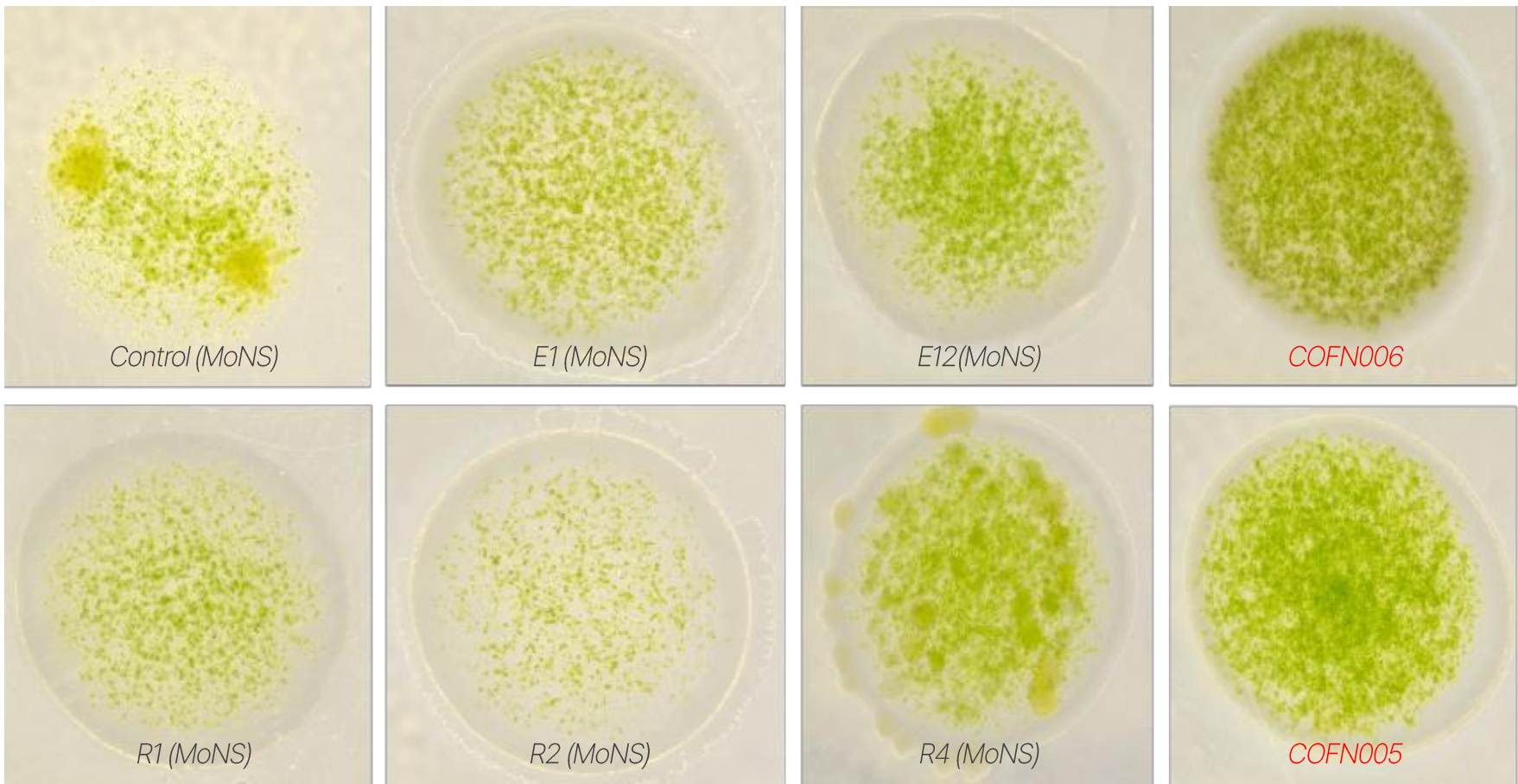


(Adams&Duggan,2008)

Symbiotic Microorganisms

The Core Mechanism of Moss Survival and Soil Restoration

- Symbiotic microorganisms inhabit moss tissues and interact with the host.
- They fix atmospheric nitrogen and supply it to both moss and soil.
- Enable growth without fertilizers, ensuring survival even in barren lands while improving soil fertility.



*Source:COFN internal data

COFN 005 · 006 Strains

Functional microorganisms that promote the early growth of moss

- **Growth Promotion Effect** : Activate cell rates even in barren environments.
- **Proprietary In-House** division and tissue growth responses in early spores.
- **Enhanced Establishment Stability** : Achieve higher survival **e Cultured Strains** : Exclusive strains selected and cultivated by COFN, optimized for biological interactions with specific moss species.

Technological Innovations of COFN

1 Functional Microorganisms Specialized for Soil Restoration

Symbiotic strains unique to COFN, optimized for nutrient supply and ecosystem recovery.

2 COFN's Proprietary Microbial Strains

Strains 005 and 006 are exclusively developed in-house, based on COFN's proprietary technology.

3 Engineered Symbiosis for Optimized Restoration

Formulated symbiotic combinations that maximize restoration outcomes while considering the entire ecosystem.





Visual Evidence of Soil Restoration

From degraded land to visible recovery, the transformation is clear.

10cm x 10cm

Before-and-After
Comparison of
Mosby Application

- 8 weeks later
- Reclaimed land,
Taeon, Korea



*Source:CCFN internal data

50m x 50m

Before-and-After
Comparison of
Mosby Application

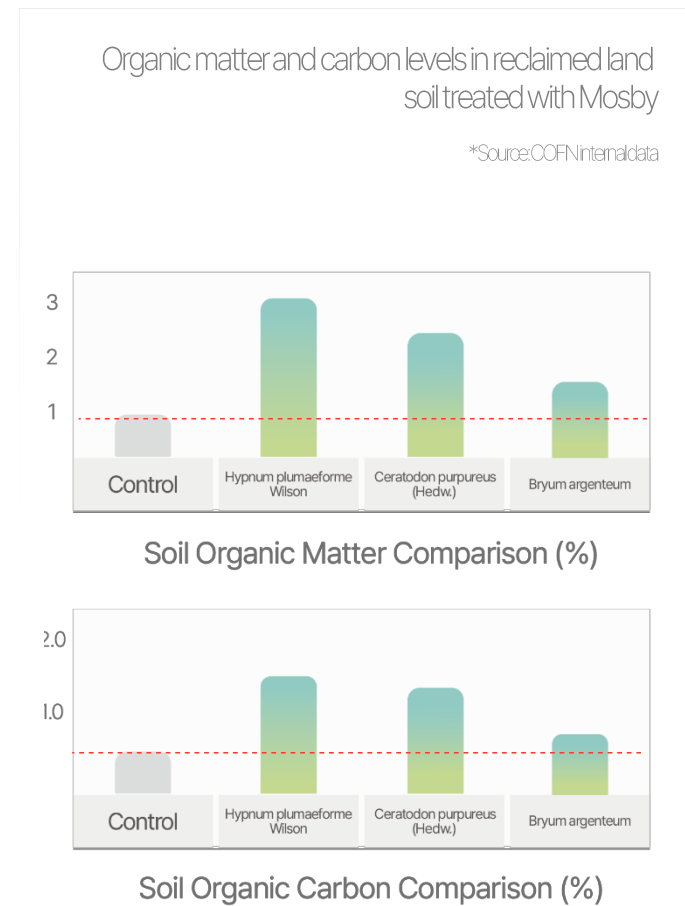
- 6 month later
- Wildfire Disaster Area,
Gangneung , Korea



*Source:CCFN internal data

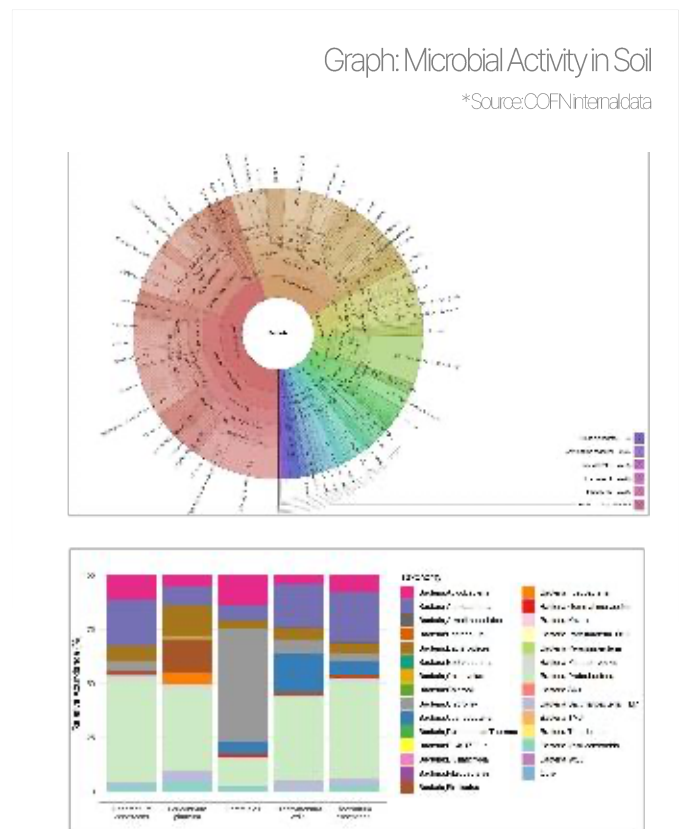
Objective and Quantitative Verification of Restoration Outcomes

1 Quantifying Soil Recovery Using Organic Carbon Indicators



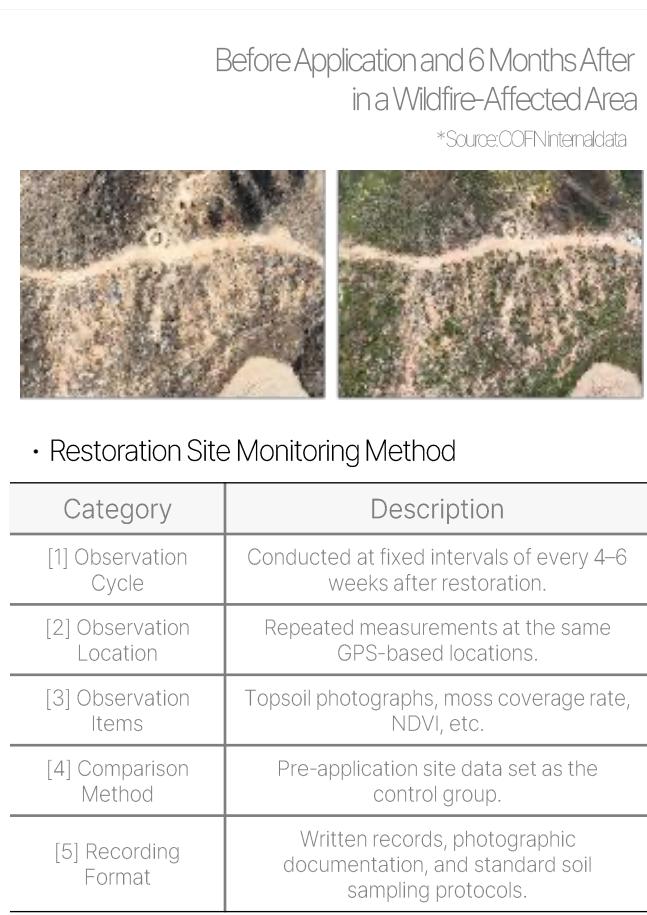
- Quantitative measurement of changes in carbon content and nitrogen ratio before and after restoration confirms organic matter accumulation.
- Repeated application of the same method across multiple restoration sites provides consistent data on organic matter accumulation trends.

2 Visualizing Biological Recovery Through Microbial Activity



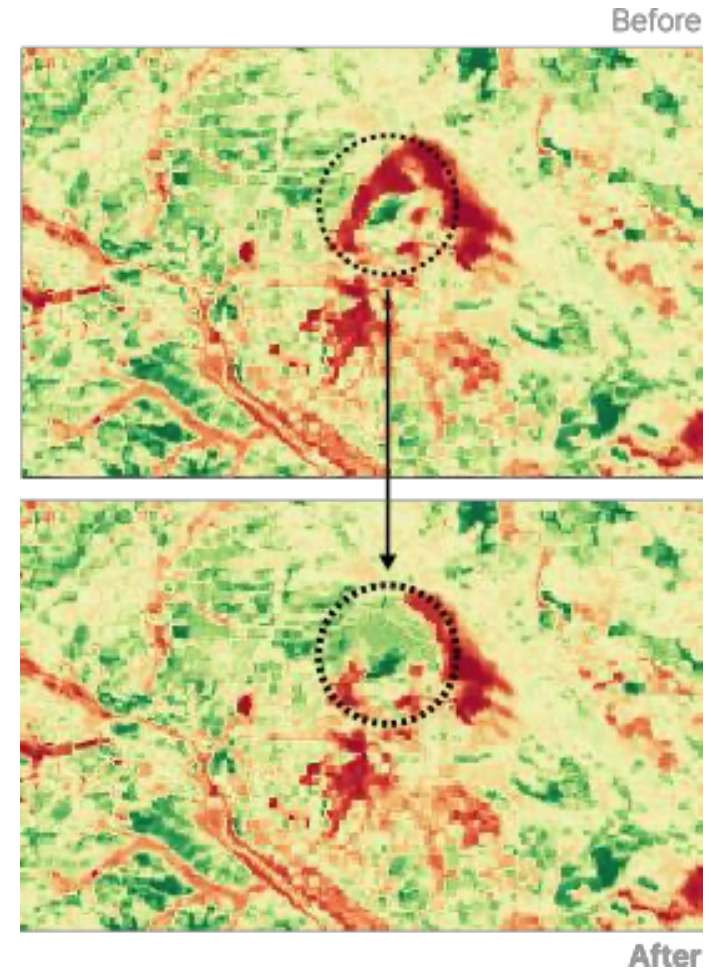
- Measurement of soil microbial respiration rates and enzyme activity provides quantitative confirmation of biological recovery immediately after restoration.
- Microbial activity analysis enables the quantitative tracking of the ecosystem's "response" to restoration.

3 Tracking Restoration Effects with Time-Series Data



- Restoration assessments use pre-application site data as the control group.
- Sites are monitored at 4-6 week intervals at the same locations, recording topsoil conditions, moss establishment, and greening rates.
- Repetition of this process across multiple sites structures data into visual patterns and characteristics of restoration outcomes.

4 Predicting Restoration Progress Using Satellite Imagery and NDVI



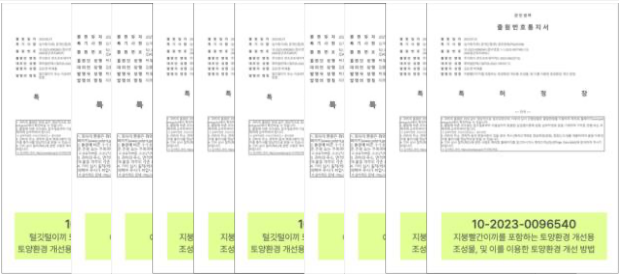
- Restoration outcomes are quantitatively analyzed through satellite NDVI assessments based on the unique reflectance spectrum of moss.
- This technology is designed to predict not only the speed of vegetation recovery but also the spatial extent of its spread.

A Strategic IP Portfolio That Protects Our Innovations

• Granted Domestic Patents: 4



• Domestic Patent Applications: 14



• PCT Applications: 4



• Microbial Strain Deposits : 4

• Domestic Patents: 16

Application No.	Name	Status
No. 10-2757897	Soil Environment-Improving Composition Comprising <i>Racomitrium canescens</i> or a Microorganism Derived Therefrom, and Method for Improving Soil Environment Using the Same	Granted
No. 10-2611051	Method for Culturing Moss Spores and Moss Spore Cultivation Kit for Forest Restoration Using the Same	Granted
10-2025-0001407	Mulching Agent Containing Moss and Method for Improving Plant Growth Using the Same	Filed
10-2024-0122625	Composition for Promoting Crop Growth Containing <i>Bryum</i> Species and Method for Enhancing Crop Growth Using the Same	Filed
10-2024-0122506	Composition for Increasing Available Phosphorus in Soil Comprising <i>Bacillus cereus</i> Strain and Method for Promoting Crop Growth Using the Same	Filed
No. 10-2844893	Composition for Increasing Available Phosphorus in Soil Comprising <i>Bacillus cereus</i> Strain and Method for Increasing Available Phosphorus in Soil Using the Same	Granted
10-2024-0122395	Composition for Increasing Available Phosphorus in Soil Comprising <i>Pseudomonas monteilii</i> Strain and Method for Promoting Crop Growth Using the Same	Filed
No. 10-2844895	Composition for Increasing Available Phosphorus in Soil Comprising <i>Pseudomonas monteilii</i> Strain and Method for Increasing Available Phosphorus in Soil Using the Same	Granted
10-2023-0180289	Nutrient Solution Composition for Promoting Moss Plant Growth to Increase Establishment Rate and Growth, and Cultivation Method of Moss Plants Using the Same	Filed
10-2023-0096540	Soil Environment-Improving Composition Comprising <i>Bryum argenteum</i> and Method for Improving Soil Environment Using the Same	Filed
10-2025-0042561	Composition for Improving Moisture Retention and Water-Holding Capacity of Moss	Filed
10-2025-0042526	Composition for Promoting Spore Germination and Protonemal Growth of Moss	Filed
10-2025-0077409	Moss Pellet Comprising Organic Waste and Method for Forming Moss Vegetation Using the Same	Filed
10-2025-0077410	Moss Growth-Promoting Composition Comprising Alginate Beads and Method for Promoting Moss Growth Using the Same	Filed
10-2025-0077411	Moisture-Supplying Bead with Improved Water Retention Capacity and Soil Moisturizing Method Using the Same	Filed
10-2025-0077292	Moss Growth-Promoting Composition Comprising Mixed Compost of Fallen Leaves and Coffee Grounds	Filed

• PCT Applications: 4

Application No.	명칭	Status
PCT/KR2024/000595	Soil Improvement Composition Containing <i>Polytrichum juniperinum</i> or Its Derived Microorganisms, and Soil Remediation Method Using the Same	Filed
PCT/KR2024/000594	Soil Improvement Composition Containing <i>Ceratodon purpureus</i> , and Soil Remediation Method Using the Same	Published
PCT/KR2024/000598	Nutrient Solution Composition for Promoting Moss Establishment and Growth, and Moss Cultivation Method Using the Same	Filed
PCT/KR2021/020107	Moss Spore Cultivation Method and Moss Cultivation Kit for Forest Restoration	Filed

• KCTC Microbial Strain Deposits : 4

Application No.	Name	Status
KCTC19097P	<i>Priestia aryabhattai</i> COFN001	Deposited
KCTC19178P	<i>Pseudomonas monteilii</i> COFN002	Deposited
KCTC19179P	<i>Bacillus Cereus</i> COFN003	Deposited
KCTC19215P	<i>Bacillus mobilis</i> COFN004	Deposited

• Trademarks: 5

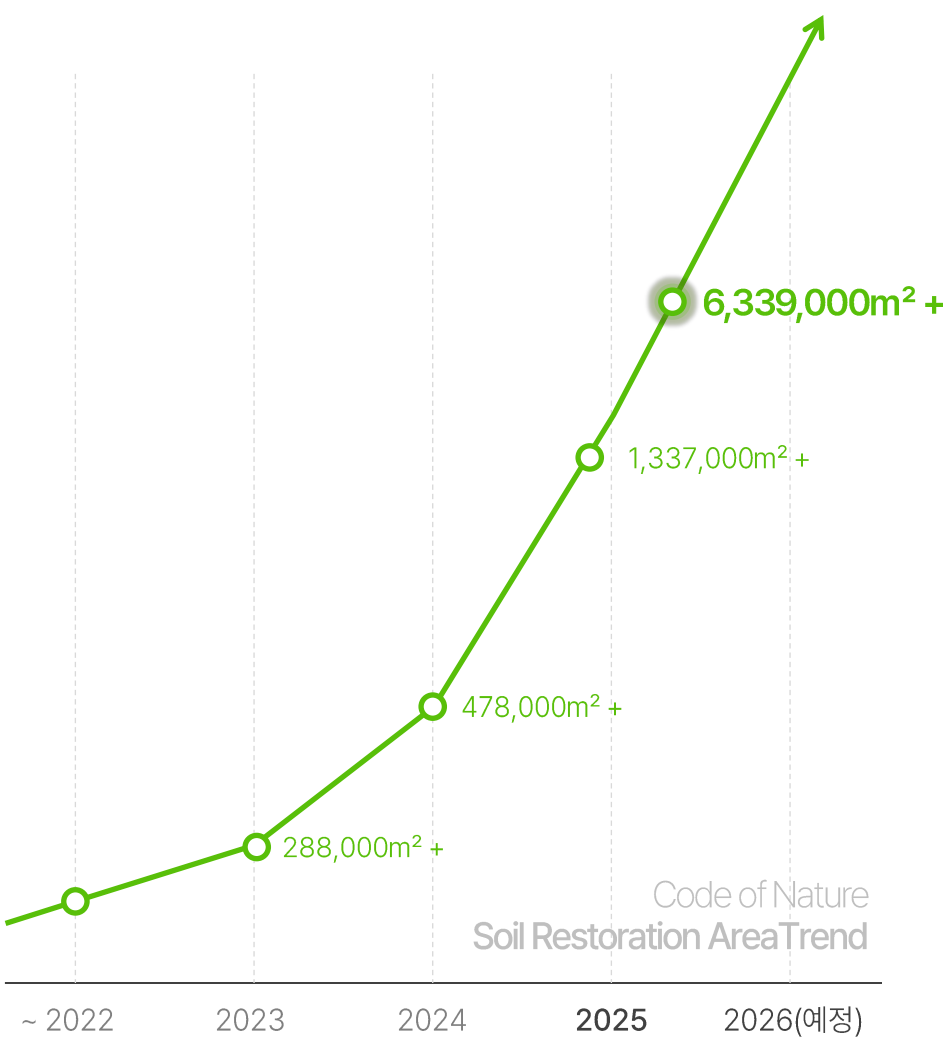
Application No.	Name	Status
40-2024-0123147 and 2 others	Code of Nature(Class 01, Class 31, Class 35)	Filed
40-2024-0123105 and 2 others	Logo+ Code of {Nature.} (Class 01, Class 31, Class 35)	Filed
40-2024-0123128 and 2 others	코드오브네이처(Class 01, Class 31, Class 35)	Filed
40-2024-0223836	Mosby (Class 01)	Filed
40-2024-0223851	모스비 (Class 01)	Filed

Solution : Product – Market fit

A Trusted Partner for Sustainable Restoration, Expanding Across More Sites Each Year

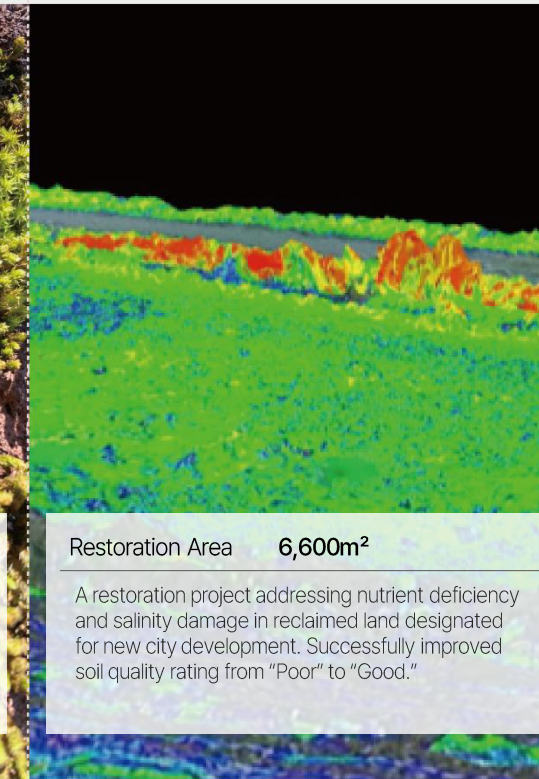
In 2026, the restored area grew 3x year over year.

Rapid expansion aligned with demand, strengthening scale and customer trust.

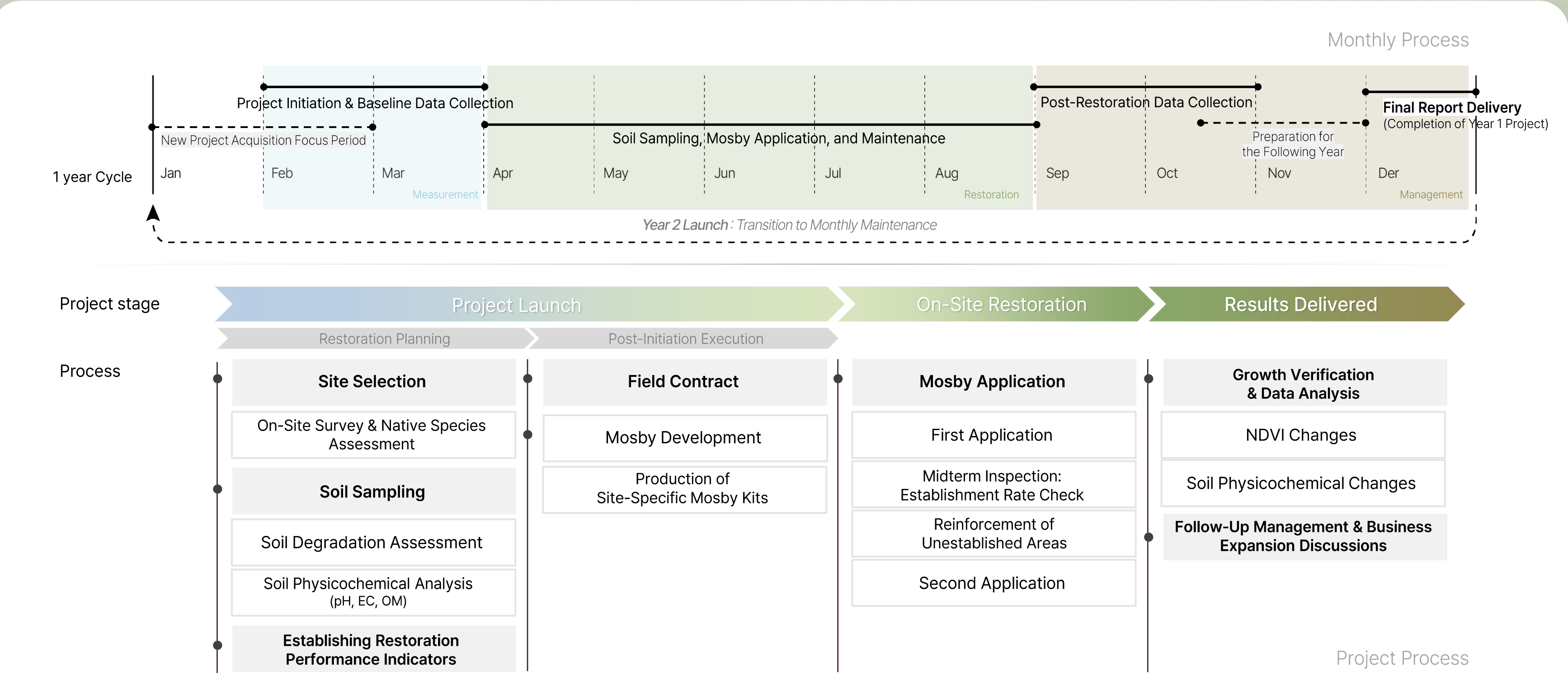


To date, Mossy has been used to restore a total area of **944,000 m²**.

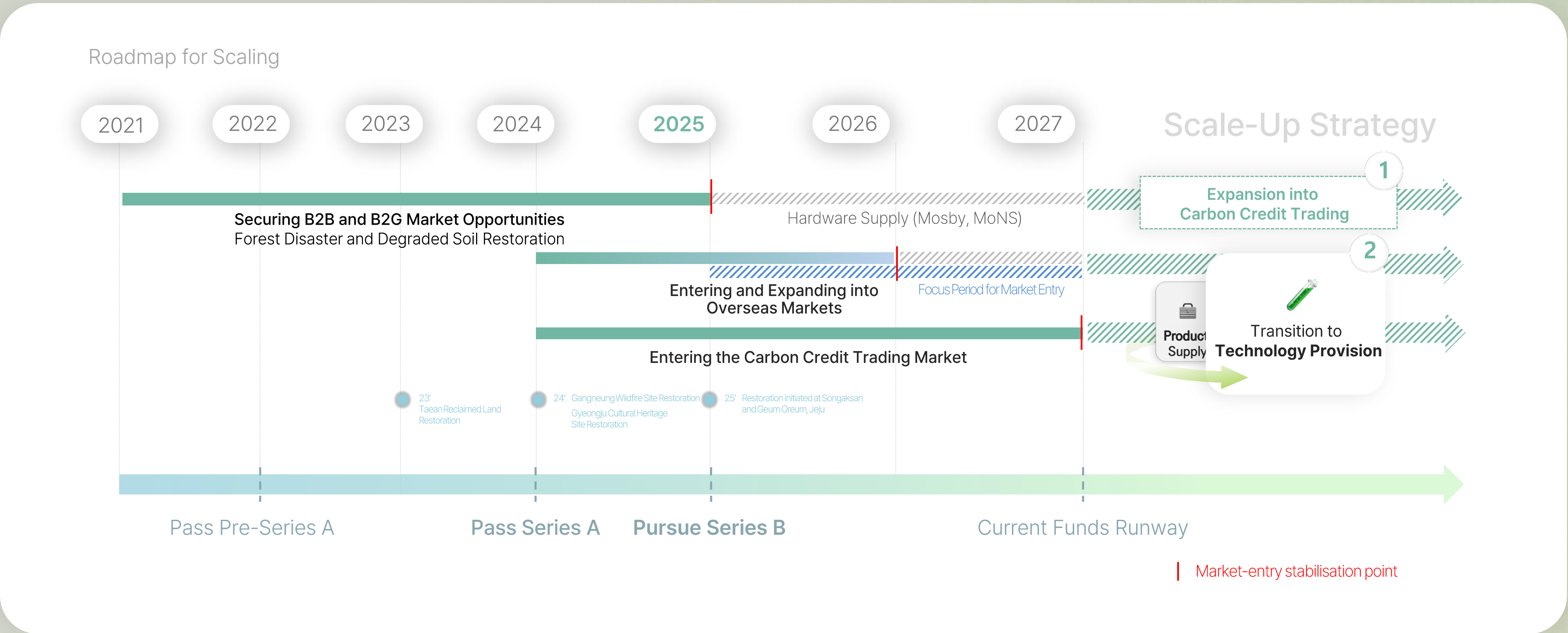
Field application provides the strongest proof of reliability.
Real-world projects demonstrate both effectiveness and measurable scalability.

1	2	3	4
Gangneung Wildfire Site Soil Restoration Project	Donnery Oreum, Jeju Soil Restoration Project	Taeon Jung Joo-young Reclaimed Land	Gyeongju Seokguram Grotto Area Soil Restoration Project
			
Restoration Area 20,000m² A restoration project covering 2 hectares within a 170-hectare wildfire site, using moss culture solution. Carbon credits are expected to be issued based on the carbon absorption of newly planted trees.	Restoration Area 150,000m² Initiated due to slow vegetation recovery even after the 2008 Nature Rest Period policy. Successfully restored using Mossy, leading to additional requests for the restoration of three more oreums.	Restoration Area 6,600m² A restoration project addressing nutrient deficiency and salinity damage in reclaimed land designated for new city development. Successfully improved soil quality rating from "Poor" to "Good."	Restoration Area 9,000m² A landslide restoration project in the Seokguram Grotto (Tohamsan) area managed by the Korea National Park Service. Field surveys and the first application of restoration materials have been completed.
Partner. 	Partner. 	Partner. 	Partner. 

From Measurement to Management: End-to-End Responsibility for Soil Restoration



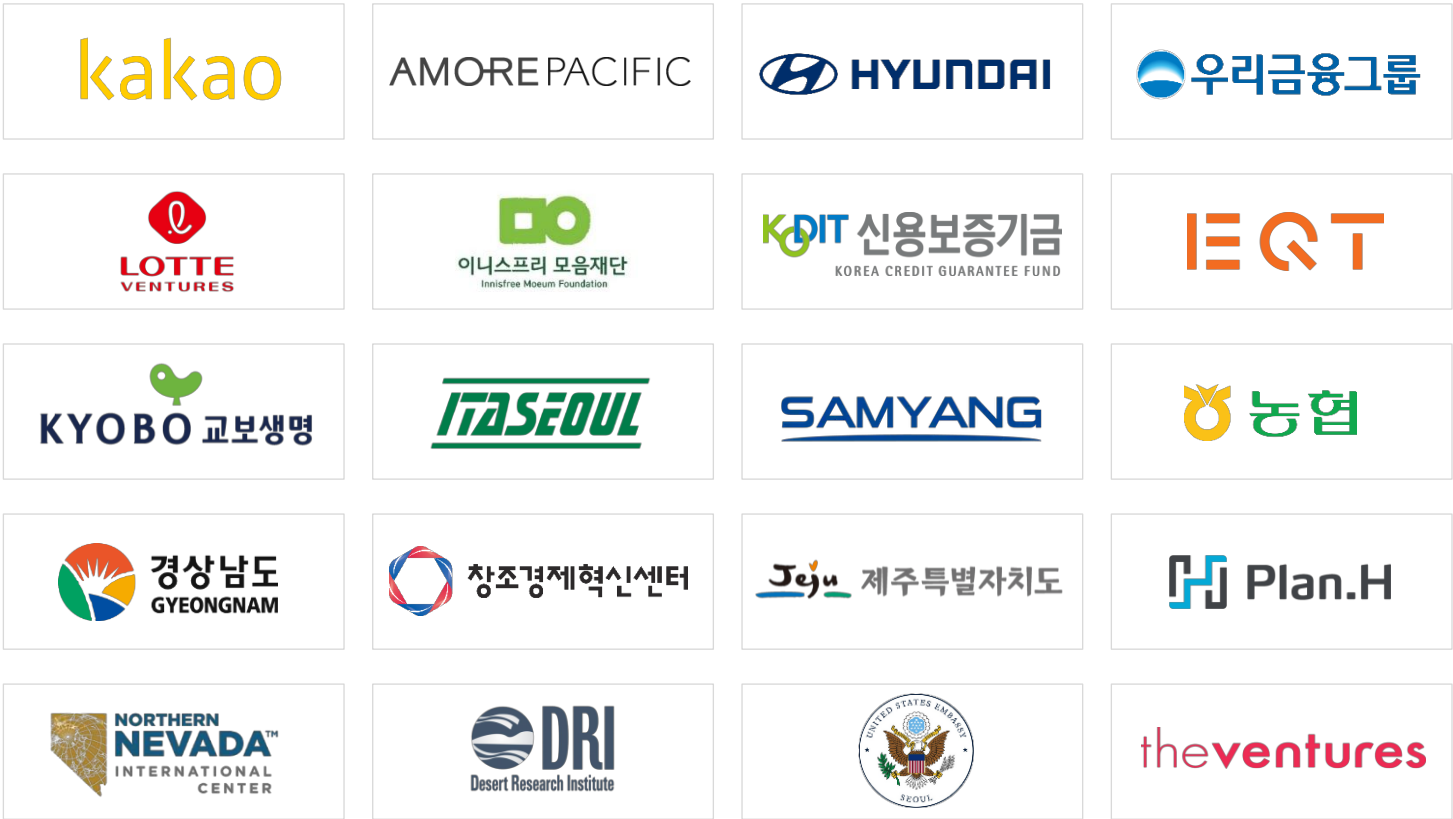
Beyond Solutions: A Sustainable, Multi-Stream Revenue Model



Through strong partnerships, we are shaping the future of restoration.

Leading local governments, national agencies,
and private developers in Korea have selected Mosby.

To date, we have completed over 944,000 m² of soil restoration projects nationwide,
in collaboration with a wide range of public- and private-sector partners.



Total Secured Project Area 6,339,000 m² +

Cumulative Investment USD 2.1M +

Partner Countries 7 Countries +

— MOU
United States, China, Canada, Singapore, Netherlands, Spain +

Proprietary Technology Portfolio 20 Patents +

— (filed/granted; incl. plant varieties & trade secrets)

*Source:CCFN internal data



Team. COFN

Industry Expertise to Lead Innovative, Ecosystem-Based Restoration Projects

Expertise and Multidisciplinary Integration

—— Top specialists from SNU and Pusan National University connect lab research with real-world restoration.

Deep Understanding of Soil Issues and Strong Problem-Solving Capabilities

—— An integrated team spans biology, microbiology, tissue culture, landscape architecture, data analysis, and field operations worldwide.

Execution and Long-Term Operational Capabilities

—— Beyond R&D, we execute and manage restoration, and design clear monetization pathways.

CEO



Ph.D., Graduate School of
Environmental Studies,
Seoul National University

CTO



Ph.D., College of Pharmacy,
Seoul National University

R&D Head



Ph.D., Department of
Plant Bioscience,
Pusan National University

Professionals with Diverse Backgrounds

TEAM Code of {Nature.}



Kim Doyeon
CTO · R&D



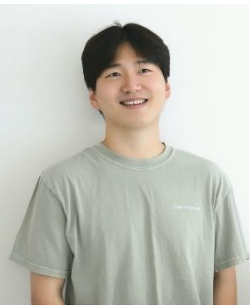
Park Jaehong
CEO



Lee Suyeon
Manager · Overseas Sales



Kim Yoobin
Senior Manager · Business



Yang Jungmo
Senior Manager ·
Business Development



Kwon Solji
Manager ·
Business Development



Kang Dongwoo
Senior Researcher · R&D



Kim Sechan
Researcher · R&D



Lee Deokyoung
Manager · Business



Jang Jungwoo
Senior Researcher · R&D



Jeong Subong
Researcher · R&D



Choi Seri
Researcher · R&D

We Restore Possibility.

— Restoring the World with Nature-Inspired Innovation.

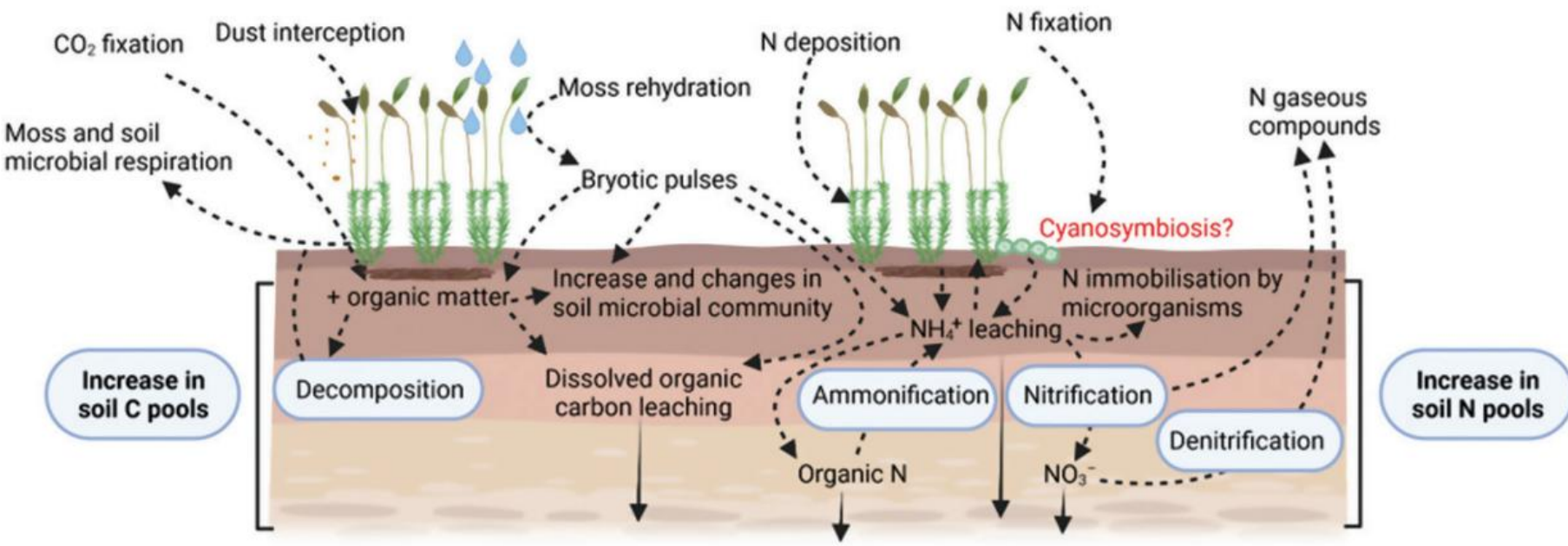
Contact codeofnature@c-of-n.com
hong@c-of-n.com

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Mechanisms of Moss-Based Soil Restoration

Moss acts as a key catalyst in initiating ecosystem recovery, contributing to carbon and nitrogen cycling and revitalizing soil health through the following ecological mechanisms:

1. Nutrient Supply	2. Moisture Retention	3. Erosion Prevention	4. Microbial Habitat Enhancement	5. Adaptation to Extreme Environments
Moss survives in environments with alternating dry and wet conditions, supplying essential nutrients such as organic carbon (C) and nitrogen (N) to the soil through photosynthesis and symbiosis with microorganisms.	Moss stores and maintains moisture in the soil, supporting the establishment of diverse vegetation.	By covering the topsoil, moss prevents erosion and loss caused by rainfall, stabilizing the soil and providing structural integrity during the early stages of restoration.	Moss fosters symbiotic relationships with a variety of soil microorganisms, which promote organic matter decomposition and nutrient cycling, thereby improving soil structure.	Moss possesses the ability to survive in harsh conditions such as high temperatures, drought, and nutrient poor soils, ensuring continuity and long term stability in restoration sites.



Effects of mosses on nutrient cycles. _@Ladrón de Guevara et al, 2022
An interaction worth investigating in moss-dominated biocrusts is highlighted in red.

Appendix. 2

Moss Species Resources Secured for Soil Restoration

The company has secured and cultivated moss species that can adapt to a wide range of soil environments both domestically and internationally, building restoration solutions centered on the key species listed below.

• Key Species Characteristics and Applicable Restoration Sites

NO.x	Species (Korean)	Scientific Name	Optimal Restoration Region	Applicable Sites
1	가는참외이끼	<i>Brachymenium exile (Dozy & Molk.) Bosch & Sande Lac.</i>	On open fields or village grounds, or in gaps between stone walls and rocks	Mixed / industrial sites
2	가는흰털이끼(비단이끼)	<i>Leucobryum juniperoideum (Brid.) Müll. Hal.</i>	On mountain rocks, humus-rich soil, or near tree bases, forming large hemispherical clumps	Mountainous areas
3	갈색민서리이끼	<i>Racomitrium anomodontoides Cardot</i>	On sunlit mountain rocks	Mixed / industrial sites
4	개털이끼	<i>Schwetschkeopsis fabronia (Schwagr.) Broth.</i>	On mountain tree trunks or rocks	Mountainous areas
5	겹친주목이끼	<i>Taxiphyllum aomoriense (Besch.) Z. Iwats.</i>	On slightly moist mountain rocks, ground, or near tree roots	Mixed / industrial sites
6	고깔바위이끼	<i>Schistidium apocarpum (Hedw.) Bruch. & Schimp.</i>	On the surface of dry mountain rocks	Mixed / industrial sites
7	구슬이끼	<i>Bartramia pomiformis Hedw.</i>	On moist mountain rocks, humus-rich soil, or near tree bases	Mountainous areas
8	그늘들솔이끼	<i>Pogonatum contortum (Menzies ex Brid.) Lesq.</i>	On moist, partially shaded mountain ground	Mountainous areas
9	깃털나무이끼	<i>Pleuroziopsis ruthenica (Weinm.) Kindb. ex E. Britton</i>	On mountain humus soil or decayed wood	Mountainous areas
10	깃털이끼	<i>Thuidium kanedae Sakurai</i>	On shaded mountain rocks or ground	Mixed / industrial sites
11	꼬리이끼	<i>Dicranum japonicum Mitt.</i>	On partially shaded mountain humus soil	Mountainous areas
12	꽃송이이끼	<i>Rhodobryum roseum (Hedw.) Limpr.</i>	On moist mountain humus soil or decayed wood	Mountainous areas
13	나무이끼	<i>Climacium japonicum Lindb.</i>	On mountain humus soil with high moisture	Mountainous areas
14	너구리꼬리이끼	<i>Pyrrhobryum dozyanum (Sande Lac.) Manuel</i>	On moist rocks or humus soil in mountain valleys	Mountainous areas
15	넓은앞윤이끼	<i>Entodon challengeri (Paris) Cardot</i>	Near tree roots or on rocks in mountainous areas	Mountainous areas
16	대호꼬리이끼	<i>Thamnobryum subseriatum (Mitt. ex Sande Lac.) B. C. Tan.</i>	On moist, shaded mountain rocks	Mountainous areas
17	둥근날개이끼	<i>Plagiochila ovalifolia Mitt.</i>	On moist mountain rocks	Mountainous areas
18	들덩굴초롱이끼	<i>Plagiomnium cuspidatum (Hedw.) T. J. Kop.</i>	On moist mountain rocks or ground	Mixed / industrial sites
19	들솔이끼	<i>Pogonatum neesii (Müll. Hal.) Doay.</i>	On partially shaded mountain ground near villages, roadsides, or fields	Mountainous areas

• Key Environmental Conditions for Each Moss Species

* Industrial areas

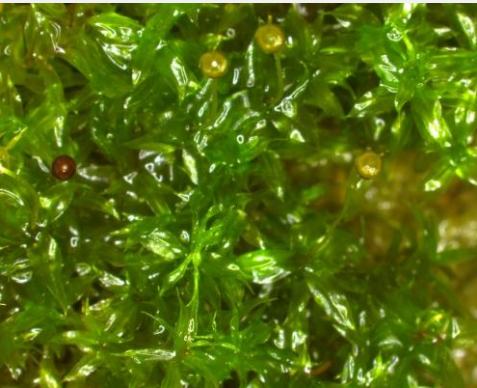


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Racomitrium canescens, Schistidium apocarpum

Moss species suited to relatively sunny and dry environments

* Reclaimed and humid areas



©국립생물자원관

Hedwigia ciliata, Plagiomnium cuspidatum, Marchantia polymorpha, Pogonatum contortum

Moss species suited to shaded and high-moisture environments

Appendix. 2

Moss Species Resources Secured for Soil Restoration

The company has secured and cultivated moss species that can adapt to a wide range of soil environments both domestically and internationally, building restoration solutions centered on the key species listed below.

• Key Species Characteristics and Applicable Restoration Sites

NO.	Species (Korean)	Scientific Name	Optimal Restoration Region	Applicable Sites
20	봉황이끼	<i>Fissidens nobilis</i> Griff.	On shaded, moist ground or streamside rock formations in southern regions	Mountainous areas
21	서리이끼	<i>Racomitrium canescens</i> (Hedw.) Brid.	On sunlit mountain rocks, sandy roadside soils, or coastal sand dunes	Mixed / industrial sites
22	솔이끼	<i>Polytrichum commune</i> Hedw.	In highly moist areas within mountainous regions	Mountainous areas
23	수풀이끼	<i>Hylocomium splendens</i> (Hedw.) Schimp.	On rocks or old logs in subalpine mountain zones	Mountainous areas
24	숲날개이끼	<i>Plagiochila porelloides</i> (Torrey in Nees) Lindenb.	On moist rocks or old logs in subalpine mountain zones	Mountainous areas
25	아기들덩굴초롱이끼	<i>Plagiomnium acutum</i> (Lindb.) T. J. Kop.	On moist mountain rocks or ground	Mixed / industrial sites
26	엄마이끼	<i>Scapania curta</i> (Mart.) Dumort.	On soil near valleys or roadsides, or on shaded, moist rocks	Mountainous areas
27	우산이끼	<i>Marchantia polymorpha</i> L.	In moist areas such as near houses in urban settings or along mountain streams	Mountainous areas
28	쥐꼬리이끼	<i>Myuroclada maximowiczii</i> (G. G. Borshch.) Steere & W. B. Schof	On damp soil or rocks, or near tree roots	Mixed / industrial sites
29	지붕빨간이끼	<i>Ceratodon purpureus</i> (Hedw.) Brid.	On thatched or wooden roofs, or on sandy soil	Mixed / industrial sites
30	참깃털이끼	<i>Bryonoguchia molkenboeri</i> (Sande Lac.) Z. Iwats. & Inoue	On trees or humus-covered rocks along mountain valley slopes	Mountainous areas
31	침세줄이끼	<i>Porella caespitans</i> var. <i>cordifolia</i> S. Hatt.	On sunny to partially shaded mountain areas or on tree trunks	Mixed / industrial sites
32	큰솔이끼	<i>Polytrichum formosum</i> Hedw.	On partially shaded mountain ground or rocks partially covered with soil	Mountainous areas
33	큰철사이끼	<i>Bryum pseudotriquetrum</i> (Hedw.) P. Gaertn.	On damp soil or humus-covered rocks near mountain valleys	Mixed / industrial sites
34	타조이끼	<i>Ptilium crista-castrensis</i> (Hedw.) De Not.	On humus soil in subalpine mountain zones	Mountainous areas
35	털깃털이끼	<i>Hypnum plumaeforme</i> Wilson	On sun-exposed rocks and ground in open mountain areas	Mixed / industrial sites
36	툇이끼	<i>Hedwigia ciliata</i> (Hedw.) P. Beauv.	On sunlit mountain rocks or tree trunks	Mixed / industrial sites
37	파도꼬리이끼	<i>Dicranum polysetum</i> Sw.	On partially shaded humus soil or decayed logs in subalpine to alpine mountain zones	Mountainous areas
38	흰털고깔바위이끼	<i>Grimmia pilifera</i> P. Beauv.	On sunlit mountain rocks and other dry areas	Mixed / industrial sites

• Key Environmental Conditions for Each Moss Species



Thuidium kanedae, Polytrichum commune, Bartramia pomiformis, Climacium japonicum

Moss species suited to partially shaded environments with humus-rich soil

Appendix. 3

Simulation-Based Ecosystem Restoration Prediction Model

Code of Nature has developed a proprietary simulation model that predicts colony expansion in restoration sites based on interaction data between moss, microorganisms, and soil. This model quantitatively simulates outcomes according to key variables that influence restoration strategy development, such as species composition, application timing, coverage area, and dispersal method. It enhances the precision of restoration design and enables numerical verification of potential outcomes prior to field application.

Purpose

To dynamically simulate the temporal spread, growth, and biodiversity recovery of moss based restoration solutions in ecosystem damaged areas such as wildfire affected sites.

The model is designed to predict ecosystem recovery pathways following moss introduction and to support future restoration strategy decisions.

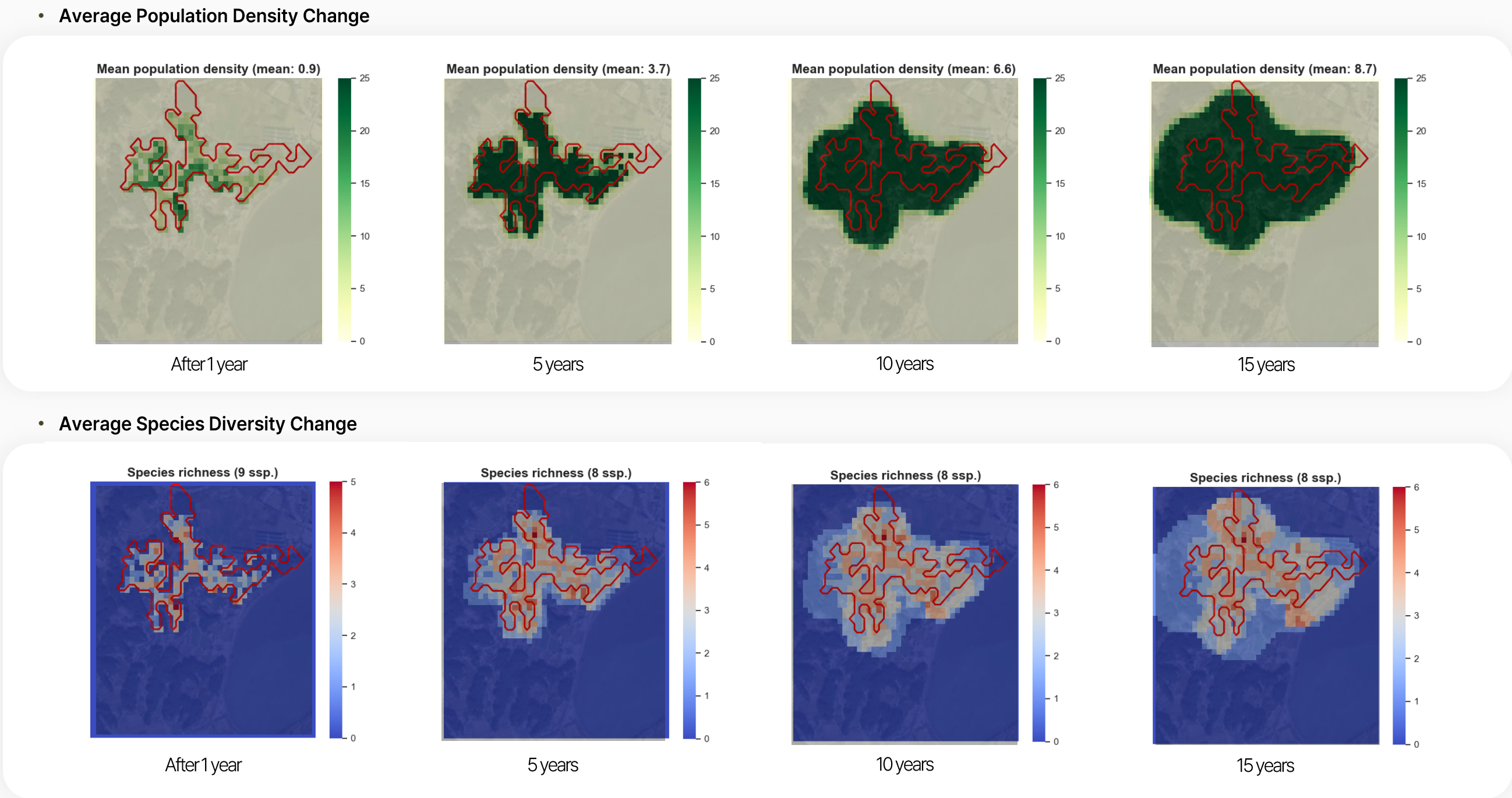
Simulation Components

- Average Population Density Change
- Species Diversity Change
- Soil Microorganism Change
- Total Organism Count Change

Technology Advancement and Application Flexibility

The model is being expanded to incorporate multiple environmental conditions such as climate risks (e.g., changes in precipitation, heat waves) and areas with increased erosion, allowing the application of diverse restoration scenarios.

This enables **numerical pre-verification of restoration effects** and **flexible design of restoration strategies** in response to environmental risk factors.



*Source:COFN internal data

Appendix. 4

COFN Equipment Assets

Code of Nature possesses moss research equipment of the highest caliber in Korea.
From precision analysis to scale experiments, enabling stable, efficient execution across fieldwork and lab.

• List of Equipment at the Company’s Affiliated Research Institute

NO.x	Equipment Name	Application	Quantity	NO.x	Equipment Name	Application	Quantity	Image
1	Clean-bench	Research Use	2	20	Core Box	Moss Cultivation and Breeding	2	 In-House Cultivation Room
2	Side table	Research Use	1	21	Environmental Measuring Device	Moss Cultivation and Breeding	1	
3	Plant Chamber	Research Use	1	22	Indoor Environment Controller	Moss Cultivation and Breeding	1	
4	Pure and Ultrapure Water Production System	Research Use	1	23	Digital Microscope	Moss Cultivation and Breeding	1	
5	Program auto clave	Research Use	1	24	Reagent Refrigerator	Moss Cultivation and Breeding	1	 Drying Oven
6	Hot plate & magnetic stire	Research Use	1	25	Cryogenic Freezer	Moss Cultivation and Breeding	1	
7	Benchtop pH Meter	Research Use	1	26	Multi Shaking Incubator	Moss Cultivation and Breeding	1	
8	Inverted Phase Contrast Microscope	Research Use	1	27	Dual chamber incubator	Moss Cultivation and Breeding	1	
9	Analytical Electronic Balance	Research Use	1	28	Freeze Dryer	Mosby Product Manufacturing	1	 Environmental Measuring Device
10	Ultra Low Temperature Freezer, Economy Model with Dedicated 10 Tier Tray	Long Term Storage of Microbial Stock and Reagents Hormones	1	29	Multi-purpose Centrifuge	Microbial Formulation	1	
11	Forced Convection Drying Oven	Drying of Laboratory Equipment and Moss	2	30	Hydrosense 2 Display	Soil Data Collection	1	
12	Refrigerated Centrifuge	Separation of Microorganisms and Culture Solution by Centrifugation	1	31	Soil Analyzer	Soil Data Collection	1	
13	Shaking Incubator	Moss Cultivation and Breeding	3	32	Photosynthesis Meter	Moss Phenotype Data Collection	1	 Clean Bench
14	Plant Incubator	Moss Cultivation and Breeding	1	33	Microscope Adaptor	Research Use	1	
15	Heating Magnetic Stirrer	Moss Cultivation and Breeding	1	34	Microscope Camera	Research Use	1	
16	Cultivation Room – Moss Cultivation Set	Moss Cultivation and Breeding	1	35	4K Digital Camera	Research Use	1	
17	Portable Soil CO ₂ Analyzer	Production and Storage of Soil Respiration Data	1	36	Automatic Pelletizer	Research Use	1	
18	SRC-2 Soil Respiration Chamber	Measurement of Soil CO ₂	1	37	High Speed Grinder	Research Use	1	
19	Spectrophotometer	Soil Data Analysis	1	38	Pelletizer Forming Balls and Others	Research Use	1	

Session 1

Understanding Adaptive Systems in Small Islands Contexts



Sanjaya Bhatia
Head of Office Incheon, UNDRR GETI

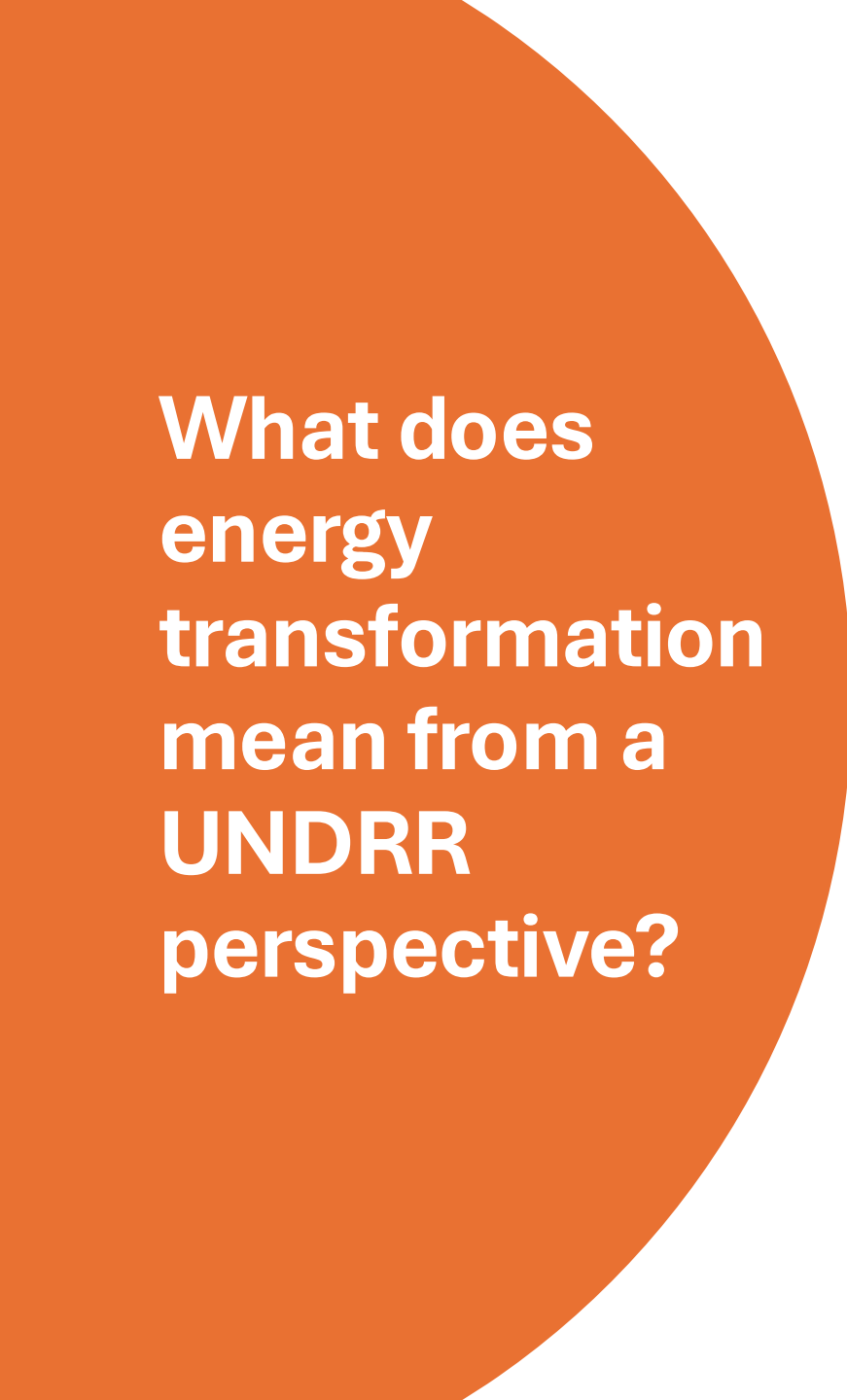
Observations & experiences on what an energy transformation means for SIDS – perspective of UNDRR

UN CTCN 2026 Joint Programme: NDE Forum, Capacity Building on AI for Adaptive Management in the Energy Sector, and Voluntary Technology Talk for SIDS



Why energy transformation matters for SIDS

- SIDS are among the world's most disaster-prone countries.
- They face disproportionate impacts from cyclones, floods, droughts, sea-level rise and other hazards.
- Many remain heavily dependent on imported fossil fuels, creating exposure to price shocks, supply disruptions and fiscal stress.
- Energy systems are often concentrated in coastal areas, making them vulnerable to extreme events.
- **Key message:** For SIDS, energy transformation is not primarily about carbon reduction. It is about **survival, resilience, affordability, security and sovereignty.**

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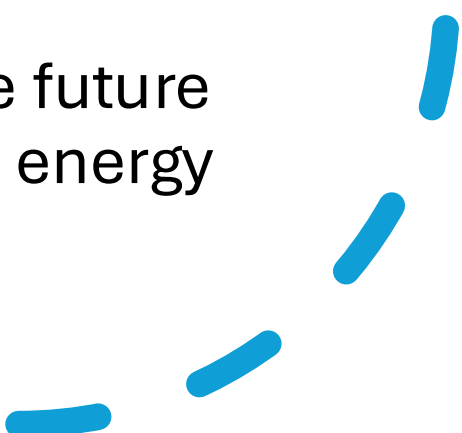
What does energy transformation mean from a UNDRR perspective?

Energy transformation means moving from: centralized and fragile systems, fossil-fuel dependence, recovery-after-disaster approaches

Towards: renewable and diversified energy sources, resilient infrastructure, distributed energy systems, risk-informed investment, systems that can withstand and rapidly recover from shocks.

The question is not: "How much renewable energy can we install?"

The question is: "How do we reduce future disaster risk while transforming the energy sector?"

A decorative blue dashed line in the bottom right corner of the slide.

Observation 1: Energy security = disaster resilience

In many SIDS, power outages after disasters become cascading crises affecting:

- water supply
- telecommunications
- health services
- ports and airports
- emergency response.
- A resilient energy sector becomes the backbone of resilience across all sectors.



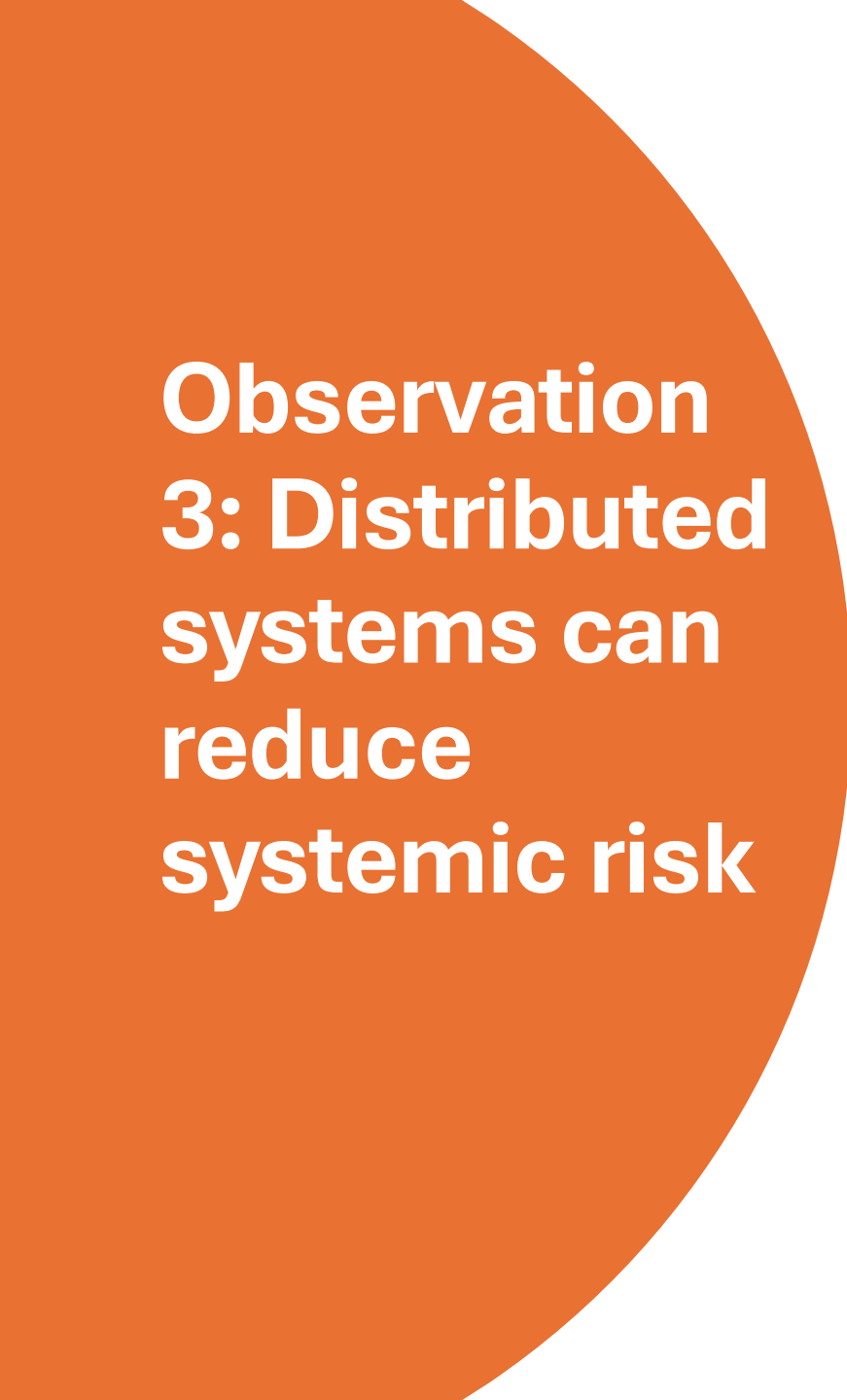
Observation 2: Renewable energy alone is not enough

Experience shows that installing solar panels is not the transformation.

The transformation also requires:

- resilient grids
- battery storage
- backup systems
- maintenance capacity
- climate-proof infrastructure.

Otherwise, renewable assets can become new points of failure during extreme events.

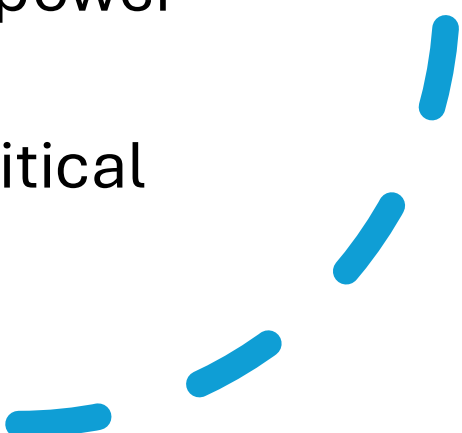


Observation 3: Distributed systems can reduce systemic risk

Examples include:

- rooftop solar
- microgrids
- community-based energy systems
- decentralized battery storage.

Benefits:

- faster recovery after disasters
 - reduced dependence on a single power station
 - improved service continuity for critical facilities.
- 

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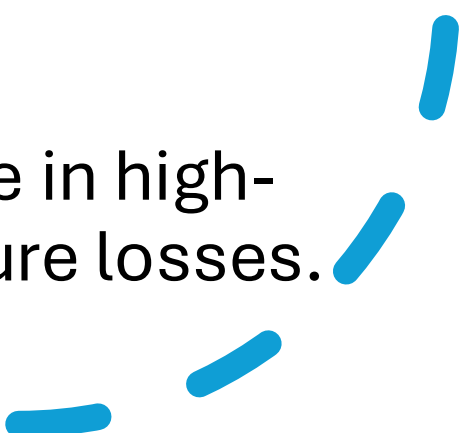
Observation 4: Risk must be integrated at the planning stage

UNDRR consistently advocates risk-informed development.

This means energy planning should include:

- hazard mapping
- climate projections
- multi-hazard risk assessments
- resilient infrastructure standards
- nature-based solutions where appropriate.

Building renewable infrastructure in high-risk locations simply creates future losses.

A series of blue brushstroke-like lines in the bottom right corner of the slide.

What successful energy transformation looks like in SIDS

Renewable energy deployment

- Solar, Wind, Geothermal (where available), Ocean energy innovations

Climate-resilient infrastructure

- Stronger design standards, Elevated critical assets, Hazard-resistant grids

Decentralization

- Microgrids, Community systems, Energy access for remote islands

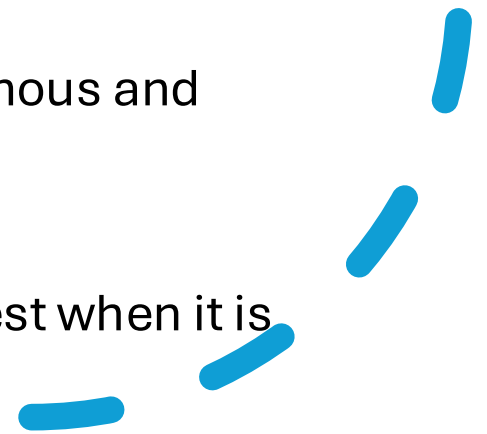
Digitalization and early warning integration

- Smart grids, Real-time monitoring, Forecast-based operations

Inclusive governance

- Local communities, Women, Youth, Indigenous and traditional knowledge holders

UNDRR emphasizes that resilience is strongest when it is inclusive and locally owned.



**Key
recommendations
for the future**

Recommendation 1

- Treat energy infrastructure as critical resilience infrastructure.

Recommendation 2

- Embed disaster risk reduction in all energy investments.

Recommendation 3

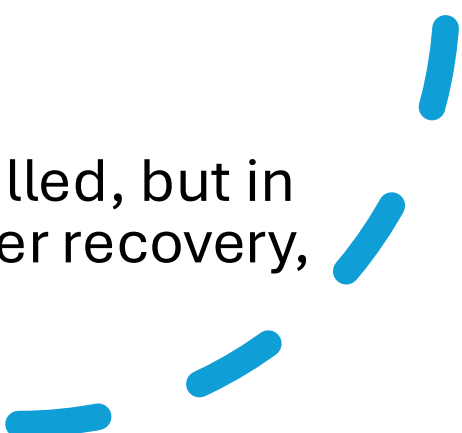
- Scale up financing for resilient renewable energy systems.

Recommendation 4

- Promote decentralized and community-based solutions.

Recommendation 5

Measure success not only in MW installed, but in avoided losses, reduced outages, faster recovery, improved resilience.





For SIDS, energy transformation is not simply a transition from fossil fuels to renewables.

It is a transition from vulnerability to resilience.

The real measure of success is not how much energy is generated, but whether energy systems continue to serve people when disasters strike.

Risk-informed, resilient and inclusive energy systems are therefore central to the future prosperity and security of Small Island Developing States.





Thank You

UNDRR

Global Education and Training Institute (GETI)

4F Songdo G-Tower, 175 Art Center-daero,

Yeonsu-gu, Incheon, Republic of Korea

undrr-incheon@un.org



SPC's Climate Innovation Co:Lab

*An Adaptation Fund Climate Innovation
Accelerator (AFCIA) programme*

*CTCN SIDS Forum
15 September 2026*





Pacific
Community
Communauté
du Pacifique



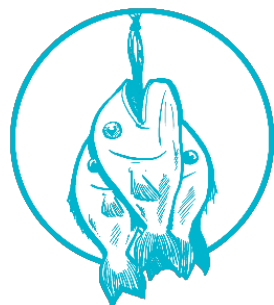
SPC is the principal scientific and technical international development organisation governing and supporting the sustainable development of 27 member countries and territories in the Pacific region.



Pierre-Yves (PY) Charpentier,
Innovation & Design Adviser
and the Co:Lab Project Manager
pierreyvesc@spc.int

Our SPC values

Our Pacific values guide us - respect, solidarity and mutuality - in navigating towards our collective well-being and prosperity. Voyaging together as we serve our Blue Pacific, we embrace:



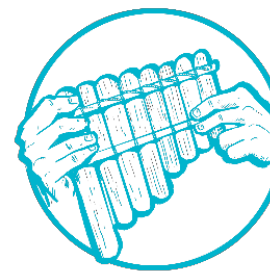
Enginkehlap | Generosity

*We provide for each other.
We work together towards*



Kaliakirangi | Stewardship

*our shared mission of being
all contributions.
We are the stewards of our
the centre of our efforts,
Blue Pacific. Our history,
knowledge and science*



Gila Sutuwa | Unity

*hold the solutions for
contemporary challenges.
We progress together.
Leaving no one behind, we*



Aroha | Care

*honour the richness of our
history and culture across
the world.
The well-being of our*

These values are SPC's navigational markers, steering us as an organisation that transforms and adapts to our region's realities in serving our members' evolving needs and priorities.

What Is Co:Lab?

- Part of AFCIA, it is regional climate innovation accelerator for the Pacific
- **Objective:** to incubate, catalyse, de-risk, and scale locally led climate adaptation innovations across PSIDS
- Operating through a structured *Incubation → Acceleration → Amplification* pathway
- Provides flexible small grants + technical assistance + scale-up support + investment matchmaking



*Incubate →
Accelerate →
Amplify.*

Background Adaptation Fund AFCIA

ADAPTATION FUND

Climate 
Innovation
Accelerator

SMALL GRANTS. BIG IMPACT.

- Launched in November 2019
- Aims to foster innovation in climate change adaptation in developing countries
- Broad range of potential finance recipients, including governments, non-governmental organizations, community groups, entrepreneurs, young innovators and other groups
- Now implemented by UNEP-CTCN, UNDP, UNIDO, WFP and SPC



14 SIDS in the Pacific:

- Cook Islands
- Fiji
- Kiribati
- Marshall Islands
- Federated States of Micronesia
- Nauru
- Niue
- Palau
- Papua New Guinea
- Samoa
- Solomon Islands
- Tonga
- Tuvalu
- Vanuatu

Geographic Focus

Target beneficiaries

Direct beneficiaries: 900 people (50% women)

Indirect beneficiaries: 2,700 (50% women)

Indigenous communities; small businesses; CSOs; government services



Co:Lab Programme Structure



Incubation

- Incubation of innovative projects
- Average US\$50,000
- Open calls



Acceleration

- Scale-up funding for high-performing projects
- Max of US\$200,000
- Capacity strengthening



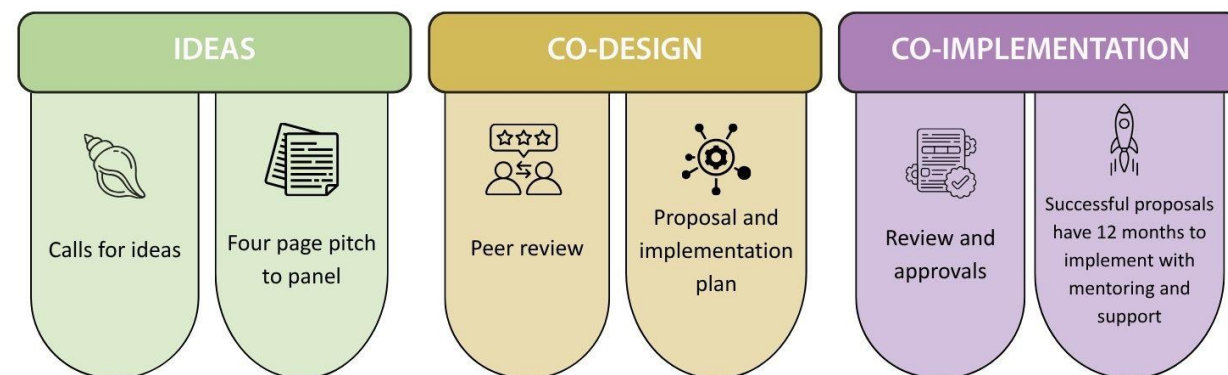
Amplification

- Investment matchmaking
- Knowledge management



Component 1: Incubation

- Identification and incubation of innovative practices for climate adaptation
- Launch of EOI (call for ideas) using a short pitch form
- Screening and selection using pre-agreed criteria
- Co-design process (about 3 months) with hands-on support for short-listed pitches
- Up to 4 calls and cohorts in 5 years
- About 12 months for implementation
- Analytical review of each cohort





Component 2: Acceleration

- Helpdesk for support to project managers, NIEs and collect adaptation innovations from countries, even between calls
- Targeted technical support to move from early-stage to acceleration
- Clinics on adaptation innovation, either online or in-country
- Selection of promising incubation projects and upgrade to the acceleration phase (no competitive calls for acceleration)
- 3 cohorts over 5 years
- 10 to 18 month for implementation
- Regional workshop on climate innovation and finance (year 3)

Component 3: Amplification

- Climate innovation matchmaking labs
- Knowledge products and management:
 - Factsheets for each project
 - Policy briefs and impact stories
 - Analytical reports on incubation cohorts
- Peer-to-peer learning exchanges
- AFCIA community of practice, website and communication channels



Co:Lab – Co:Laboration, Co:Design & Co:Implementation

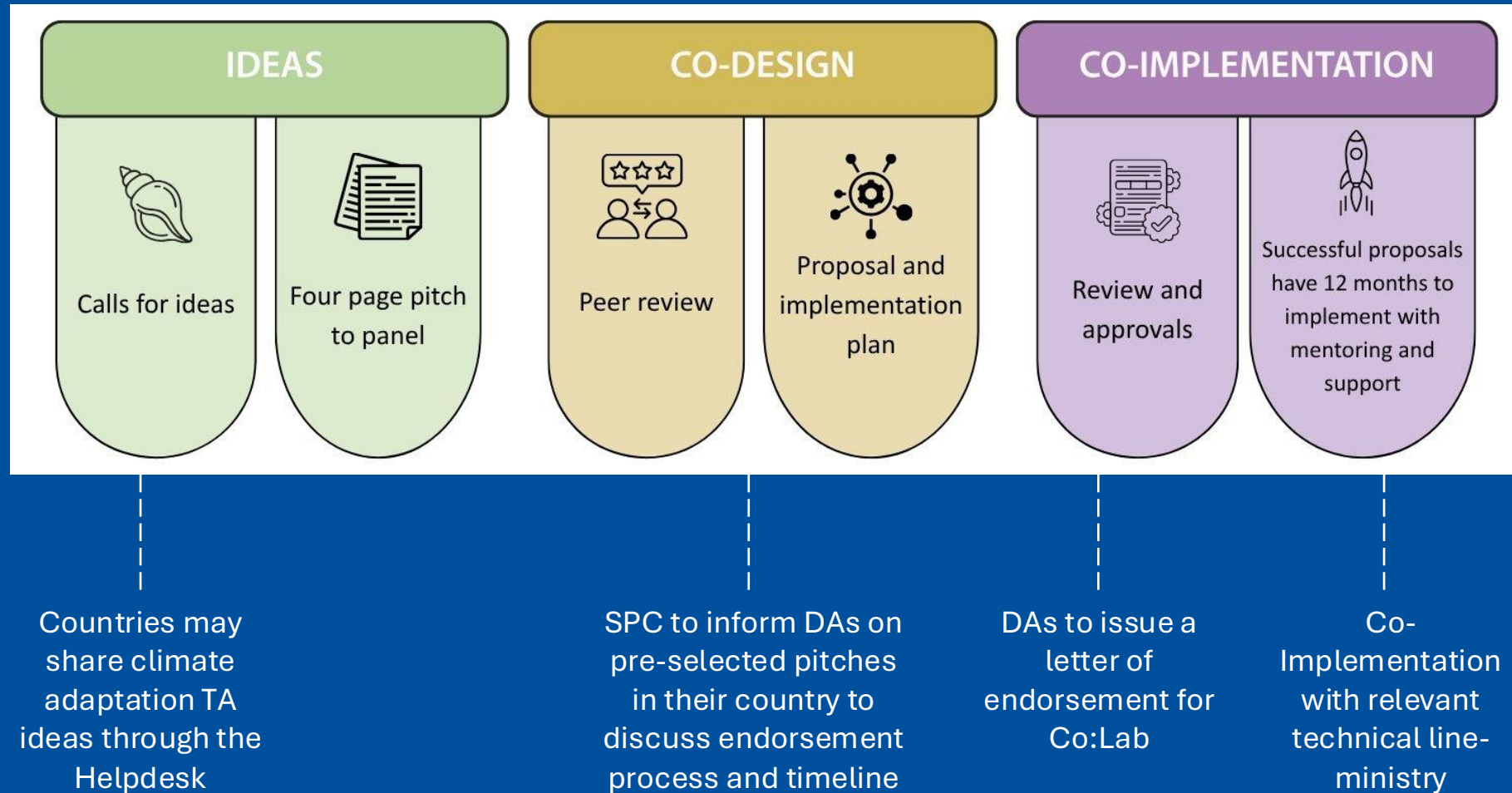
- Main delivery mechanism: **co-implementation** of adaptation innovation initiatives with technical services of PSIDS (14 countries) with SPC divisions
 1. Call for pitches
 2. Co-design between SPC teams and member's technical services
 3. Letter of Endorsement from Designated Authorities
 4. Co-implementation between SPC and technical services of member countries
- Over the course of the implementation of Co:Lab, external calls for pitches will be issued encouraging the submission of pitches by a broad range of actors



Selection Criteria

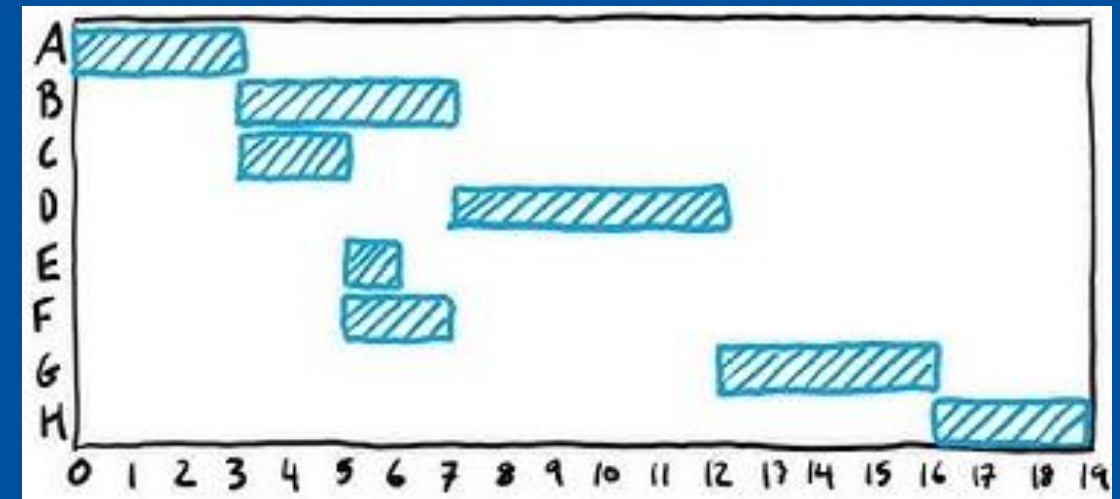
Climate rationale	Responds to clear adaptation or resilience challenge and links to potential loss and damage. Clearly identifies a specific impact caused by climate change and demonstrates how it will address that impact.
Alignment to National Priorities	Linked to national priorities or policies (NDCs, NAPs, national policies) or responds to a clear request from a member country.
Innovation	Demonstrates a new or improved approach to Pacific challenges – whether created from within Pacific communities and knowledge systems, adapted from elsewhere to work in Pacific contexts, or drawn from traditional practices and local resources applied in new ways. (Not business-as-usual)
Feasibility	Can be delivered within 12 months with clear activities and “shovel readiness”, demonstrating the ability to begin implementation quickly and effectively.
Local ownership	Existing ability to co-design and co-implement with country partners with adequate implementation capacity.
Inclusion	Promotes gender equality, youth and social inclusion by supporting young and emerging Pacific professionals, and/or promoting gender equality, women’s leadership and social inclusion.
Replicability	Shows potential to expand, be replicated in other Pacific contexts, or attract further funding.
Good value for money	Activities and budget are realistic and have the potential to deliver the best possible results for the resources invested.

Role of Designated Authorities



Work Plan Year 1

- June 2026: first call for project pitches
- July-Oct 2026: Co-Design process
- Oct 2026: Implementation of the first cohort of incubation project
- Sept-Oct 2026: Helpdesk set-up with SPC-Climate Change and Sustainability Division
- Sept 2027: 2nd Incubation Call, 1st Amplification cohort



Work Plan 5 years

- Up to 4 Incubation project cohorts
- 3 Acceleration project cohorts
- Regional workshop on climate innovation and finance in 2029
- Annual Matchmaking Labs from Y3
- At least 2 Peer-to-peer learning exchanges for country-to-country cooperation
- Policy briefs, impact stories, innovations promoted in sectoral meetings

End of project:
May
2031

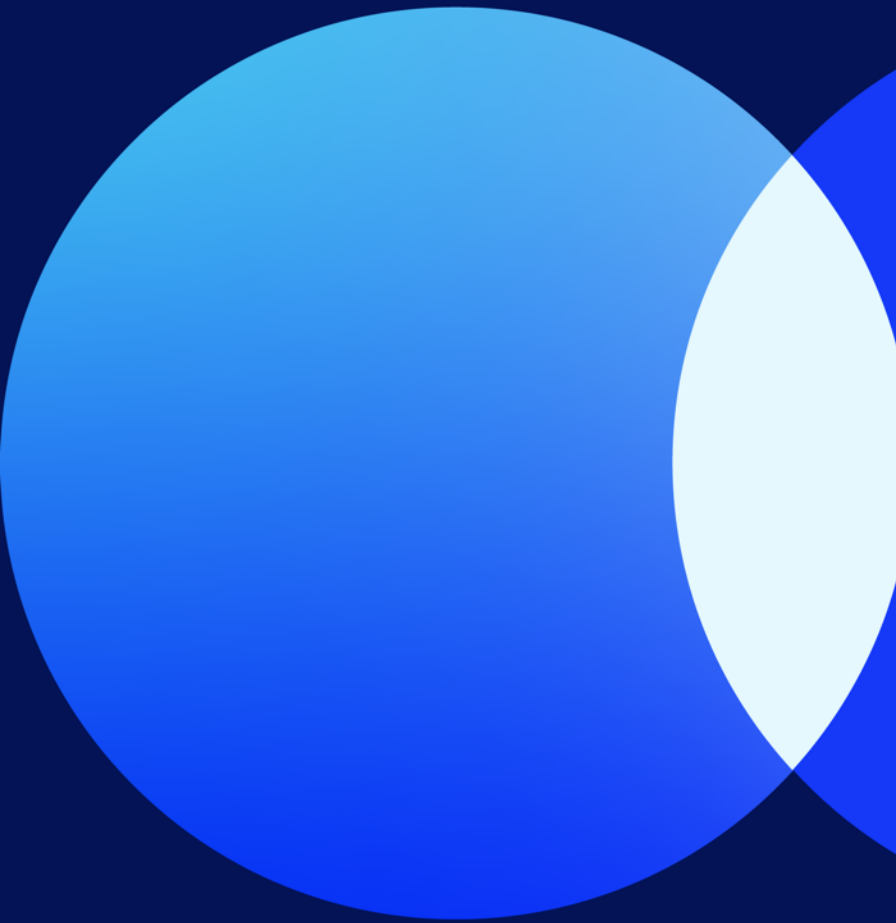
Next Steps

- First Co:Lab project cohort co-design process (7 initiatives in 9 Pacific Island Countries – Naoreo, Federated States of Micronesia, Cook Islands, Vanuatu, Kiribati, Fiji, Tuvalu, Samoa, Marshal Islands) – until October 2026
- Approvals by DAs and announcement of the first Co:Lab cohort – October 2026
- Helpdesk setup (with Climate Change and Sustainability Division) – Sept-October 2026

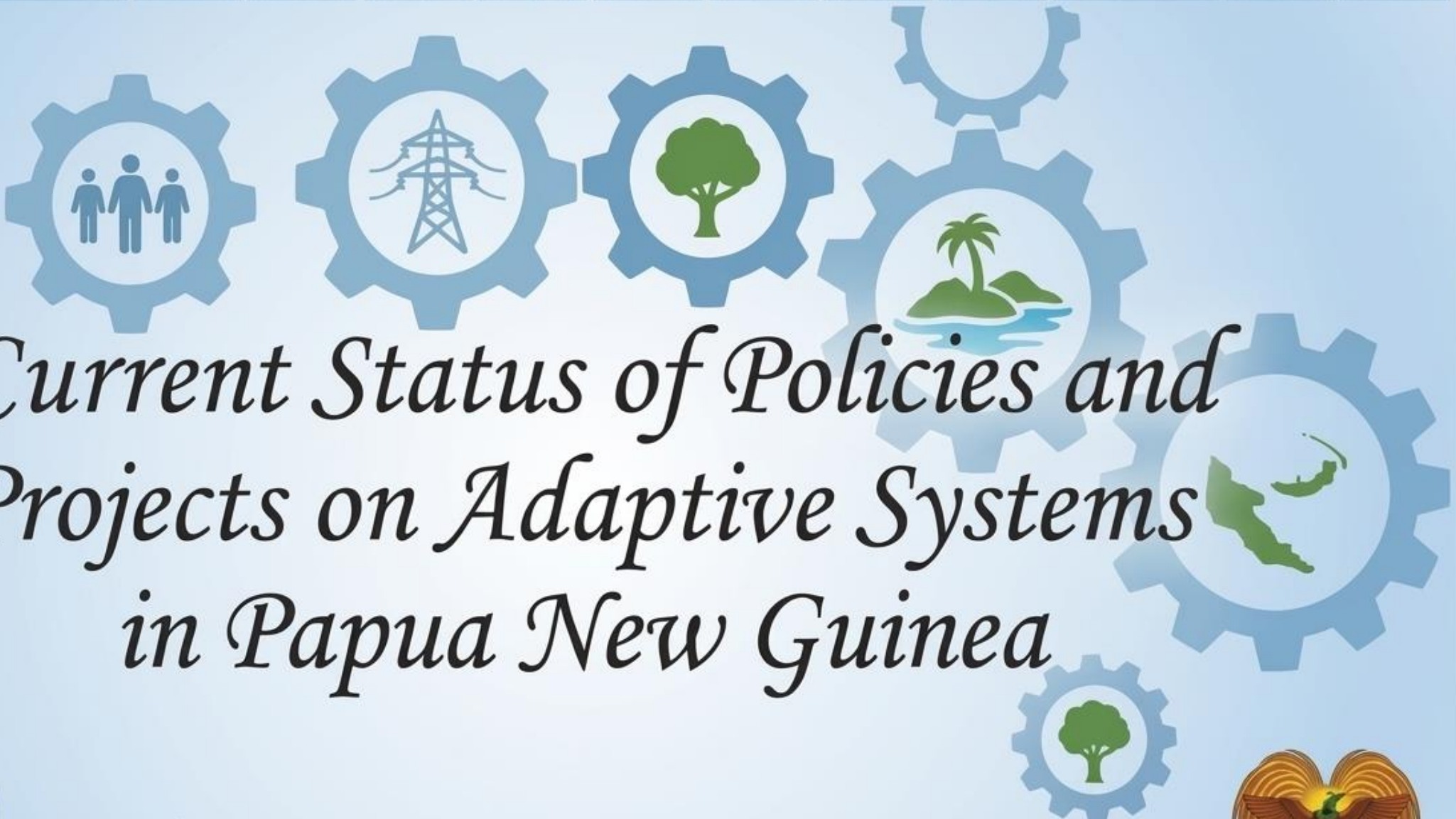
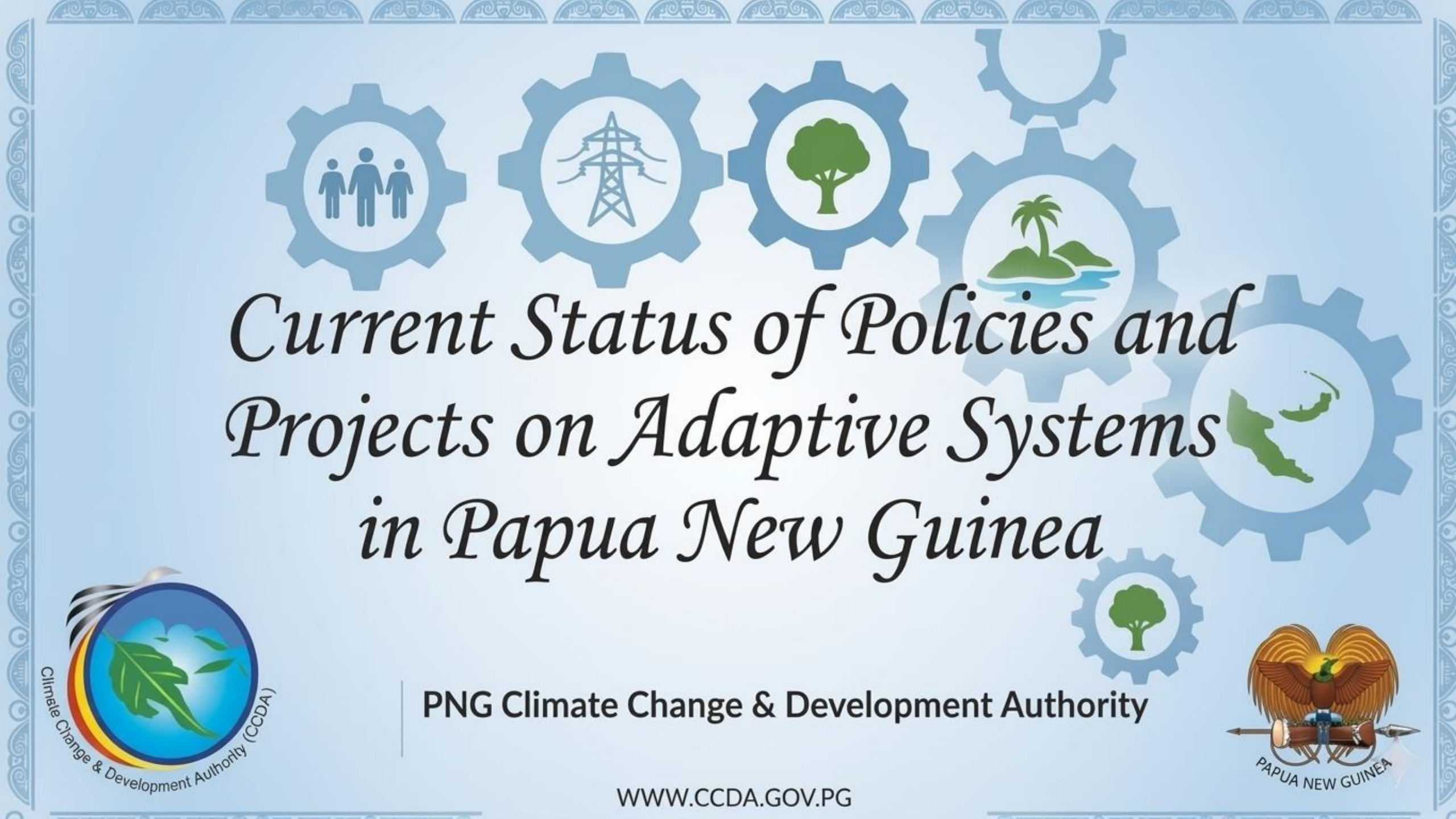


Q&A

Thank you!



Snapshot of SIDS Reality – Country status update (coffee served at 15:30)



Current Status of Policies and Projects on Adaptive Systems in Papua New Guinea



PNG Climate Change & Development Authority

WWW.CCDA.GOV.PG





Bridging Resilience and Global Responsibility

Papua New Guinea Adaptive Systems

Country Status Presentation



Policy Architecture & Governance:

- Validation of NDC 3.0 (2025-2035) and institutionalizing the National Adaptation Plan (NAP) across 12 core ministries.
- Alignment with Medium-Term Development Plan IV (MTDP IV 2023-2027) for macro-economic resilience.
- Sectoral Policy Alignment:
 - **National Agriculture Sector Plan (NASP 2024-2033):** Climate Smart Agriculture (CSA) & rural food security.
 - **National Energy Policy 2017-2027:** 70% renewable electricity target by 2030 (hydro, solar, geothermal, Biomass)
 - **National Protected Areas Policy/NBSAP:** Biodiversity preservation and nature-based solutions.
 - **National Forest Policy Framework:** Phase-out of raw round log exports by 2025 and REDD+ customary landowner safeguards.



Innovative Green Finance:

- Climate Responsive Budgeting across provincial & national levels.
- Private banking integration via IGFP Taxonomy v2
- Grant allocations through the PNG Biodiversity & Climate Fund.



Mitigation & Innovation - Local Action:

- Leveraging GCF REDD+ payments (\$63.4M), raw round log export phase-outs, and UN CTCN technology transfers (E-Mobility, e-OTEC).
- Direct benefit sharing: 60% for communities, 40% for enforcement.
- Ground level Provincial Adaptation Plans (PAPs).
- Climate proofing 'Connect PNG' corridors and deploying coastal bio-shields.
- Enforcing Article 6 Carbon Market Regulations.
- Establishing the national Loss & Damage Framework.
- Solar Mini-Grids & Off-Grid Hydro – localized clean energy infrastructure projects targeting rural communities.



Financing Adaptive Systems: National Mechanisms & Systemic Reforms



Inclusive Green Finance Policy (IGFP) Framework:

- Rolled out the Inclusive Green Finance Taxonomy Version 2.
- Introduced mandatory Environmental Risk Policy Guidelines for commercial banking institutions.
- Established standards for Green Loan Classification to direct private banking capital into resilient agriculture and renewable energy.



National Climate Finance Strategy:

- Managed via a newly designated Climate Finance Unit under the CCDA.



PNG Biodiversity & Climate Fund (PNG BCF):

- Sovereign-backed grant facility delivering direct adaptation and restoration capital to NGOs and rural communities.



USD 63.4 M

The Green Climate Fund (GCF) REDD+ Payout:

- Formalized a USD 63.4 Million Results-Based Payment mechanism for 17 million tonnes of verified carbon reductions.



Global Advocacy:

- Actively joining the Tropical Forests Forever Facility (TFFF) to unlock new debt-for-nature swaps.



The Green Fee (On Hold): **ON HOLD**

- Statutory K50 framework established, currently paused for standard operating procedure (SOP) and payment terminal deployment.

Mitigation & Technology Innovation: Forest Assets, E-Mobility & Ocean Energy



GCF



UN CTCN



Forest Assets & Community-Led Economics



GCF Funding Milestones

- Secured **USD 63.4 Million** in Results-Based Payments
- Rewards **17 million tonnes** of verified CO2 reductions



Community-Led Economics: 60/40 Equity Split



Technology Innovation: UN CTCN Technical Assistance



E-Mobility Policy Study

- National policy for E-mobility deployment and green charging infrastructure
- Low-carbon transport to reduce urban emissions and fossil fuel reliance



Ocean Energy & e-OTEC Pre-Feasibility Study



- Partnership: CCDA, National Energy Authority (NEA), Korea Institute of Energy Research (KIER)
- Evaluating Salinity Gradient Energy and e-OTEC with Blue Battery storage

**Positions PNG at the forefront of
marine energy innovation**



Adaptation Action: Resilient Communities, Infrastructure & Marine Defense



Provincial Adaptation Plans (PAPs)

- Localized vulnerability mapping across 21 climate-threatened provinces, islands, and remote atolls.



Resilient Water & Health Security

- Scaling climate-proof water harvesting and sanitation infrastructure (e.g., New Ireland Province Water Initiative).



Climate-Resilient Infrastructure & Transport

- Retrofitting bridges, drainage, and road corridors against landslides and high-intensity rainfall.



Climate-Smart Agriculture & Early Warning Systems

- Scaling drought-tolerant crop varieties with NARI.
- Deploying hydrometeorological stations for localized forecasting.



Coastal Bio-Shields & Community Ecosystem Defense

- Mangrove restoration, artificial reef deployment, and seawalls to protect vulnerable coastal villages.

Future Horizon: Loss & Damage, Carbon Markets & 2030 Development Targets



Inaugural Loss & Damage Framework

Legally protecting vulnerable communities from slow-onset events (sea-level rise, coastal erosion) & structured climate relocation protocols.



MTDP IV Strategic Alignment (SPA 10)

Mainstreaming climate adaptation across all 12 Strategic Priority Areas, embedding climate risk assessments into Connect PNG national infrastructure rollout.



Article 6 Carbon Market Architecture

Enforcing robust national regulations for high-integrity carbon trading (Article 6.2/6.4) to protect customary landowner rights & guarantee revenue sharing.



Renewable Energy Transition (PPL & NEA Master Plan)

Scaling baseline clean energy targets toward 70% renewable by 2030 and 100% by 2050 through hydro, solar mini-grids, and geothermal power.



Sustainable Forestry & Value-Addition

Phase-out of raw round-log exports to favor onshore wood processing and REDD+ verified conservation corridors.



THANK YOU!

Danny Nekitel

Manager Mitigation & Low Carbon Growth

PNG's National Designated Entity Focal Point for UN CTCN
Climate Change & Development Authority

Email: danny.nekitel@ccda.gov.pg / dan.nekitel@gmail.com

Kiribati energy transition

Country status, policy direction and responsible use of AI

Moanibou Muller

Senior Assistant Secretary, Administration – Corporate Services Department

Ministry of Infrastructure and Sustainable Energy

KIRIBATI

ENERGY
TRANSITION

Energy planning across dispersed islands

A small system with large distances

Equipment, fuel and specialist support travel long distances. Small markets limit economies of scale.

Energy assets also face sea-level rise, erosion, saltwater intrusion and extreme weather.

WHAT THIS MEANS

Higher capital and transport costs

Long lead times for spare parts

Limited technical capacity

Infrastructure must withstand island conditions

Solar and storage are expanding supply

Solar is Kiribati's most commonly used renewable energy technology

6.5 MW

combined solar generation capacity expected from STREP and the South Tarawa Water Supply Project

13.5 MWh

combined energy storage capacity expected from the two projects

The projects will strengthen Public Utilities Board generation and supply capacity in South Tarawa.

Energy and water planning are connected: reliable electricity supports safe water production and distribution.

Policy and regulation support implementation

NATIONAL DIRECTION

National Energy Policy

Kiribati Integrated Energy Roadmap

SDG 7 Roadmap

Least-cost pathways to 2030, energy-saving opportunities and stronger NDC alignment

REGULATORY FOUNDATION

Energy Act 2022 and supporting regulations

Renewable energy • codes of practice
Tariffs • petroleum
Energy performance labelling and standards

Grid code

In draft form

Current reform focuses on achievable targets that can be measured, monitored and reported.

Four constraints shape project delivery

- | | | |
|----|----------------------------------|--|
| 01 | Upfront cost | Small markets and long supply routes raise project costs. |
| 02 | Operation and maintenance | Large systems require skills, service arrangements and long-term budgets. |
| 03 | Spare parts and logistics | Delays can extend outages and reduce the value of installed assets. |
| 04 | System losses | PUB continues to improve generation, storage, transmission and distribution. |

POIDIER connects energy with outer-island development

POIDIER

Promoting Outer Island
Development through the
Integrated Energy
Roadmap

US\$5.3m

GEF funding with UNDP and
Government of Kiribati cofinancing

PROJECT SUPPORT

Skills and community outreach

Energy policy, regulation and planning

Financing mechanisms for renewable energy and efficiency

Solar mini-grids, billing systems and agricultural water supply

Productive uses support coconuts, fisheries, agriculture and locally made efficient cookstoves.

Energy access supports livelihoods as well as household and public services

Potential application of AI in Kiribati's energy sector

Practical applications

Demand and solar generation forecasting

Solar and battery system optimisation

Detection of unusual system losses

Predictive maintenance and asset planning

CONDITIONS FOR USE

Reliable data

Human oversight

Data protection

Affordable support

Begin with one measurable pilot before wider deployment

Partnerships must leave operating capability

PUBLIC LEADERSHIP

Government and PUB

Set priorities, regulate, operate assets and retain accountability.

PRIVATE PARTICIPATION

Suppliers and institutions

Supply outer-island solar systems and support projects for churches, schools and other users.

DEVELOPMENT SUPPORT

Finance and expertise

ADB, World Bank, UNDP, GEF, SPC and regional regulators support projects, policy and knowledge exchange.

A sustainable partnership includes training, readily available spare parts, maintenance arrangements, realistic operating costs and knowledge transfer.

Kiribati's priority

Responsible technology that improves essential services and strengthens national capability

IMPLEMENT

**Move viable energy plans
into delivery**

MEASURE

**Use targets that can be
monitored and reported**

SUSTAIN

**Build systems that Kiribati can
operate and maintain**

Kam rabwa

Adaptive Systems Initiatives in Palau

Energy • Climate • Oceans • Communities

A brief overview

1. Renewable Energy & Energy Resilience

Goal: increase renewable electricity and reduce dependence on imported fuels

Solar PV + battery storage are key options

Hydrogen production

OTEC- Energy and Byproducts

Pilot study on Wave Generator

Wind energy is also evaluated

Energy efficiency reduces demand

Long-term roadmap targets 100% renewable electricity by 2050

2. Energy Innovation: Beyond Solar

Battery storage for grid flexibility

Green hydrogen as long-term energy storage

Electric vehicles as flexible electricity users

Renewable options for road and marine transport (Traditional sailing/'wind)

Monitoring helps determine what works best

3. Marine & Ocean Adaptation

Palau National Marine Sanctuary protects a large ocean area

Remaining fishing areas are managed for sustainable domestic use

Marine ecosystems provide food, livelihoods and tourism value

Monitoring supports adjustments to management

Traditional knowledge(Bul) can complement scientific information

4. Climate & Disaster Resilience

Improve preparedness for storms and climate impacts

Protect critical infrastructure and services

Use climate information for planning

Learn from disaster impacts and improve future response

Energy resilience supports communications, water, health and emergency services

5. GIS as an Adaptive Tool

Map energy infrastructure and critical facilities (Asset Inventory)

Map solar resources and hazard exposure

Track renewable-energy projects through time

Combine field data, remote sensing and community knowledge

Update maps as conditions and projects change

Provide data to communities for zoning and land use planning (www.palaugov.org/palaris)

Key Takeaways

Palau is using multiple approaches to build resilience

Energy transition is a major adaptive-system initiative

Marine conservation and climate resilience also depend on feedback

GIS can connect data, infrastructure, hazards and decisions

The objective is a system that can learn and adjust

FIJI COUNTRY UPDATE

Climate Technology & Adaptation Priorities

UN Climate Technology Centre and Network (CTCN)
National Designated Entity – Fiji
Ministry of Environment and Climate Change | Fiji

15 September 2026

Presenter: S.Devi
Department of Climate Change, Fiji





Agenda

1. Background
2. Climate Hazards
3. Adaptation Related Policies
4. Projects supporting community resilience
5. Institutional adaptive systems and capabilities
6. CTCN Project in Fiji
7. Challenges and Opportunities

Fiji - MAP



4

FIJI - DESCRIPTION

- Land Area - 18,274 km²
- Capital – Suva
- Language – Fijian, English, Hindi and Rotuman.
- Population Estimate – 950K.
- Currency – Fiji Dollar (Fj\$).
- Time zone - UTC+12 (FJT)



Fiji's Climate Risk Profile & Adaptation Demand

Acute Climate Hazards

High exposure to tropical cyclones, severe flash floods, prolonged droughts, and accelerated sea-level rise.

Coastal & Ecosystem Vulnerability

Inundation, severe erosion, and saltwater intrusion threaten coastal settlements, freshwater aquifers, and marine habitats.

Impacted Economic Sectors

Agriculture, food security, infrastructure, water supply, and local livelihoods face compound systemic risks.

Beyond Physical Infrastructure

Requires sustained access to spatial data, high-resolution mapping, technical skills, and locally maintainable systems.



Statutory & Policy Framework for Climate Resilience

OVERARCHING FRAMEWORK

Fiji National Adaptation Plan (NAP) 2018

Provides overarching strategic framework for integrating adaptation across all economic sectors and levels of governance.

STATUTORY BASIS

Climate Change Act 2021

Establishes legal mandate for national climate governance, reporting, risk integration, and institutional coordination.

GLOBAL COMMITMENT

Nationally Determined Contribution (NDC) 3.0

Connects national adaptation and mitigation priorities directly to Paris Agreement commitments.

DEVELOPMENT INTERGRATION

National Development Plan 2025-2029 and Vision 2050

Mainstreams climate risk considerations into national budget, infrastructure, and sectoral planning

TECHNOLOGY LINKAGES

Fiji Technology Needs Assessment Report Adaptation 2020 (Mitigation/Adaptation)

Identifies priority technologies for climate change adaptation and mitigation

Fiji's Six Adaptation Priority Domains

Food and Nutrition Security

Improves capacity to anticipate and reduce environmental and climate risks and ensure sustainable food production

Health

Improves systems and infrastructure to manage the negative impacts caused by future climate variability and change

Human Settlements

Reduces vulnerability to major assets, infrastructure and population centers, providing the ingredients for growth

Resilient Infrastructure

Helps to ensure full life span of investments are reached by reducing environmental and climate risks

Biodiversity and the natural environment

Supports maintenance of biodiversity and the natural environment and the services it provides

Climate Data & Digital Tools – (Climate Relocation)

GIS spatial mapping, remote sensing, automated weather stations, and decision-support platforms.

STRATEGIC SHIFT: Moving from individual isolated projects to integrated systems that enable adaptation at national scale.

Fiji NDE Operational Role & CTCN Mechanism

Focal Point & Prioritization

Identifies, reviews, and prioritizes national technology needs aligned with the Climate Change Act & NAP, NDP, NDC and Technology Needs Assessment for both Mitigation and Adaptation, .

Coordination & Linkages

Connects national line ministries, academia, and private sector with international technical experts.

Technology-to-Finance Bridge

Leverages CTCN technical assistance to build investment-ready concepts for larger climate funds.

CRITICAL DISTINCTION: How CTCN Operates for Fiji

- **CTCN does NOT provide direct grant funding to national budgets.**
- CTCN provides targeted Technical Assistance (TA), expert advisory, capacity building, and specialized tools.
- Value Add: CTCN acts as the vital bridge linking a recognized climate problem to a practical, scalable, and bankable solution.

Featured CTCN Technical Assistance: Climate-Resilient Agriculture

Lead National Partner: Ministry of Agriculture and Waterways

Primary Objective: Strengthen national capacity to promote, pilot, and scale climate-smart farming.

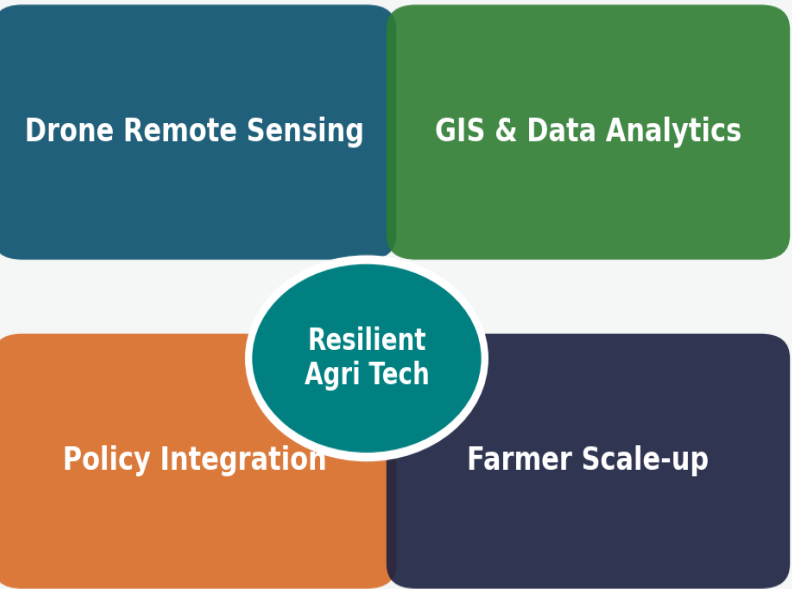
1. Policy Integration: Reviewing agricultural policies to embed climate resilience criteria.

2. Data & Drones: Deploying drone remote sensing for field data collection and crop monitoring.

3. Capacity Building: Training government officials, extension officers, and farming communities.

4. Scaling Concept: Developing an investment-ready concept for nationwide adoption.

CTCN Technical Assistance Pillars



Fiji's CTCN Project: From Approval to Implementation



Photos 1 & 2: International Consultant Team and participants attending the Inception Workshop, organised and facilitated by the Ministry of Environment and Climate Change in collaboration with the Ministry of Agriculture, Waterways and Sugar Industry.

Installed off-grid Renewable energy Projects (Approx. 6MW)

Project Name	Location	System Size
Namara Solar Hybrid System	Namara village, Kadavu	30kW
Tukavesi Solar Hybrid System	Tukavesi village, Cakaudrove, Vanua Levu	60kW
Solevu High School – Solar Hybrid	Solevu High School, Bua, Vanua Levu	30kW
Yasawa Secondary School – Solar Hybrid	Naviti, Yasawa	30kW
Nakoro village – Solar Hybrid	Navosa	50kW
Vio island – Solar Hybrid	Off Lautoka wharf	5.88kW
Bukuya Hydro	Magodro, Ba	100 kW
Buca Hydro	Cakaudrove	30kW
Muana Hydro	Tunuloa, Cakaudrove	40kW
Kadavu – Koro Hydro	Naceva, Kadavu	20kW
Nabukelevu and Dakuibeqa Health Centers - Solar	Kadavu and Beqa	16.6kW
Mua Solar PV Plant	Mua, Taveuni	1.5MW
Stand Alone Solar Home Systems (SHS)	Maritime Islands	~ 4.11MW

On-going development partner Projects

PARTNERSHIP PROGRAMME	PROJECT FUNDED
KOICA	4 MW Agro-Photovoltaic system in Ovalau
United Arab Emirates (UAE) and New Zealand Government (NZG)	LAKARO Project (Lakeba, Kadavu, Rotuma)
United Nations Industrial Development Organizations (UNIDO)	1. Solar Grid Connect System for Nausori Market 2. Solar Hybrid System for Lomanikaya Village, Vatulele
Asian Development Bank (ADB)	1. Rehabilitation of the Buca Project 2. Solar Hybrid System for Tiliva Village
Fiji Rural Electrification Fund (FREF) w/t UNDP & UK,AUS, NZ	1. Vio Island Repairs + Upgrade 2. 1st Stage Tender (3 Sites) – Kioa, Yacata, Yadrana

Planned energy Fiji limited (efl) Projects

No	Project	Anticipated Output	Estimated cost (hydro+ transmission)
1	Qaliwana Hydro Project	17.0MW/ 39GWh/annum	US\$90 M
2	Wailoa Downstream Hydro project	28.6MW/ 135.7 GWh/annum	US\$277 M
3	Lower Ba hydro project	49.0MW/ 214GWh/annum	US\$324 M
4	Waivaka hydro project	32.0MW/ 67.6GWh/annum	US\$ 88M
5	Wailevu hydro project	17.0MW/ 58.08GWh/annum	US\$ 75.1M
6	Qeleloa, Ba & Tavua	15MW/65.7GWh/ annum	-



Rotuma



Solevu



Davigele
Health Centre



Tukavesi

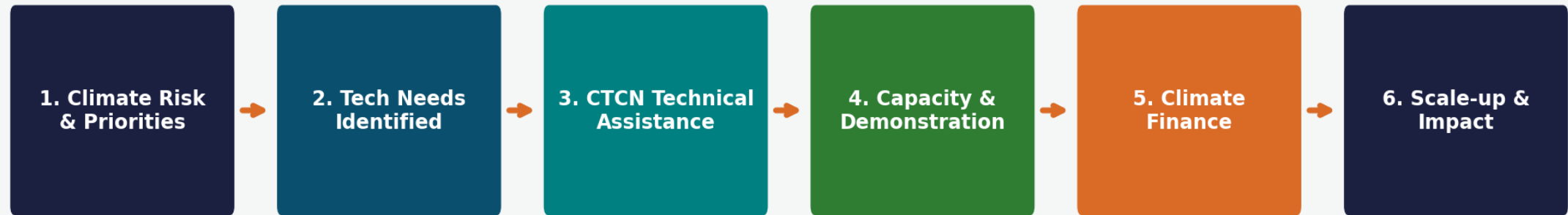


Yasawa

Addressing Gaps via Future CTCN Engagement

Dimension	Key Bottleneck / Gap	Targeted CTCN Engagement
Technology	Limited island suitability, affordability, and lack of local testing.	Demand-driven technical assessment & practical pilot demonstrations.
Data & GIS	Fragmented datasets, low-resolution mapping, poor interoperability.	Digital risk mapping, remote sensing tools, and open data platforms.
Capacity	Technical expertise gaps and project-bound knowledge loss.	Institutional capacity development and long-term local training.
Finance Scale	Difficulty transitioning from pilot projects to national scale.	Developing technology-to-finance pathways and investment concepts.

From Climate Risk to Climate Solutions: National Pathway



CORE CONCLUSION & CALL TO ACTION

- Fiji is committed to strengthening the entire technology transfer pipeline—connecting climate risk assessments directly to deployed, scalable adaptation solutions.
- The CTCN is a vital strategic partner in helping Fiji bridge the gap between identifying technical needs and mobilizing climate finance for national impact.

Vinaka Vakalevu | Thank You | Questions & Discussion



THANK YOU

Session 2

Available CTCN support for Adaptative Process Improvement

- The Open House format is an **interactive dialogue** designed to foster learning and action
- Designated rapporteurs will provide a topic-related guide, address questions, and support the creation of outputs
- NDEs will be divided into **3 groups of 3-4 people** and will choose between **4 thematic stations** on key CTCN operations

Logistical Support

Rapporteur:
Jeawon Kim

Key procedures related to Logistic Support and other countries' logistic support examples and go through the form to complete the exercise for your country.

Post Impact of TA

Rapporteur:
Tomoko Furusawa and
Nadege Trocellier

Reflections and methodologies to support the scalability and financial sustainability of Technical Assistance projects.

TA requests and NDE manual

Rapporteur:
Hyoung Jo

Progress check on ongoing TA requests, learn NDE manual proposed to clarify role and responsibility of an NDE

CRD&D

Rapporteur:
Suil Kang

Latest updates on cRD&D support activities, consult on your viewpoints towards cRD&D direction, modalities, and procedures. This includes consultation on cRD&D TA ideas.

2025 National - Logistical Support, Modality 1

Decision 4/ CP.28 Welcomes the engagement of the TEC and the CTCN national designated entities to provide technical and logistical support to them.

Pilot tested from Oct 2024-March 2025 (Cambodia)

Operationalization: Oct 2025-April 2026

8 signed requests:

2 from Asia

6 from Africa

0 from LAC, SIDS and Eastern Europe



Date & time: 17 July, 9am - 5pm

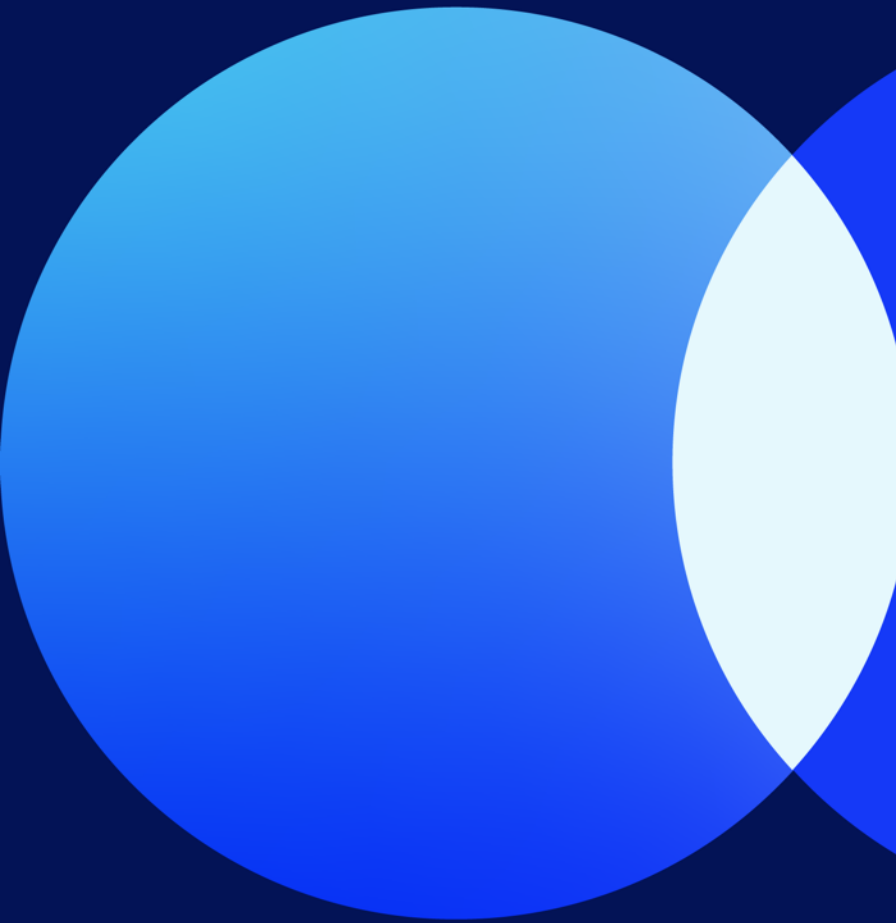
Venue: Ministry of Environment, Cambodia

Participants: MoE, MISTI, MPT, ARDB, Network members, Universities

Key insights

- Marked as the first time in the history of Cambodia's MOE to run the workshop on climate technology (separate from the national working group)
- 3 TA ideas were generated (1 on digitalization, 1 on adaptation, 1 on mitigation)





Post Impact of TA

TA Post-Implementation Form

Biennial UNFCCC Technology Mechanism NDE Survey & Technical Assistance Post-Implementation Form

Your input matters! Share your experience by July 30.

Dear National Designated Entity (NDE),

You are invited to contribute to the **Biennial UNFCCC Technology Mechanism NDE Survey**. This survey gathers your insights on your experiences, awareness, and the effectiveness of support provided by the Climate Technology Centre and Network (CTCN) and the Technology Executive Committee (TEC) in advancing the development and transfer of climate technologies.

As a key stakeholder, your input is essential to the monitoring and evaluation process. Your responses will help identify success stories, best practices, and areas for improvement. They will also inform the Periodic Assessment of the Technology Mechanism and contribute to the Global Stocktake under the Paris Agreement.

Please complete the relevant NDE survey here (Annex I or Non-Annex I):

 [Biennial UNFCCC Technology Mechanism NDE Survey \(Annex I\)](#)

 [Biennial UNFCCC Technology Mechanism NDE Survey \(Non-Annex I\)](#)

In addition, as per guidance of the Advisory Board, we are pleased to introduce the **Technical Assistance Post-Implementation Form**. This form aims to capture progress and outcomes following the completion of CTCN technical assistance, helping to monitor longer-term impacts and inform future CTCN support.

The form should be completed for all technical assistance (TA) that concluded in your country between 2022 and 2024, in collaboration with the main beneficiary.

Practical steps:

An email "Call for Input: NDE Survey & Post-Implementation Form" was sent to NDEs from UN Climate Technology Centre and Network [<economy@un.org>](mailto:economy@un.org) on 15 April 2026

This form aims to capture progress and outcomes following the completion of CTCN technical assistance, helping to monitor longer-term impacts and inform future CTCN support.

TA Post-Implementation Form



TECHNICAL ASSISTANCE POST-IMPLEMENTATION FORM

Guidelines:

- This form is to be completed by the National Designated Entity (NDE) in coordination with the Project Proponent(s) of the country which has/have received the technical assistance.
- The purpose of this form is to provide a progress update on the implementation activities after the end of CTCN support. This will help to monitor mid and long-term impacts of technical assistances, inform the continuous improvement of the CTCN technical assistance process, and provide follow-up support.
- By completing this Form, you consent to the CTCN using the provided data, information and materials for communication purposes.

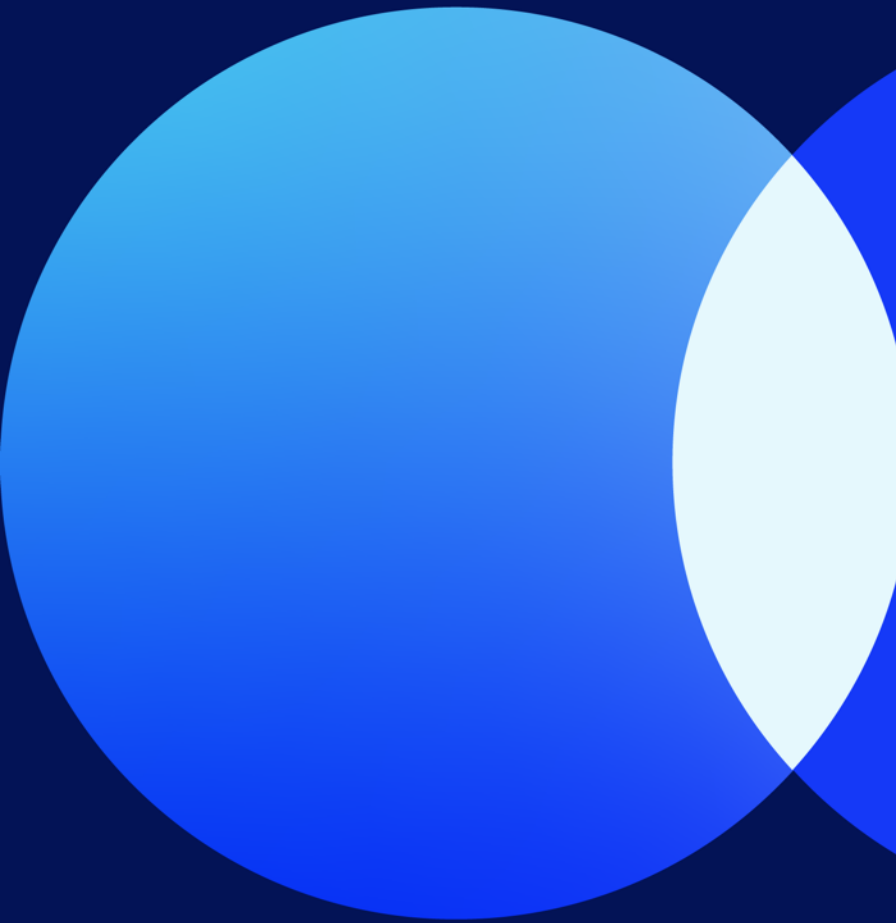
Country:		TA Request reference number:	
Title of TA:			
NDE			
Project proponent(s)			
Date of TA completion:	Click or tap to enter a date.		
1 st follow up	Click or tap to enter a date.		
Additional comments:	Click or tap to enter text.		

The form should be completed for all TA that concluded in your country between 2022 and 2024, in collaboration with the main beneficiary.

1. Map all relevant TA projects completed between 2022–2024
2. Share the form with the main beneficiary and complete it collaboratively
3. Review the submission
4. Submit it to the CTCN

Complete all the forms by 30 July 2026.

For questions related to the NDE Surveys, please contact the CTCN Secretariat (thanh.tranova@un.org)



TA requests and NDE manual

Purpose of this station

Learn how the updated NDE Manual can help NDEs shape stronger, country-driven CTCN Technical Assistance requests.

Expected output

A clearer understanding of how to strengthen TA requests before submission or further refinement.

What we will focus on

- Alignment with NDCs, TNAs, TAPs and national strategies
- Strong stakeholder engagement and national ownership
- Clear problem statement, technology need and expected impact
- NDE role before, during and after Technical Assistance
- Practical feedback on TA requests currently under design

What Makes a Strong CTCN TA Request?

A strong request should clearly answer:

1. Why this request?

What climate challenge, policy priority or technology gap does it address?

2. Why CTCN?

What technical assistance is needed that CTCN can realistically support?

3. Who owns it nationally?

Which ministries, agencies, local actors, finance actors or end-users should be involved?

4. How will it be used?

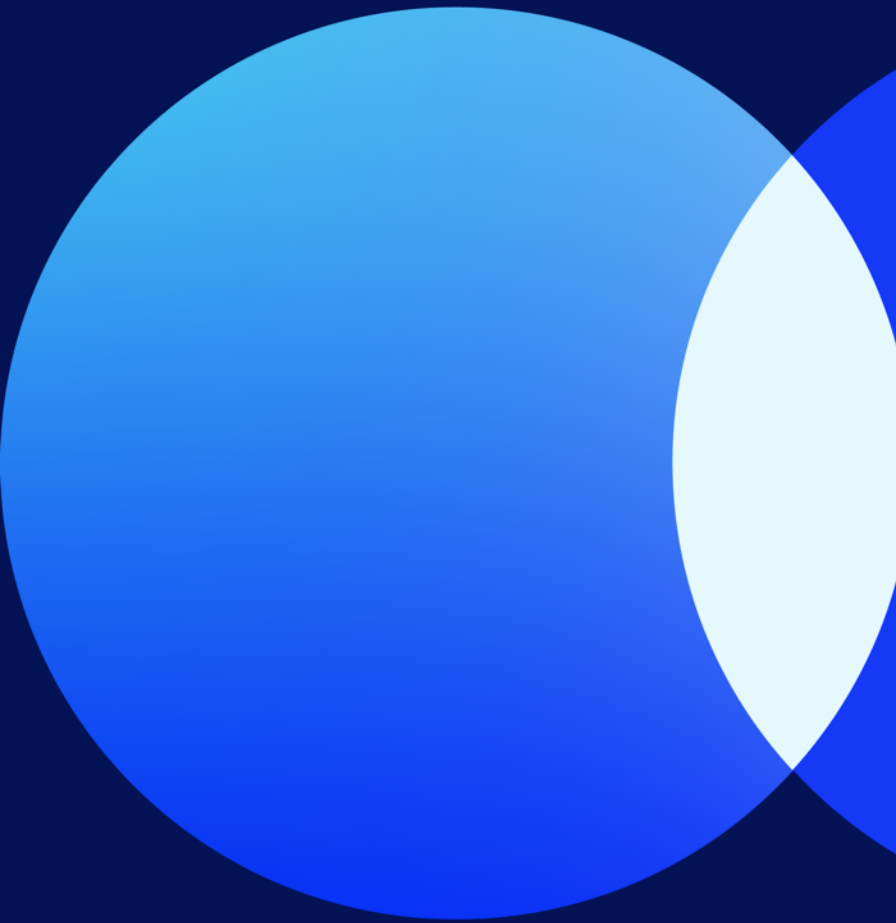
Will the outputs support policy uptake, feasibility study, investment planning, piloting or scale-up?

5. What happens after TA?

What follow-up pathway can the NDE help coordinate after completion?

Discussion prompt:

Do you have a TA idea or draft request that could benefit from CTCN feedback today?



**Relocation to Busan –
Group Bus will be
arranged. Pick-up-point
G-tower, lobby**

10:10am

Meet us at BEXCO
Auditorium for
opening ceremony

Keep your eyes on
WhatsApp group
chat for information

Supported by:



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ADAPTATION FUND



環境省
Ministry of the Environment



METI
Ministry of Economy, Trade and Industry



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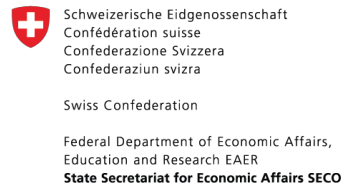
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GREEN
CLIMATE
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Schweizerische Eidgenossenschaft
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Confederazione Svizzera
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Education and Research EAER
State Secretariat for Economic Affairs SECO



gef



UK Government



Ministry of Science and ICT



Federal Ministry
for Economic Affairs
and Energy



Government Offices of Sweden
Ministry of the Environment and Energy



MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE



NDC
PARTNERSHIP



Spanish
Cooperation



Federal Ministry
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Climate Action, Environment,
Energy, Mobility,
Innovation and Technology



MINISTRY FOR FOREIGN
AFFAIRS OF FINLAND



Comhshool, Póbal agus Rialtas Áitiúil
Environment, Community and Local Government