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2015-2021: An Overview of Korea's Engagement with the United Nations Climate Technology Centre & Network (CTCN)

GREEN TECHNOLOGY CENTER

CTCN
UN Climate Technology Centre & Network
UNFCCC Technology Mechanism

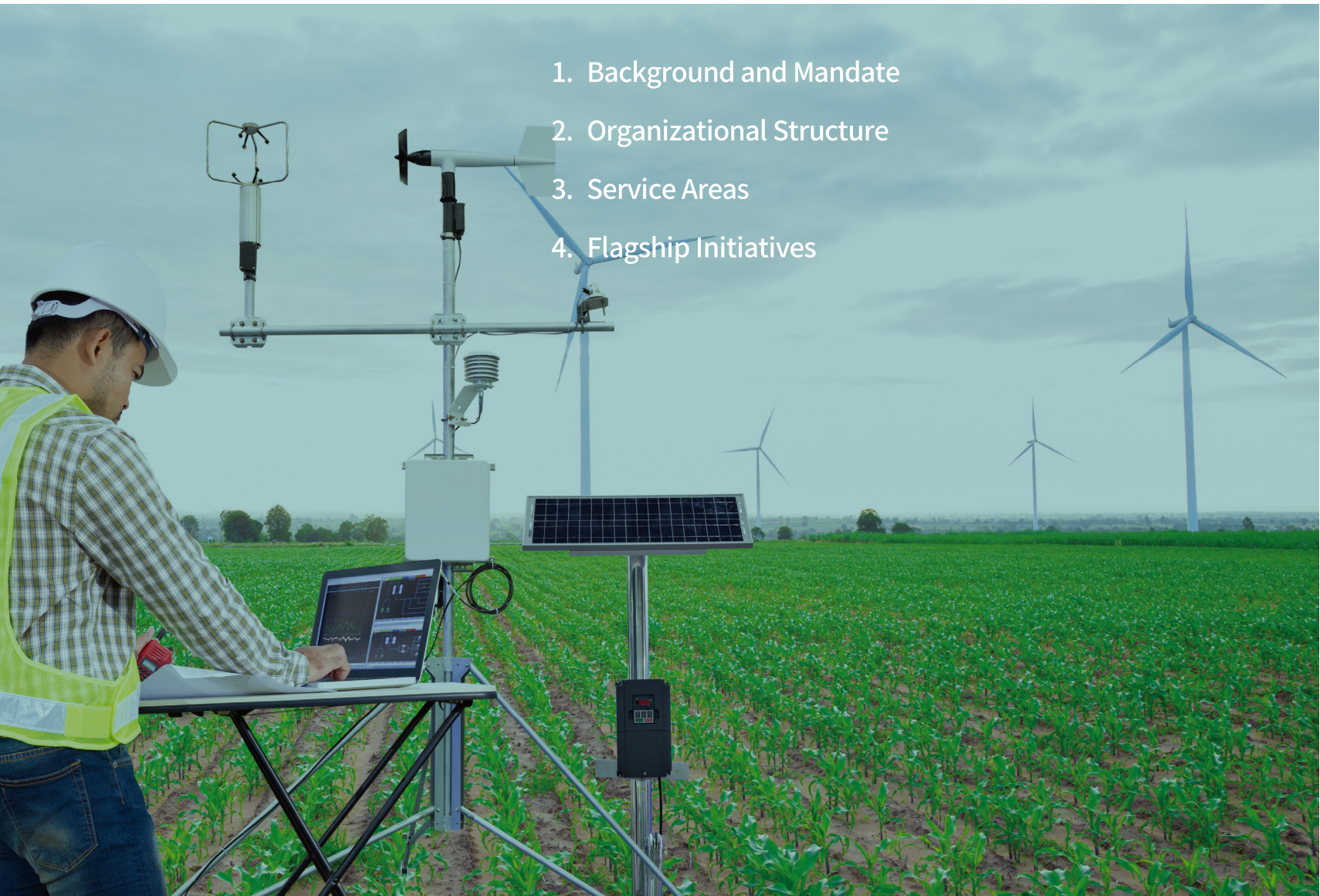
Contents

Abbreviations

AF	Adaptation Fund
AFCIA	Adaptation Fund Climate Innovation Accelerator
BTP	Bio-Data Technical Proposal
CCKP	Climate Change Knowledge Portal
CTCN	Climate Technology Centre & Network
CTis	Climate Technology Information System
EoI	Expression of Interest
GCF	Green Climate Fund
GEF	Global Environment Facility
KMS	Knowledge Management System
LDCs	Least developed countries
NAMA	Nationally Appropriate Mitigation Actions
NAP	National Adaptation Plans
NDC	Nationally Determined Contribution
NDA	National Designated Authority
NDE	National Designated Entity
NIE	National Implementing Entity
ODA	Official Development Assistance
RP	Response Plan
RPET	Response Planning Expert Team
SDGs	Sustainable Development Goals
SIDs	Small Island Developing States
STP	Simplified Technical Proposal
TA	Technical Assistance
TF	Technology Framework
TEC	Technical Executive Committee
TNA	Technology Needs Assessment
ToR	Terms of Reference
UNEP	UN Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGM	United Nations Global Marketplace
UNIDO	United Nations Industrial Development Organization
UNON	United Nations Office at Nairobi

I

CTCN Overview



1. Background and Mandate
2. Organizational Structure
3. Service Areas
4. Flagship Initiatives

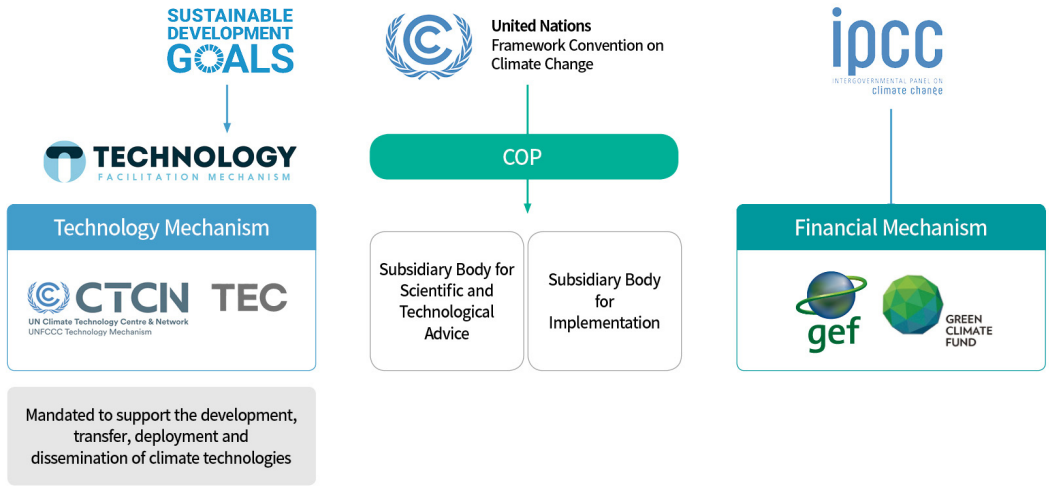
1. Background and Mandate

Background

The Climate Technology Centre & Network (CTCN) was established in 2013 following the decision of the United Nations Framework Convention on Climate Change (UNFCCC) to promote climate technology[1] cooperation and technology development and transfer.[2] COP 15 in 2009 culminated in an agreement to establish a "Technology Mechanism" (discussed below). At COP 16 in 2010 the Technology Mechanism was further elaborated to include the CTCN and Technology Executive Committee (TEC; also discussed further below). COP17 in 2011 marked the establishment of the CTCN and the selection procedure for the host agency was agreed. At COP 18, the formal selection of UNEP as host of the Centre was finalized. The mission of the CTCN is "to stimulate technology cooperation and enhance the development and transfer of technologies to developing country parties at their request."

- The adoption of the Paris Agreement in 2015 committed its parties to nationally determined contributions (NDCs)on both mitigation and adaptation action, highlighting support for the development and transfer of climate technology to strengthen the adaptive capacity of climate risks in developing countries.[3]

[Figure Ⅰ-1] Technology Mechanism under the UNFCCC Organizational Structure



[1] Climate technology, as defined by the Intergovernmental Panel on Climate Change (IPCC), encompasses equipment, techniques, functions and knowledge that can be utilized in climate change response activities.
[2] CTCN (2014) Introducing the CTCN - The Climate Technology Centre & Network
[3] TEC (2017) Technological Innovation for the Paris Agreement, TEC Brief#10

Mandate

Technology Mechanism[4]

Establishment

At COP 15 (2009) in Copenhagen, an agreement was reached to establish a Technology Mechanism. The Technology Mechanism was established in accordance with the decision of the General Assembly of the Parties in 2010 and is comprised of two complementary bodies: the Technology Executive Committee (TEC), which is the policy arm focused on identifying policies that can accelerate the development and transfer of low-emission and climate resilient technologies, and the CTCN as the implementation arm.

Role

Consisting of approximately 20 technical experts, including those from developed and developing countries, the TEC is tasked with analysing climate technology issues, developing policy recommendations, and supporting countries in accelerating action on climate change.

Technology Framework, TF[5,6]

Establishment

Article 10 of the Paris Agreement established the Technology Framework. At COP 24 in Katowice, Parties adopted the framework, which plays a role in enhancing the effectiveness and efficiency of the work of the Technology Mechanism by addressing the transformational changes envisioned in the Paris Agreement.

Role

Provision of guidance to the work of the Technology Mechanism in promoting and facilitating enhanced action on technology development and transfer toward achieving the long-term vision of technology development and transfer under the Paris Agreement. The following five key themes are the main areas of action under the framework:

- Innovation
- Implementation
- Enabling environment and capacity-building
- Collaboration and stakeholder engagement
- Support

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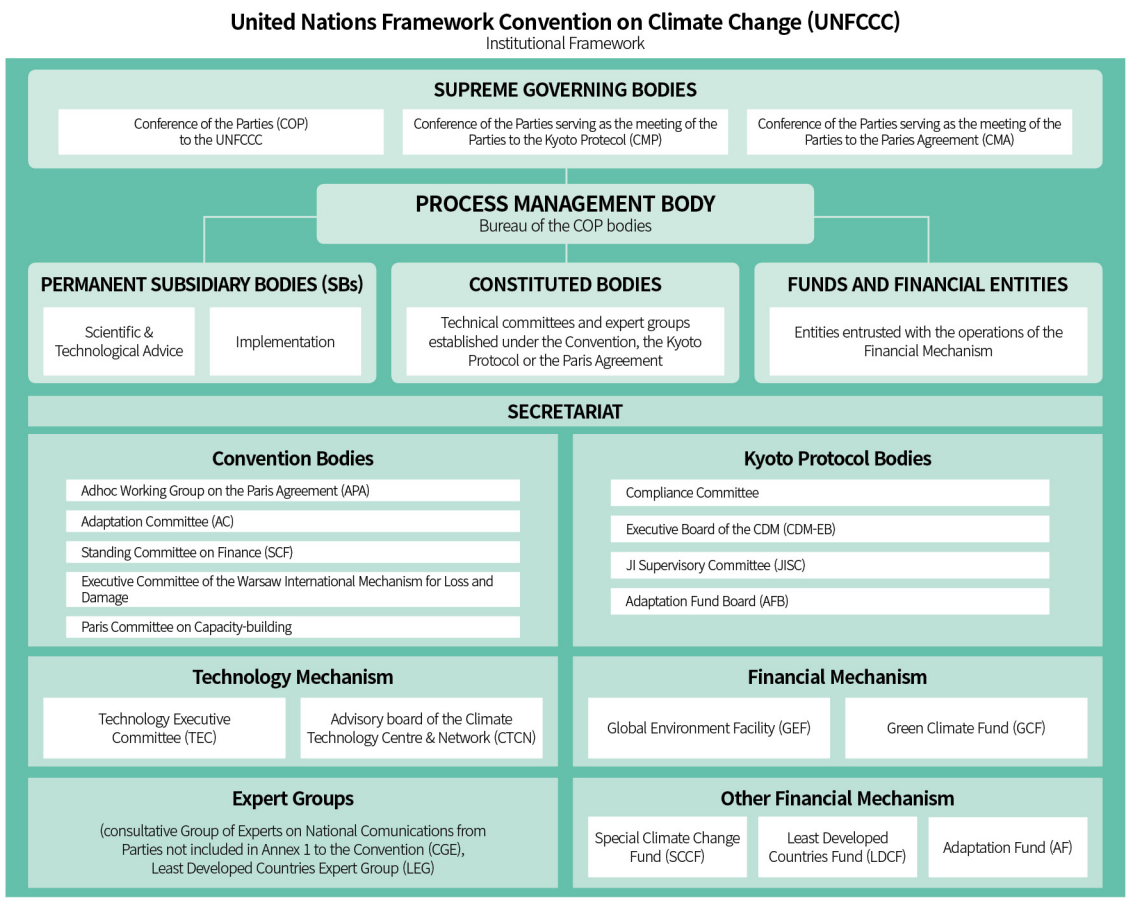
4 Technology Executive Committee, Strengthening climate technology policies [Website]. (2021, Jun 9). https://unfccc.int/ttclear/tec.

5 Technology framework under Article 10, paragraph 4, of the Paris Agreement [Website]. (2021, Jun 9). https://unfccc.int/documents/187562.

6 Climate Technology Centre and Network. (2021). *UNFCCC Technology Mechanism. 2020 Annual Report*. Climate Technology Centre and Network.

- The CTCN is the operational arm of the UNFCCC Technology Mechanism, which aims to strengthen the capability of developing countries to meet their technology needs, implement technology projects and enhance capacity on technological development and transfer for vulnerable groups, including indigenous groups, women and youth.
- The CTCN promotes technology development and transfer in response to requests from developing countries, considering their local needs and priorities.
- The CTCN contributes to creating an enabling environment that is conducive to regulatory and legislative frameworks and policies to foster technology uptake, ultimately reducing GHGs and global climate vulnerability while promoting investments in climate innovation and technology.

[Figure Ⅰ-2] Technology Mechanism under the UNFCCC Organizational Structure[7]



Source： UNFCCC, 2020

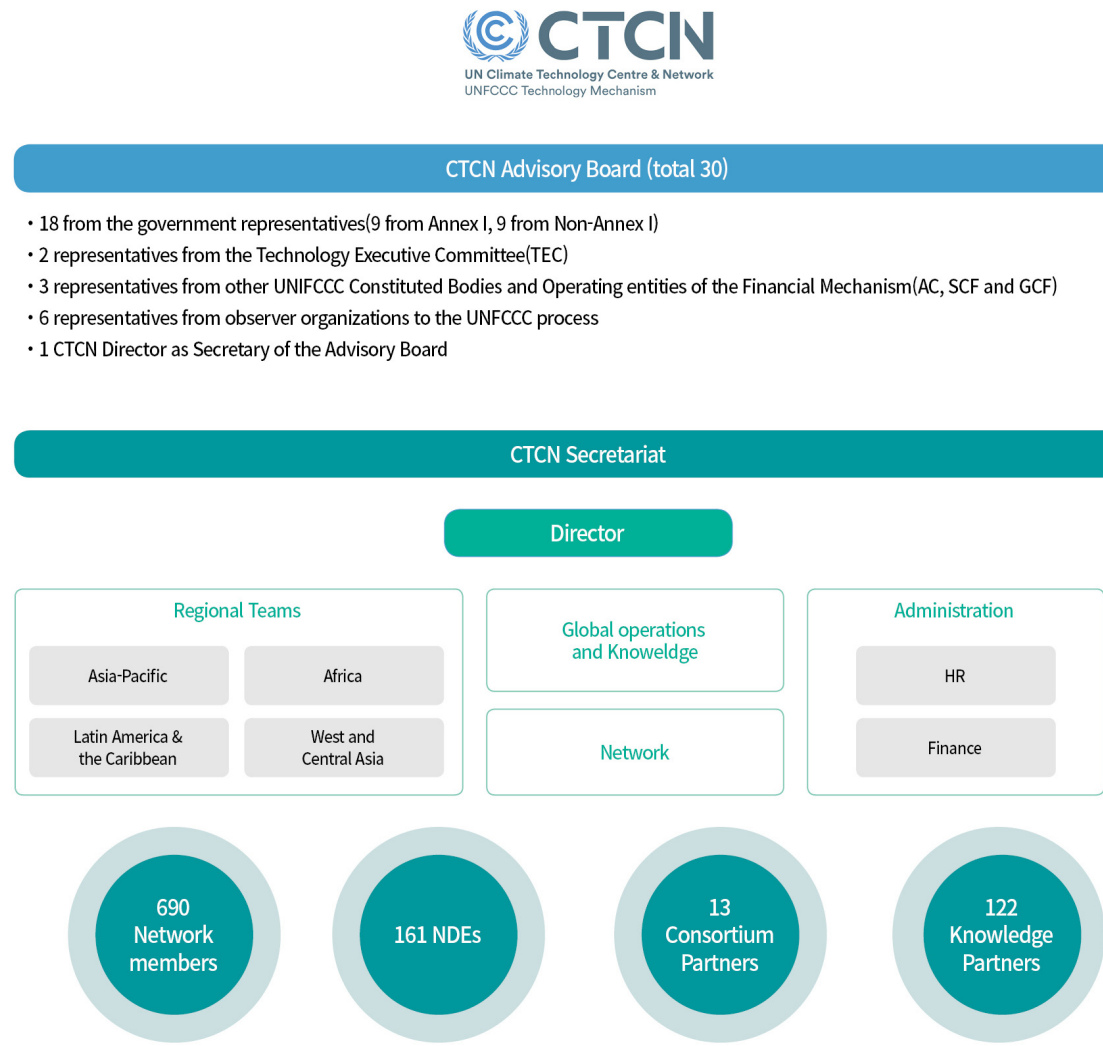
[7] UNFCCC (2014) UNFCCC Organizational Structure, UNFCCC Website, https://unfccc.int/files/inc/graphics/image/png/unfccc_bodies_large.png (Access Date：2018.12.10.)

2. Organizational Structure

Organizational Structure

• The CTCN has been hosted by the United Nations Environment Program (UNEP) and the United Nations Industrial Development Organization (UNIDO) since 2013, supported by a Network of 690 civil society, finance, private sector, and research institutions from over 100 countries who provide customized technology solutions.

[Figure Ⅰ-3] CTCN Organizational Structure



CTCN Advisory Board

- The CTCN operates within its terms of reference and is accountable to, and under the guidance of, the UNFCCC Conference of the Parties (COP) through an Advisory Board. The Advisory Board determines its operational modalities and rules of procedure based on the functions outlined in decision 1/CP.16, paragraph 123. The Constitution of the Advisory Board was agreed upon at COP 18. The Advisory Board meets twice per year and provides direction on the CTCN's fulfillment of the COP's guidance.
- In accordance with the UNFCCC's guidelines, the CTCN Board is composed of 30 members in total, including 18 government representatives[8] comprising equal representation of Annex I and non-Annex I Parties, Director of the CTCN, 2 representatives from the TEC, 3 representatives from the Green Climate Fund (GCF), Adaptation Fund (AF), Special Climate Change Fund (SCCF), and 6 representatives from observer organizations to the UNFCCC process tasked with determining the rules of operation that are consistent with the CTCN's functions. The 6 observer organizations belong to the following constituency groups: Business and Industry NGOs (BINGO), Research and Independent NGOs (RINGO), Environmental NGOs (ENGO), Indigenous Peoples Organizations (IPO), Youth NGOs (YOUNGO), and Women and Gender (WGC).[9]

CTCN Secretariat

- Located at the United Nations Campus, UN City, in Copenhagen, Denmark, the CTCN Secretariat is composed of a small group of staff including the Director, Finance, HR and Global Operations and Knowledge team. The Secretariat works closely with regional offices in Bangkok, Nairobi and Mexico.[10]
- Copenhagen's CTCN Secretariat shares experience and knowledge from regional activities through collaboration with Network members around the world, with efforts to mainstream gender, youth and indigenous people in all global operations of the CTCN.

[Figure Ⅰ-4] CTCN Secretariat Location and Composition

* Source： CTCN Webpage(www.ctc-n.org)[11]

[8] In Korea, the Director of R&D Policy Bureau under the Ministry of Science and ICT (MSIT) serves as a member of the board.
[9] Advisory Board [Website]. (2021, Jun 9). https://www.ctc-n.org/about-ctcn/advisory-board
[10] Who we are [Website]. (2021, Jun 9). https://www.ctc-n.org/about-ctcn/who-we-are

Partner Agencies

Consortium Partners

- 14 agencies constitute the Consortium partners, including international organizations and research institutes supporting activities promoted by the CTCN. Consortium partners were critical in establishing and operationalizing the CTCN as it developed and grew its Network of technical expertise. With time and as the Network grew, the Consortium partners held less of a role in implementing TAs as they did in the early phases, although they remain quite active.

UNEP-led CTCN Consortium[12]

Consortium Partner (CP)

UNEP (host institution), UNIDO (UN Agency), AIT (Thailand), Barlioche Foundation (Argentina), CSIR (South Africa), GIZ (Germany), ENDA (Senegal), NREL (United States), TETI (India), TNO (Netherlands), CATIE (Costa Rica), UNEP-DTU Partnership (Denmark), UNEP-DHI Partnership (Denmark), ICRAF (Kenya)

Diversity by region and field

Consortium partner organizations consist of 14 multinational institutions or organizations from North America, Latin America, Europe, Africa, and Asia-Pacific, includingUNEP and UNIDO. The main fields include energy, economy, and environment.

Network Members

- A total of 690 Network member institutions are distributed around the world. Institutions can join the Network to become a member by submitting a membership application to the CTCN Secretariat.

  ❖ In Korea, 85 member institutions (as of December 2021) joined the CTCN, which is the largest country group in the Network. Guidance and support for registration and related documents can be requested from the Green Technology Center. Check the "Subscribe to Network member (p.44)" page for details.

National Designated Entities (NDEs)

Each country designates a national focal point for climate technology development and collaboration with the CTCN. South Korea has designated the Ministry of Science and ICT (MSIT) as its National Designated Entity (NDE) in 2015.[13]

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11 About the Climate Technology Centre & Network[Website]. (2021, Jun 9). https://www.ctc-n.org/about-ctcn.

12 Kim, Hyungju et al. (2016). *Climate Technology Cooperation Strategy through the UNFCCC Technology Mechanism (CTCN) Based Approach,* Green Technology Center.

13 Jung, Sungho. "Ministry of Science and ICT nominated as UNFCCC Korean focal point for technology cooperation", *Yonhap News*, December 16, 2015. https://www.yna.co.kr/view/AKR20151216161900017

NDEs in developed countries

NDEs that are designated in developed countries play a central role in catalyzing the cooperation between developed and developing countries on technology development and transfer, in supporting the linkage between national efforts to combat climate change and climate technology, and encouraging the active participation of public and private institutions.[14]

Key Activities

- Promote partnership and synergy with the CTCN.
- Provide guidance on the CTCN to stakeholders and coordinate their participation in the activities of the CTCN.
- Promote the activities of the CTCN through sharing information on the CTCN throughout the country and enhancing efficiency by providing feedback to the CTCN.
- Link the activities of development aid and the CTCN, targeting developing countries.
- Promote technical support requests to the CTCN through cooperation with partner institutions in developing countries.
- Connect existing national development support programs/projects with the activities of the CTCN.
- Support the NDEs in developing countries to strengthen their capacity through knowledge exchange and support activities, etc.
- Participate in the regional- and global-level networking, knowledge exchange, and collaboration efforts within the CTCN.
- Share technical knowledge by providing domestic technical expertise and tools.
- Participate in knowledge exchange and collaboration activities offered by the CTCN at the global or regional level and promote joint events and activities with the CTCN, etc.

NDEs in developing countries

As the national focal points, NDEs provide communication channels for the activities of the CTCN. NDEs make official requests to the CTCN that are consistent with the national priorities. They also facilitate the implementation of national climate response activities by supporting the activities of the CTCN.[15]

Key Activities

- Generate a demand for technology that is related to national development and climate change response. NDEs also generate a demand for long-term and sustainable capacity development at the levels of the individual, institution, and organization.
- Support the participation of central and local governments and stakeholders from the private sector, academia, civil society, etc., and promote the CTCN-related activities in the country, such as training, capacity-building, and information dissemination.

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[14] National Designated Entities (NDEs) for the CTCN[Website]. (2021, Jun 4). https://www.ctc-n.org/sites/www.ctc-n.org/files/annex_1_national_designated_entities_-_roles_and_responsibilities.pdf

- Participate in international cooperative projects and knowledge exchange activities conducted by the CTCN and provide data and tools that can be shared with other countries.
- Communicate and consult with national organizations associated with various mechanisms under the UNFCCC to improve the effectiveness of CTCN projects and those implemented by other international climate funds.
- Promote the participation and registration of national organizations as CTCN Network members, and provide feedback on CTCN projects.

Knowledge Partners

- To support the CTCN's knowledge sharing activities, there are 122 organizations designated as Knowledge Partners, including consortium partners and international organizations, member institutions, academic institutions, non-governmental institutions, and private institutions.

Collaboration between Technology and Financial Mechanisms

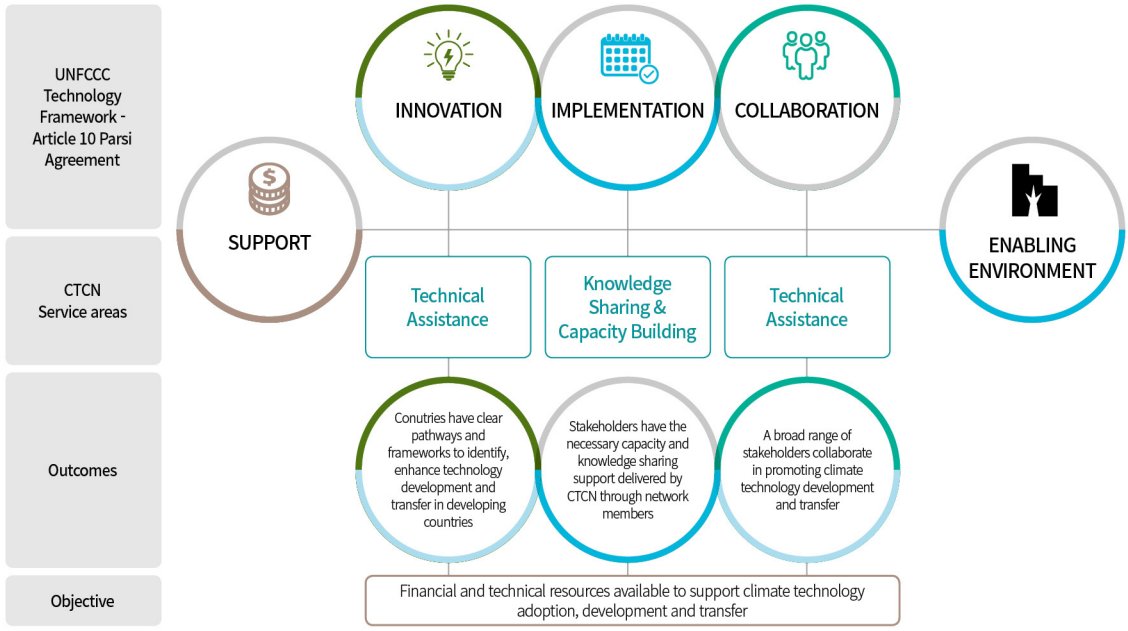
- The CTCN closely works with the Technology Executive Committee (TEC), as well as the operating entities of the Financial Mechanism - the Green Climate Fund (GCF)and the Global Environment Facility (GEF).[16] The CTCN is actively seeking new opportunities for collaboration with both the TEC and the operating entities of the Financial Mechanism, in response to both COP guidance and recommendations provided in the independent reviews of the CTCN.

[15] National Designated Entities[Website]. (2021, Jun 9). https://www.ctc-n.org/about-ctcn/national-designated-entities
[16] UNFCCC Collaborations [Website]. (2021, Jun 8). https://www.ctc-n.org/about-ctcn/unfccc-collaborations

3. Service Areas

• The core functions of the CTCN are divided into area 1. Technical Assistance (TA), area 2. Knowledge Sharing & Capacity building, and area 3. Collaboration and Network.[17]

[Figure Ⅰ-5] CTCN's Service Areas and Outcomes



Area 1. Technical Assistance (TA)

• The CTCN Secretariat develops response plans based on requests for technical assistance officially submitted by the NDEs of developing countries and generally provides technical support initiated via a bidding process for Network member organizations around the world.

• Modality of TAs: TAs are divided into three tracks depending on the size and nature of the project[18] as shown in the able below

[17] How we work[Website]. (2021, Jun 8). https://www.ctc-n.org/about-ctcn/how-we-work
[18] Technical Assistance[Website]. (2021, Jun 30). https://www.ctc-n.org/technical-assistance.

[TableI-1] CTCN TA Project Tracks[19]

TA Track	Indicative Funding Size	Main Characteristics
Technical Assistance	USD 50,000 ~ 250,000	- Typical CTCN TA Projects - Require more specific countermeasures compared to an FTA and carry out open, competitive bids to consortium partners or Network member organizations
Fast Technical Assistance	USD 10,000 ~ 15,000	- For smaller interventions requiring urgent and strategic approach - Proceed through professional contracts, not limited to consortium partners and Network members

- Types of TA activities: CTCN TA supports technology development and transfer in developing countries by providing services such as the following:

1. Technical and feasibility assessments, including technical expertise and recommendations related to specific technology needs, identification of technologies, technology barriers, technology efficiency, as well as piloting and deployment of technologies;
2. Technical support for policy and planning documents, include strategies and policies, roadmaps and action plans, regulations and legal measures;
3. Trainings;
4. Tools and methodologies;
5. Implementation plans.

CTCN TA by type of assistance[20]

The value of technical assistance is that it is demand-driven and conducted directly in response to developing country requests, which are in direct alignment with and contribute to NDC implementation. Technical assistance supports the analysis and identification of needs in the early stages of climate technology cooperation, the preparation and planning of related systems, and the strengthening of capacity in developing countries through the following types of assistance and outputs:

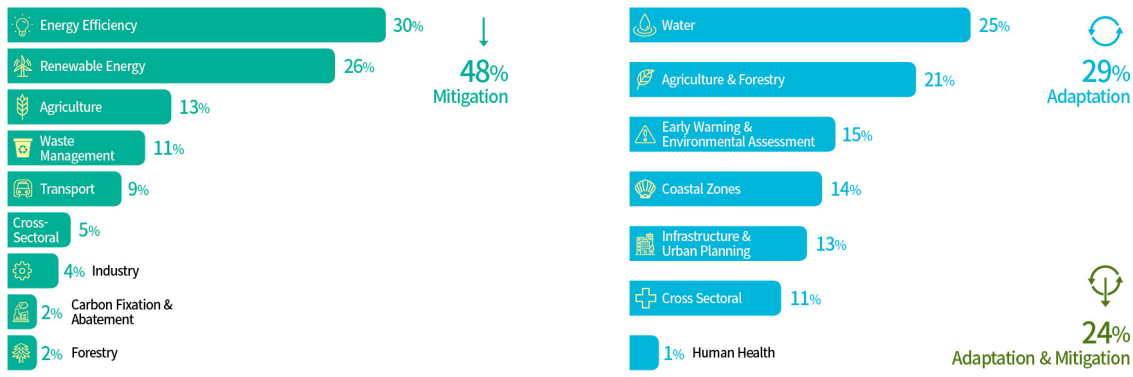
- Decision-making tools and/or information provision;
- Feasibility of technology options;
- Financing facilitation;
- Piloting and deployment of technologies in local conditions;
- Recommendations for law, policy and regulations;
- Research and development of technologies;
- Sectoral roadmaps and strategies; and
- Technology identification and prioritization.

19 Park, Dongwoon et al. (2019). *Research on Technology Cooperation Governance between Korea and UNFCCC Climate Technology Centre and Network (CTCN) : building its platform and expanding the programmatic approach.* Green Technology Center.

20 Final type of assistance [Website]. (2021, Jun 14). https://www.ctc-n.org/technical-assistance/data?order=field_phase&sort=asc.

• Sectoral focus: CTCN technical assistance covers a host of sectors in mitigation and adaptation.[21]

[Figure Ⅰ-6] Sectoral focus of TA Requests



❖ The CTCN presents a detailed technology classification of the focus areas, based on which information on the TA projects was collected.[22]

Area 2. Knowledge Sharing & Capacity building

The CTCN supports various networking events, regional forums, workshops and webinars to promote knowledge-sharing, collaboration, and cooperation among national policymakers and stakeholders from the public and private sectors.

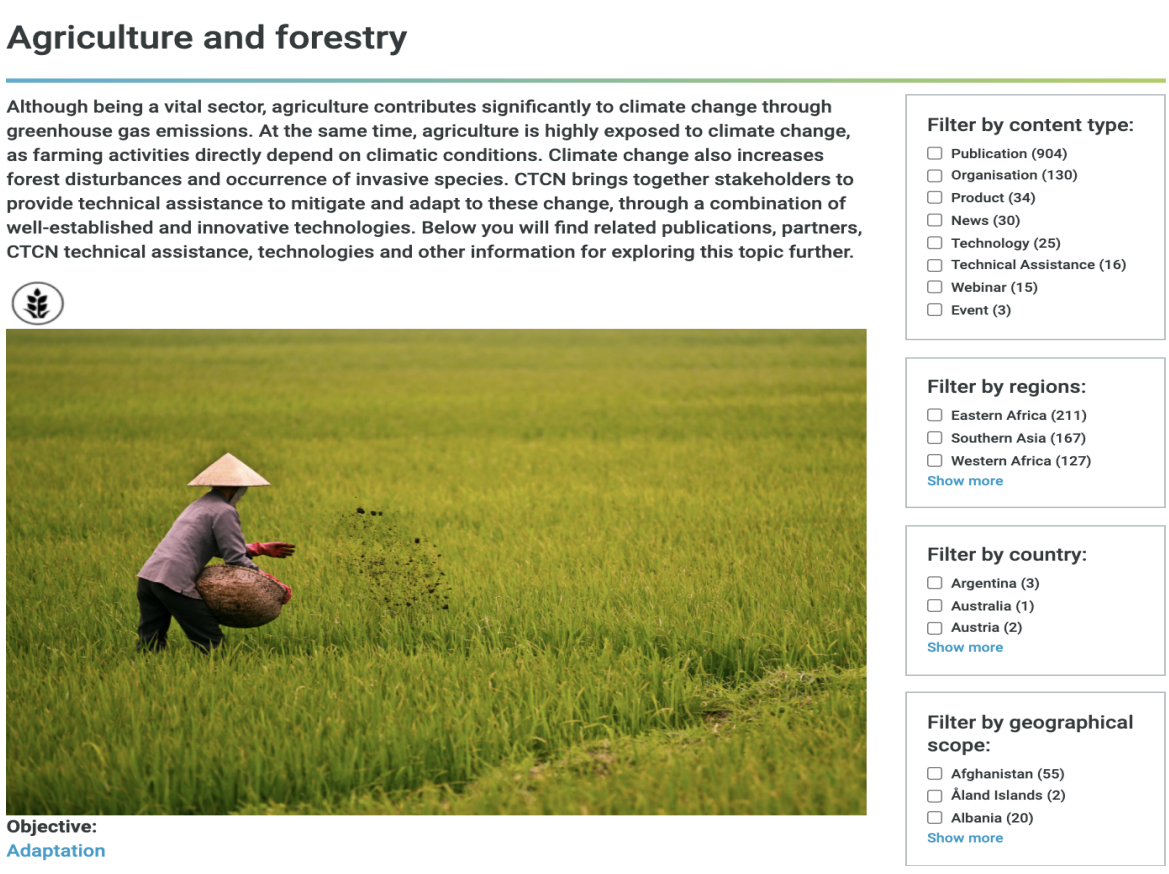
• Type of activities: The CTCN provides a mixture of capacity building activities and trainings, and the facilitation of private sector involvement and information sharing on global, regional and national levels.

1. Regional forums and events: The CTCN conducts a series of regional forums to provide opportunities for NDEs, Network Members and climate technology stakeholders to meet and discuss critical technology issues and share experiences.
2. Workshops: In 2019, the CTCN launched its technology clinic programme for SMEs to generate awareness of the green technologies available to businesses and the new markets that can be established through their use. Since 2018, the CTCN's Vision to Concept capacity building module has sought to fast-track countries' NDC implementation by enhancing the skills of project proponents in preparing GCF concept notes and transforming national priorities into concrete project ideas.

21 Technology Sectors [Website]. (2021.Jun 9). http://www.ctc-n.org/technology-sectors.
22 CTCN has developed a taxonomy consisting of nearly 500 climate mitigation and adaptation technologies. Refer to to [Annex] on p.77 for the full taxonomy.

3. **Webinars:** Webinars targeting a variety of technology sectors related to adaptation and mitigation strategies and technologies are offered throughout the year, often in partnership with Network members.
   - The CTCN also provides access to one of the world's largest online sources of climate technology information. The CTCN web portal, www.ctc-n.org, contains close to 17,000 information resources and can be viewed in six UN languages. Visitors can access climate technology case studies, descriptions, national planning documents, publications, tools, and webinars.

[Figure Ⅰ-6] CTCN Knowledge Library



Area 3. Collaboration & Network

Collaboration among a diverse array of stakeholders is instrumental to successful technology planning and implementation. The CTCN's collaborations with NDEs, Network members, the private sector, women, men, youth, indigenous people, and local communities are fundamental to its success.

4. Flagship Initiatives

Adaptation Fund Climate Innovation Accelerator (AFCIA)

- The primary objective of the AFCIA administrated by UNEP-CTCN is to support developing countries to test, evaluate, roll out and scale up innovative adaptation practices, products and technologies. Based on technical assistance services, 25 micro-grants projects are implemented for 5 years to enhance climate resilience and adaptation to climate change in the countries. As CTCN technical assistance had been mostly focused on climate mitigation, the AFCIA project was promoted in order to provide and support adaptation technology in developing countries.
- The AFCIA will focus on producing two expected results:
  - New innovations encouraged and accelerated – the development of innovative adaptation practices, tools and technologies is encouraged and accelerated; and
  - Evidence base generated - Evidence of effective, efficient adaptation practices, products and technologies generated as a basis for implementing entities and other funds to assess scaling up.
- The Centre, which was selected to manage the AFCIA programme, received over 200 requests from more than 60 countries in response to its first two calls for proposals. The CTCN is now providing technical assistance to test, evaluate, roll out and scale up innovative adaptation practices, products, and technologies. Key sectors include agriculture, food security, water management, rural development, disaster risk reduction and human health.

Youth Climate Innovation Lab

- The CTCN's Youth Climate Innovation Labs and Academy offer youth-centered workshops to co-create endogenous climate technology solutions by using tools such as design thinking principles.
- Following the completion of the two Labs in Africa and Asia, selected groups participated in a Youth Innovation Academy, a two-month intensive incubator designed to help idea-stage start-ups transform ideas into viable projects. Eleven of the newly developed and promising start-ups pitched their technology solutions for enhanced climate action to investors, partners, and experts in the industry. A third lab was launched in Latin America in July 2021, and the Academy took place in the fall.
- In total, the CTCN received over 1,300 applications from young innovators from across 74 countries. Ninety-seven mentors guided participants throughout the lab and academy. With over 4,3 million impressions on social media, the CTCN estimates that over 33 million people were engaged on the topic of youth and technology innovation in online media.

II

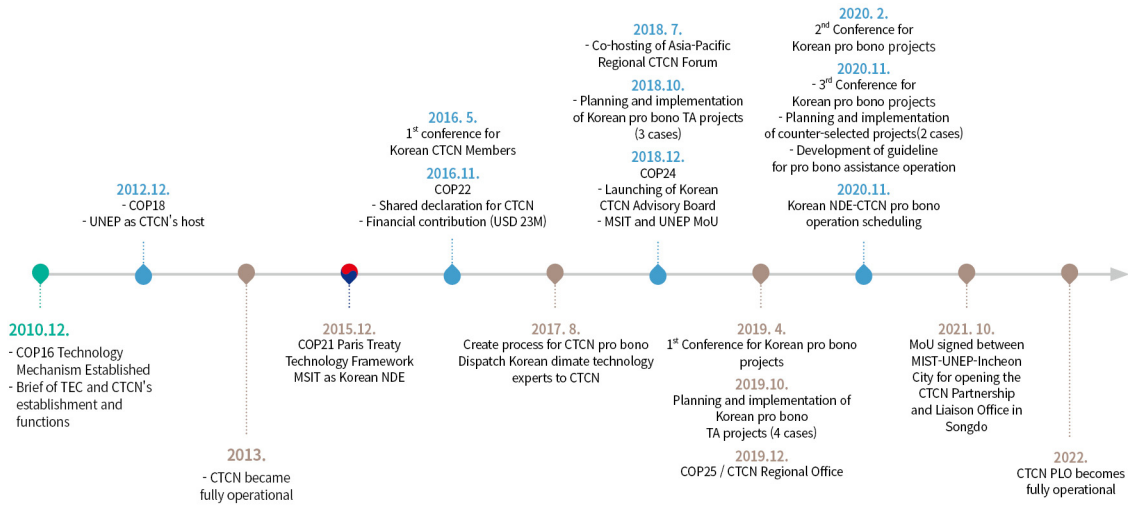
Korea's Engagement with the CTCN

1. Engagement Overview
2. Engagement Activities

1. Engagement Overview

History

[Figure Ⅱ-1] Korean-CTCN Cooperation Timeline (2010~2021)



2015

• Designation of the Ministry of Science and ICT (MSIT) as the Korean NDE for Technology Mechanism at the 21st Conference of the Parties (COP21) to the UNFCCC;

2016

• Joint statement by 8 countries and the EU[23] on their financial contributions to the CTCN (US$23 million) at COP22 to the UNFCCC and hosting of the first conference for the CTCN Network members in Korea;

2017

• Dispatch of climate technology cooperation experts[24] to the CTCN Secretariat to fulfill their role as secondees, who represent the Centre's Network, NDEs, Consortium partners, or CTCN donor institutions

[23] USA, Japan, Canada, Switzerland, EU, Germany, Denmark, Italy, and Korea
[24] Dispatched researchers from the Green Technology Center (2017-2020), dispatched from the MSIT (2019-2022)

and are invited to participate in the CTCN Secretariat's work for a period of at least 6 months. working on areas such as innovation and R&D… Selected secondees, representing the Centre's Network, National Designated Entities, Consortium partner, and/or CTCN donor institutions are invited to participate in the work of the CTCN Secretariat in Copenhagen, Denmark for a period of at least 6 months. The purpose of the programme is to expand the CTCN's abilities to respond to developing country needs by utilizing the expertise within its network of partners, to give partner organizations hands-on experience with the work in the global climate community, and to foster inter-regional and inter-cultural exchange and collaboration. To date, four secondees from Korea have participated in the program, focusing on the following themes: adaptation (2017), network (2018), network (2019) and innovation & RD&D (2020/2021/present).

2018

- Nomination to the Advisory Board of the CTCN at COP24, co-hosting of the 2018 CTCN Asia-Pacific Forum with Japan[25], Support Korea's pro bono (voluntary cooperation) TA projects (3 cases)[26], and signing of a memorandum of understanding (MoU) between the MSIT and UNEP to mutually cooperate in creating innovative business models for climate technology to contribute to the realization of a low-carbon economy based on the linkages between CTCN and GCF as well as technical cooperation through CTCN;

2019

- Support Korea's pro bono TA projects (4 cases)[27] and preparations and discussions for the arrangement with UNEP and the CTCN to establish a CTCN Partnership and Liaison office in Songdo, South Korea;

2020

- Planning and execution of the world's first supply-driven projects[28] (2 cases)[29] and the Korea-CTCN pro bono arrangement;

[25] 2018 CTCN Asia-Pacific Forum was held from September 16th to 20th in 2018 at Seoul, Korea where the CTCN and UNFCCC Secretariat, TEC, Adaptation Committee, NDEs from the Asia-Pacific region and network members for capacity building and strengthening the network.

[26] TA for Sri Lanka's climate smart city (adaptation), Ethiopia's public transportation system, and Serbia's regional energy supply technology assistance.

[27] TA for the construction of climate smart cities in Sri Lanka (mitigation), introduction of low carbon transportation technology in Cambodia, sustainable solar water pump for households in Tanzania, and solar energy technology in rural Togo.

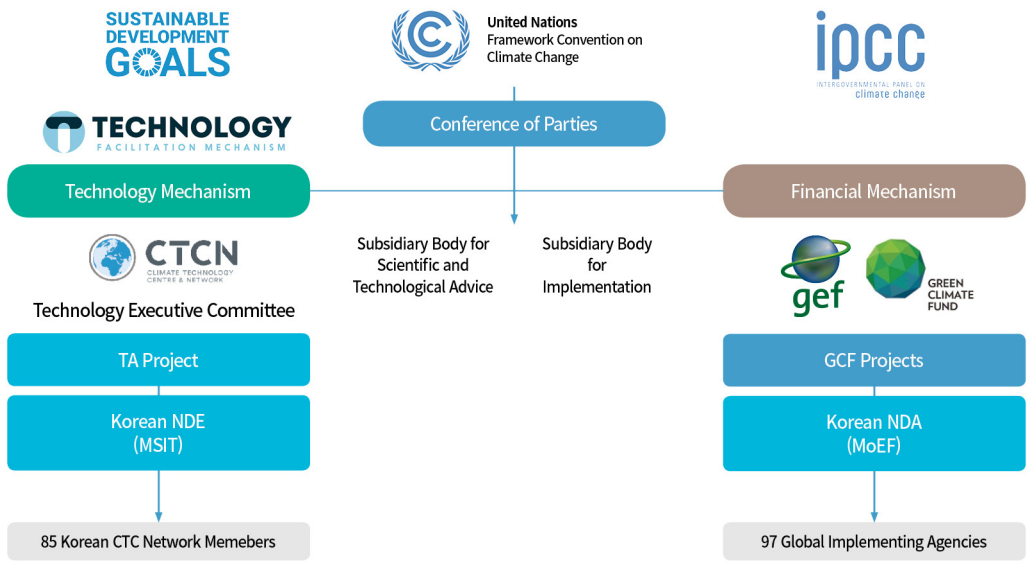
[28] Not based on the request of developing countries. They are supplier-oriented projects that specify target regions, countries, budgets, technology fields and types of activities, which are carried out after approval of the recipient country's NDE and consultation with the CTCN Secretariat.

[29] TA for drinking water supply using gravity-driven membranes for Cambodia and Myanmar

2021

• Preparation of national laws[30] to enable cooperation activities between the Korean government and the CTCN, securing of the budget and dedicated agency for the management of the Korean pro bono technical assistance, and opening of the CTCN Partnership and Liaison Office in Korea (October 2021)

[Figure Ⅱ-2] NDEs and Implementing Agencies of the Technology and Finance Mechanisms



Role of the Green Technology Center as an implementing entity of the NDE

Purpose of Establishment

• The Green Technology Center is the dedicated supporting organization for Korea's NDE, the Ministry of Science and ICT (MSIT). Since implementing its first technical assistance project in Korea in 2016, it has supported other Korean CTCN Network members in various ways, such as by supporting application and bidding processes and organizing conferences.

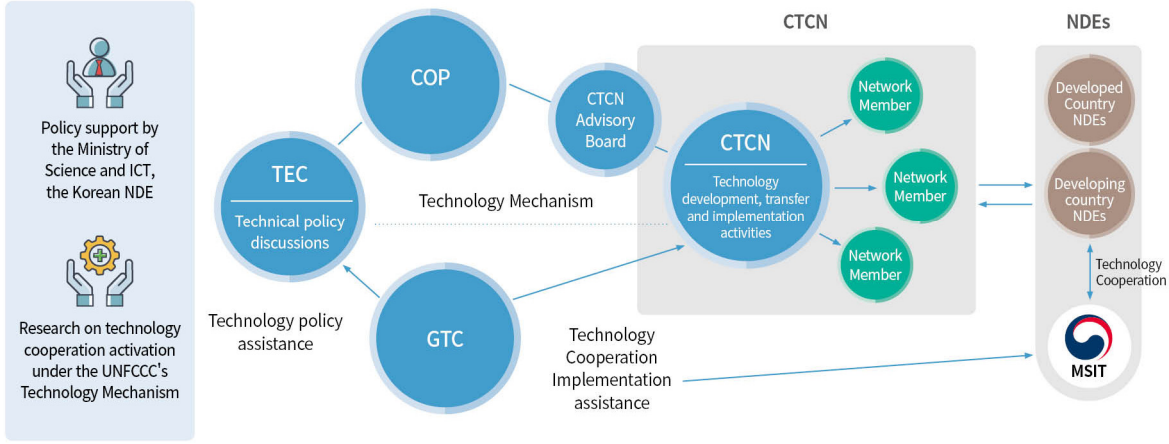
• Established as an internal entity of the Korea Institute of Science and Technology (KIST) in 2012 to support cooperation on green technology R&D and policy establishment. Designated as a subsidiary of KIST in 2013.

30 The Act on Promotion of Technology Development for Climate Change Response (Enacted on `21.4.20)

Functions

- ❶ Support for the planning and establishment of national green technology R&D policies;
- ❷ Analysis and statistical management of green technology levels and trends;
- ❸ Establishment of international cooperation mechanisms for the transfer and dissemination of green technologies; and
- ❹ Research on future green technologies, etc.

[Figure Ⅱ-3] The Green Technology Center's Role within the Technology Mechanism



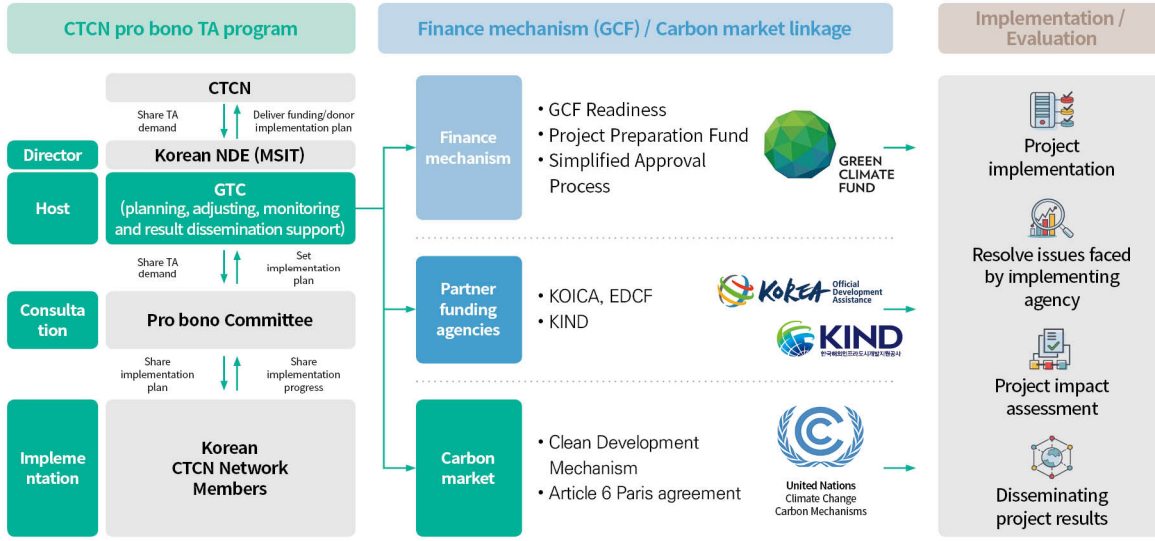
Key Roles Related to the CTCN

- Support the Korean NDE's activities within the Technology Mechanism and execute cooperative activities with the CTCN;
- Establish a network and cooperation system with the CTCN based on relevant policy research and business performances,[31] perform the role of a think tank while also taking action on climate technology cooperation through governance and model research, system analysis, case studies, planning of programs, etc.;
- Closely support the collaborative activities with the CTCN in Korea, perform collaborative activities with the CTCN Secretariat, and support the CTCN Partnership and Liaison Office in Korea;

[31] Since 2015, the Green Technology Center has conducted various policy studies on major international agendas related to "technology development and transfer" between countries through support for national technology negotiations and activities of Korean members within the technology mechanism. In 2016, it participated in international biddings for the CTCN TA projects and attained theoretical research and practical experience by obtaining and implementing the first project in Korea.

- Support the planning and implementation of the CTCN pro bono projects in Korea, scale-up TA projects including pro bono projects, and support subsequent linkages;
- Provide guidance and support for the participation of Korean agencies in the activities of the CTCN;
- Strengthen collaboration with the Financial Mechanism and other UNFCCC observer bodies;

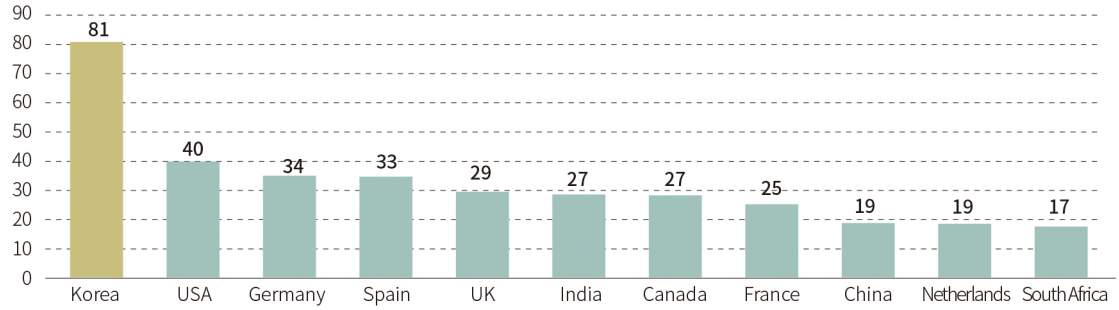
[Figure Ⅱ-4] Korea CTCN pro bono Project Structure and the Role of Green Technology Center



Korea's engagement overview

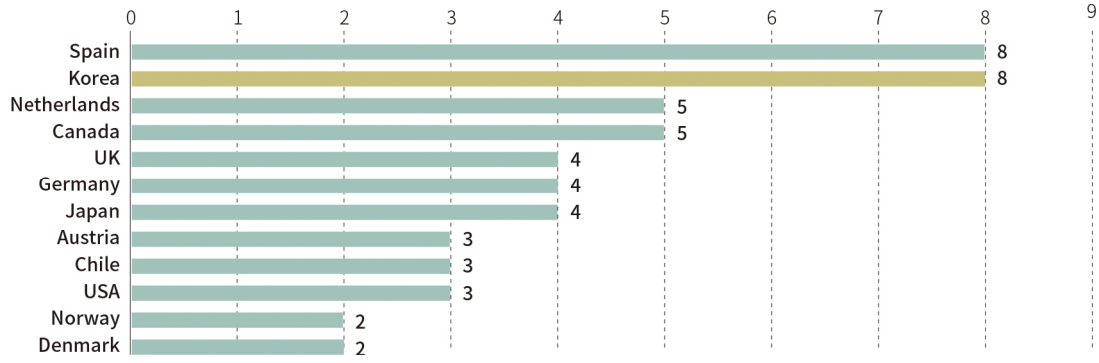
- As of December 2021, Korea has 85 Network members, followed by the United States with 40 members, Germany with 34 members, and Spain with 33 members.

[Figure Ⅱ-5] Number of Network Members by Country



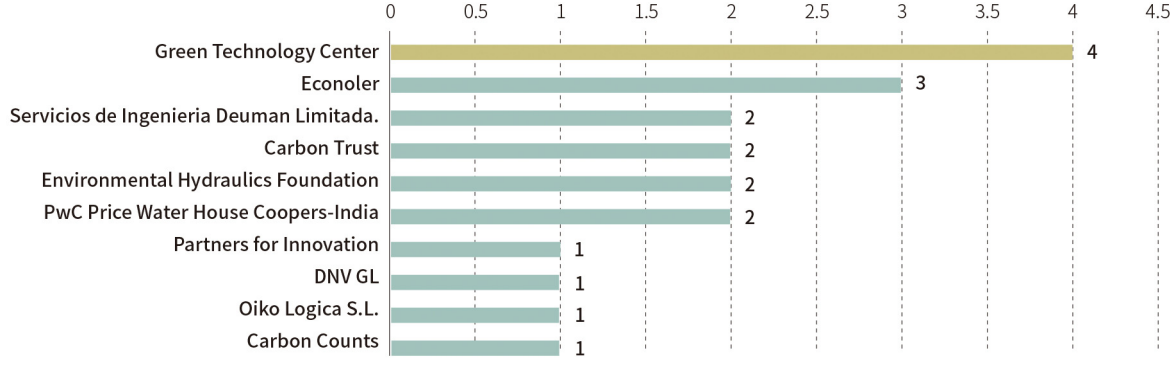
- Network members of Korea and Spain appear to be the most active participants in TA projects. Apart from consortium partners, TA projects carried out by the Korean members within Korea and Spain led with 8 cases each, and Netherlands and Canada ranked second with 5 cases each [Figure II-5].
- Except for consortium partners, the most active implementers of CTCN TA projects[32], namely the Green Technology Center, Econoler, Services de Ingenieria Deuman Limitada., and the Carbon Trust, have carried out the highest number of TA projects.

[Figure II-6] Number of TAs Implemented by country(excluding consortium partners)



Source: CTCN Website[33]

[Figure II-7] Number of TAs Implemented by agency(excluding consortium partners)



Source: CTCN Website34

[32] Including consortium partners, UNEP-DTU Partnership has carried out the most TAs (16 cases)
[33] CTCN Technical Assistance[Website]. (2021, Jun 30.) https://www.ctc-n.org/about-ctcn/open-data

2. Engagement Activities

Korea's Pro-bono Support to CTCN Technical Assistance

Concept

- A voluntary contribution method wherein a state or institution provides its own resources or expertise for technical support requested by the developing country.

Background

- In response to the growing requests for technical support from developing countries, and as part of the effort to diversify the financial resources for support, the CTCN established the pro bono Technical Support Track in 2017.
- To date, Korea, Japan, and the EU, have participated in supporting pro bono technical support requests.

Current status of implementation

- Since 2017, the Ministry of Science and ICT (MSIT, Korean NDE) and the Green Technology Center supported CTCN pro bono projects through consultations with the CTCN Secretariat to establish a set of procedures that expand technical support provided within the national CTCN network.

Progress to date

- As of December 2021, the total number of pro bono projects funded by Korea is 14;
  - 2018: 3 pro bono technical assistance cases funded by the MSIT (Ethiopia, Sri Lanka, Serbia);
  - 2019: 4 pro bono cases funded by the MSIT (Sri Lanka, Cambodia, Togo, Tanzania) and 1 by the Korea Institute of Environmental Industry and Technology Institute (KEITI) (Namibia);
  - 2020: 1 TA funded by the Gwangju Institute of Science and Technology (Cambodia), 1 pro bono workshop by the Green Technology Center (multiple countries), 1 pro bono TA case by the Korea Institute of Environmental Industry and Technology Institute (Namibia, 2nd round), and 1 TA by the Korean Geological Resources Research Institute (Vietnam);
  - 2021: 1 pro bono TA by the Korea Institute of Environmental Industry and Technology Institute (Mozambique), 1 pro bono forum by the Gwangju Institute of Science and Technology (multiple countries).

Project modality

- The implementing agency is selected according to the procedures of each donor country or agency, and subsequent activities are managed by the CTCN Secretariat through a procedure similar to typical TAs.

[Table Ⅱ-1] Differences in project modality between CTCN Typical TA and Pro Bono TA

Type	General TA	pro bono TA
Operation Method	❶ Submission of request (developing country NDE) and evaluation (CTCN) ▼ ❷ Development of a response plan ▼ ❸ Selection of the implementing agency (CTCN) through a 'Call for Proposal' ▼ ❹ Execution of technical assistance * Order of ❷, ❸ may change	❶ Sharing of TA requests (CTCN) and a consultation on generating project demand (CTCN, donor NDE and network agency) ▼ ❷ Selection of the implementing agency (CTCN) through a matchmaking process between the TA request and the donor country/networking agency ▼ ❸ Development of a response plan ▼ ❹ Execution of technical assistance * Order of ❷, ❸ may change ** Not a process that verifies and supports the technical support requests through bidding announcements, but a procedure for prospective implementing agencies to check the technical support requests submitted in advance and to suggest technical support to developing countries
Funding	CTCN TA Fund	Budget of the donor country or implementing agency

[Table Ⅱ-2] International CTCN Pro Bono TAs

Year	Implementing Country	Implementing Agency	Beneficiary	TA
2017	Japan	Research Institute of Innovative Technology for the Earth (RITE)	South Africa	Review on the reduction of greenhouse gases in the cement industry through the integration of waste heat and mining carbon capture
2017	Germany	Deutsche Gesellschaft für Internationale Zusammenarbeit(GIZ)	Dominican Republic	Community-based early warning system in Santo Domingo
2019		Energy Hydrogen Alliance (EHA)	Brazil	Internationalization of Brazil's hydrogen energy research and development network
2019	Japan	New Energy and Industrial Technology Development (NEDO)	Thailand	Benchmark project on energy consumption and greenhouse gas emissions in Thailand's steel industry
2019	US	Clean Energy Solutions Center (CESC), National Renewable Energy Laboratory	Uganda	Establishment of a response plan on the financial linkages for renewable energy development
2020	US	USAID		Establishment of the CTCN Secretariat Monitoring and Assessment (M&E) system

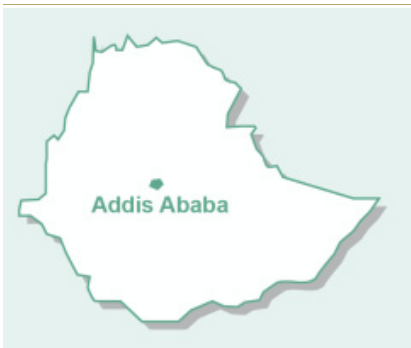
[Table Ⅱ-3] Status of Korea's CTCN pro bono TA projects (2018~2021)

Year	Title	Country	Promoting Agency	Implementing Agency	Total Budget (KRW)
2018	Public transportation system development TA	Ethiopia	Ministry of Science and ICT (MSIT)	Envelops	160M
	Climate smart city development adaptation TA	Sri Lanka		Korea Environment Institute	120M
	Regional energy supply TA	Serbia		Korea District Heating Corp.	160M

Year	Title	Country	Promoting Agency	Implementing Agency	Total Budget (KRW)
2019	Climate smart city development mitigation TA	Sri Lanka		Eco Network	200M
	Low carbon transportation technology adoption TA	Cambodia		Envelops	200M
	Rural solar energy technology provision TA	Togo		Kyungpook National Univ.	150M
	Sustainable solar-powered home water pump provision TA	Tanzania		Yujin Energy Consulting Co.	200M
	Water recycling technology adoption TA (1st round)	Namibia	KEITI	Yujin Energy Consulting Co., KPMG	50M
2020	Gravitational membrane filtration and water purification system provision TA	Cambodia	Gwangju Science and Technology Institute		120M
	Water recycling technology adoption TA (2nd round)	Namibia	KEITI	Yujin Energy Co., KPMG	150M
	CTCN-TERI-GTC South-South cooperation workshop for the promotion of low carbon transportation	Multiple Countries	Green Technology Center		30M
	A feasibility study on the application of carbon mineralization technology for the Cao Ngan thermal power plant	Vietnam	Geological Resources Research Institute's carbon mineralization project group, Green Technology Center		250M
2021	TA for the implementation of the Mozambique rainwater collection system	Mozam -bique	KEITI	Envelops	200M
	Asia-Pacific Water Forum (Design Stage)	Multiple Countries	Gwangju Science and Technology Institute		30M

List of Korea's CTCN Pro Bono TA Projects and Follow-Up Cases

Case 1: Financing strategy for Transit-Oriented Development (TOD) – Addis Ababa Light Rail Transit (Mitigation)



	Background / Purpose • Background: - Ethiopia seeks to develop a Light Rail Transit-linked public transportation hub to address air pollution and traffic congestion caused by rapid urban growth, but the country lacks a strategy to secure public and private investment • Purpose: - To establisha public infrastructure project planning and investment strategy through an analysis of Addis Ababa's transportation system
Beneficiary / Location	Ethiopia / Addis Ababa
Size / Resource	Total: KRW 160M / MSIT
Implementation Period	October 2018 – October 2019 (12 months)
Implementing Agency	Envelops
Overseas Cooperation Agency	Ethiopia Ministry of Environment and Forest (NDE), Ethiopian Railway Corporation (TA Requesting Agency)
Project Information	• Public transportation system analysis and development strategy implementation - Analysis of the public infrastructure demand for land use and transport linkage and establishment of public transportation-centered development strategies (required costs, step-by-step planning, etc.) • Provision of a financial linkage plan - Provision of business models and financing measures (public, private, public-private cooperation, utilization of international funds, etc.) for project implementation • Climate change impact analysis - Suggesting the effect of improving adaptability to climate change and reducing carbon dioxide in the relevant area through the establishment of a public transportation system
Results	• Concept development for low-carbon public transportation reform project - Development of a project concept and reform plan for the public transportation system • Establishment of a financial linkage plan - Establishment of a long-term financial linkage plan through a financial linkage analysis
Scale-up / Linkage	• Korea Ministry of Land, Infrastructure and Transport (MOLIT) ODA - The MOLIT ODA project design is currently in development (as of June 2021) for the establishment of a master plan to reform transportation for a transition to a low-carbon public transportation system.

Case 2: Incorporating innovative renewables and waste heat technologies in Belgrade's district heating system (Mitigation)

	Background / Purpose • Background: - With the largest regional heating system in Europe, Belgrade's main heating energy source is natural gas, making the city largely dependent on imports. Therefore, it is necessary to promote the introduction of renewable energy technology to reduce its energy import dependence, improve efficiency, and reduce greenhouse gases. • Purpose: - To review the applicable energy supply technologies in Belgrade, conduct preliminary feasibility studies to select the most appropriate technologies, and plan the project
Beneficiary / Location	Serbia / Belgrade
Size / Resource	Total: KRW 160M / MSIT
Implementation Period	October 2018 – October 2019 (12 months)
Implementing Agency	Korea District Heating Company (Host), Yujin Energy Consulting Co. (Participant)
Overseas Cooperation Agency	Serbia Ministry of Agriculture and Environmental Protection (NDE), Belgrade City Government (TA Request Organization) Beogradske elektran.
Project Information	• Energy technology review - Review of the applicability of five energy supply technologies • Selection of target cities and establishment of scale-up project plans - Selection of the target sites for pilot projects, review of the feasibility of two pilot projects, and establishment of plans for the final pilot projects and follow-up projects
Results	• Analysis of five potential renewable energy technologies - Analysis on the possibility of connecting renewable energy (e.g. solar energy, geothermal, biogas, biomass, heat pumps, etc.) to regional heating power generation • Feasibility analysis of solar technology application - Feasibility analysis of project implementation using a technical feasibility study and economic analyses of the candidate sites for the demonstration projects
Scale-up / Linkage	• MSIT ODA - The MSIT ODA Project, 'IoT-based Regional Heating Smart Monitoring System Implementation and Renewable Energy Linkage Plan Establishment' (2021 – 2022, KRW 365M), is under implementation.

Case 3: Technical assistance for the development of a climate-smart city in Kurunegala, Sri Lanka (Mitigation)

Background / Purpose
• Background: - Due to rapid development and effects of climate change on the urban economy, the city of Kurunegala must establish an integrated urban plan that considers climate change. It is necessary to review climate technologies and establish an urban road map and action plan to reduce greenhouse gas emissions in the city's energy and transportation sectors. • Purpose: - To select appropriate technologies to reduce greenhouse gas emissions and develop action plans for their use in Kurunegala.

Beneficiary / Location	Sri Lanka / Kurunegala
Size / Resource	Total: KRW 200M / MSIT Climate Technology Localization Project (150M) Agency Matching (50M)
Implementation Period	November 2019 – December 2020 (13 months)
Implementing Agency	Econetwork
Overseas Cooperation Agency	Sri Lanka Ministry of Environment (NDE), Kurunegala City Government (TA Request Organization)
Project Information	• Research on greenhouse gas emissions - Analysis of existing greenhouse gas emissions, policy environment, reduction measures, etc. to determine the priority areas (energy, transportation, etc.) for emissions reduction and to consult with local officials • Technical review and roadmap presentation - Prioritization of climate technologies after review and submission of technological roadmaps by sector
Results	• Technology roadmap and climate technology cooperation demand - Successful cooperation between Korea and Sri Lanka to develop the technology roadmap for low-carbon urban energy, transportation, and waste sectors
Scale-up / Linkage	• Linkage to a project that supports the establishment of a master plan - To link the ODA resources to a master plan, the Korea Environmental Industry & Technology Institute's Sri Lanka Waste Management Master Plan Project is under implementation (2021, KRW 650M).

Case 4: Development of low-emission mobility policies and financing proposal for Cambodia (Mitigation)

	Background / Purpose • Background: - Traffic is rapidly increasing as the Cambodian economy grows, especially the number of fossil fuel-based modes of transportation. As the problem of air pollution from the transportation sector is growing, it is necessary to expand e-mobility and switch to low-carbon modes of transport, including electric vehicles, hybrid cars, and bicycles. • Purpose: - To develop a policy roadmap for the introduction of low-carbon transportation technology and for the provision of financial resources to implement technology transfer projects.
Beneficiary / Location	Cambodia
Size / Resource	Total: KRW 200M / MSIT
Implementation Period	November 2019 – November 2020 (12 months)
Implementing Agency	Envelops
Overseas Cooperation Agency	Cambodia Ministry of Environment (NDE), Ministry of Economy and Finance, Ministry of Public Works and Transport
Project Information	• Policy Roadmap Development - Development of a policy roadmap and action plan for the introduction of low-carbon transport technology • Financial linkage - Support for the development of low-carbon transportation project proposals (GCF, GEF, etc.) for the introduction of E-mobility technology
Results	• Policy status analysis - Policy status analysis of the road and traffic sectors in Cambodia • Policy roadmap and action plan - Development of policy roadmaps and action plans to introduce e-mobility transportation technologies • Concept paper for international climate finance organizations - Completion of concept papers for international climate finance organizations to implement E-mobility projects
Scale-up / Linkage	• Scale up to GCF Readiness Project - Proposal for the 'Climate Technology Diffusion Roadmap for Cambodia Mobility Ecosystem' project currently being reviewed (as of Jan, 2022)

Case 5: Sustainable domestic water pumping using solar photovoltaic TA (Mitigation)

	Background / Purpose • Background: - Tanzania's semi-arid areas (Tabora, Dodoma, Manyara) suffer from water shortages due to the effects of climate change. The government is encouraging the supply of solar water pumps to address the water shortages, but the communities struggle with the higher costs and maintenance associated with solar water pumps compared to electric and diesel water pumps. • Purpose: - To design a locally applicable solar water pump model for a sustainable water supply in the semi-arid region of Tanzania and to conduct demonstrations
Beneficiary / Location	Tanzania / Nghambi
Size / Resource	Total: KRW 200M / MSIT
Implementation Period	December 2019 – March 2021 (15 months)
Implementing Agency	Yujin Energy Consulting Co.
Overseas Cooperation Agency	Tanzania Commission for Science and Technology (NDE), Tanzania Renewable Energy Association (TA Request Organization)
Project Information	• Development of solar water pump models for homes - Review of applicable solar water pump technologies and provision of a model based on the basic survey of the target area • Small-scale demonstrations - Development of a business model for small demonstrations and technology diffusion of solar water pumps
Results	• Solar water pump system package configuration - Solar water pump system package configuration that is suitable for local conditions • Small-scale demonstration - Production, installation, and operation of products for small-scale demonstrations • Business model development - Development of a business model to expand the technology penetration
Scale-up / Linkage	• Scale up to GCF Readiness - 'Roadmap for Climate Technology Diffusion for the Supply of Water Pumps' (Project concept note and preliminary feasibility study aimed at developing the main project proposal) is currently underway (as of Jan, 2022)

Case 6: Namibia Water Recycling Technology Adoption TA (1st Round) (Adaptation)

Background / Purpose
• Background: - Namibia suffers from severe water shortages due to population growth and sporadic rainfall. It has operated the world's first plant to reuse sewage water to supply drinking water since the 1960s. However, the plant can no longer meet the rising demand and the country must identify technologies for mass water harvesting • Purpose: - To support the evaluation of water reuse technology and establish financial linkage for an effective application to the local outskirts of the capital, Windhoek, to reduce water shortages

Beneficiary / Location	Namibia / Windhoek
Size / Resource	Total: KRW 200M / Korea Environmental Industry and Technology Institute CTCN Developing Country Technology Distribution Project
Implementation Period	(1st) June 15, 2019 – December 10, 2019 (5 months) (2nd) May 25, 2020 – November 30, 2020 (6 months)
Implementing Agency	Yooshin Engineering Corporation
Overseas Cooperation Agency	Namibia Ministry of Environment and Tourism (NDE)
Project Information	• Status report - Basic research on the status of the water supply, challenges, as well as related policies, systems, laws, etc. that are necessary to introduce Namibia's water reuse technology • Development of a response plan - Consultation with key stakeholders (e.g. the CTCN Secretariat, NDEs in developing countries) to identify Namibia's technology requests and target sectors • Technical support activities - Developing country adaptation solution activities (technical evaluation, technology roadmap establishment, finance mechanism) through technical assistance during the following year • Production of pilot projects and GCF concept notes - Development of small pilot projects (drinking water, wastewater reclamation systems) in the outskirts of the capital and joint development of GCF concept notes
Results	• Contribution to Korean Pro Bono - Support to CTCN technical assistance through the provision of resources to Korean network members • Linkage to the GCF project development - Small-scale pilot projects completed and CTCN TA-GCF projects linked following consultation with countries in need of the technology
Scale-up / Linkage	• Implementation of small-scale demonstration projects (approximately KRW 300M) (as of July, 2021)

Strengthening network among Korean CTCN members

Network Member Committee Meetings for Korean CTCN Members

- Since 2016, a total of 12 'Conference for CTCN Members' were hosted by the Korean NDE and organised by GTC in Korea, during which CTCN information and protocols for participation were shared. The meetings provided opportunities to share project implementation experiences among existing members, and to discuss the linkage between TA and other projects, and scale-up opportunities for TAs .
- Apart from the Network Member Committee, the 'Korean CTCN pro bono Technical Assistance Committee' has been held 4 times since 2019 for agencies that are interested in carrying out projects using their own funds. At these conferences, Korean members discuss pro bono operations in general, schedule modification, etc.

[Table II-4] History of Network Member Committee Meetings

Main Agendas of Conference	Participants	Date
1st CTCN Network Member Committee Meeting • 12th TEC meeting and sharing of the 7th CTCN Secretariat results (GTC) • CTCN membership application briefing (GTC) • CTCN members' TA project participation method	24 attendees including MSIT, 8 CTCN members and related agencies, etc.	May 13, 2016
2nd CTCN Network Member Committee Meeting • Current status of global climate cooperation policies to address the new climate regime • Introduction of climate technology-related cooperation status and future implementation plans by each member organization • Introduction and suggestion of business models on climate technology cooperation	Approx. 50 attendees including MSIT, 27 CTCN members and related agencies, etc.	Aug 30, 2016
3rd CTCN Network Member Committee Meeting and Project Briefing • Sharing of key results of NDEs in 2016 • Announcement of NDE and CTCN activities planned for 2017 • Discussion on future collaboration plans and technical assistance for climate technology transfer	Approx. 70 attendees including MSIT, 36 CTCN members and related agencies, etc.	Mar 7, 2017
4th CTCN Network Member Committee Meeting • Trends and countermeasures related to the withdrawal of the U.S. from the Paris Agreement • Sharing of the technology mechanism trends in the first half of 2017 (GTC) • Discussion about the CTCN: a sharing of opinions by domestic CTCN Network members (GTC)	MSIT Climate Tech. Cooperation Team, GTC, CTCN members, etc.	July 11, 2017
5th CTCN Network Member Committee Meeting CTCN Expert Seminar • Introduction of international trends and projects for climate technology cooperation	Approx. 100 attendees including MSIT, GTC, CTCN Secretariat, TEC	Nov 23, 2017

Main Agendas of Conference	Participants	Date
• Sharing of exemplary cases of climate technology cooperation in Korea • Discussion of ways to promote participation in TA projects, etc.	member Sung Changmo, CTCN members, etc.	
6th CTCN Network Member Committee Meeting • Sharing results of the 11th Advisory Board meeting and plans for the 2018 conference and committee operations • Introduction of technical assistance projects and climate technology information system • Introduction of the CTCN TA implementation cases and financing • Implementation cases for the GCF projects (Industrial Bank of Korea, IBK)	Approx. 100 attendees including MSIT, GTC, CTCN members, IBK, etc.	Mar 29, 2018
7th CTCN Network Member Committee Meeting • Announcement of plans for the CTCN regional forum • Introduction of initiatives on local demand generation for climate technology assistance (CTCN pro bono)	Approx. 80 attendees including MSIT, GTC, and CTCN members, etc.	July 5, 2018
8th CTCN Network Member Committee Meeting • Introduction of domestic pro bono projects and new projects for 2019 • Sharing of results for the CTCN Secretariat • Invitation of experts on climate funding and sharing of pro bono experiences	Approx. 80 attendees including MSIT, GTC, MoEF, CTCN members, etc.	June 10, 2019
9th CTCN Network Member Committee Meeting (Jointly hosted with the NDE Workshop) • Introduction of key status and results of domestic climate technology cooperation • Sharing of climate technology demand and potential cooperation areas in developing countries • Introduction of domestic members' climate technology and cases of overseas application (water, waste, energy, etc.) • Specification of demand for climate technology in developing countries, preparation of concept papers	Approx. 80 attendees including MSIT, GTC, NDEs from Developing Countries*, CTCN members (*Myanmar, Laos, Cambodia, Bhutan, Sri Lanka, Senegal, Bosnia, Ecuador)	Nov 12, 2019
10th CTCN Network Member Committee Meeting • Introduction of the domestic and international CTCN trends and pro bono projects • Sharing of experiences in TA projects • Introduction of potential funding opportunities to scale	MSI, GTC, CTCN Members, Secretariat, KOICA, etc. (on/offline)	Nov 26, 2020
11th CTCN Network Member Committee Meeting • Recent status and future plans in climate technology cooperation • Sharing international cooperation programs in climate technology	MSIT, GTC, CTCN Members, Secretariat, KEXIM, etc. (on/offline)	Jun 30, 2021
12th CTCN Network Member Committee Meeting • Introduction to the CTCN Partnership and Liaison Office and CTCN activities in linking the technology and financial mechanisms • Sharing of experiences in TA projects from a network member and panel discussions	MSIT, GTC, CTCN Members, Secretariat, KEXIM, KDB, Korea Western Power, etc. (on/offline)	Dec 14, 2021

Case Studies on Various Engagement Activities of International and Korean Network members

International Members

Case 1

Agency Characteristic	Canadian private consulting firm with experience in developing energy efficiency projects
Cooperation Type	Network member and knowledge partner
Specialization	Mitigation > Sustainable Energy, Energy Efficiency, Sustainable Energy
Main Activities	Has carried out 3 TA sand 3 webinars

• Econoler[34]

Case 2

Agency Characteristic	Chilean private renewable energy company
Cooperation Type	Network member and knowledge partner
Specialization	Mitigation > Sustainable Energy Adaptation > Water Resources
Main Activities	Has carried out 2 TAs; established policy roadmaps for transportation, disaster, biodiversity, waste and water resource management, etc.

• Servicios de Ingeniería Deuman Limitada[35]

[34] Econoler[Website]. (2021, Jun 30). http://www.econoler.com
[35] Servicios de Ingeniería Deuman Limitada[Website]. (2021, Jun 30). http://www.deuman.com

Case 3

Agency Characteristic	A non-profit organization related to CCS located in Canada
Cooperation Type	Network member and knowledge partner
Specialization	Mitigation > Carbon fixation and reduction
Main Activities	Shared examples of applying multi-emission industrial processes by holding 3 webinars on carbon capture and storage (CCS)

• The International CCS Knowledge Centre (ICCSC)[36]

Case 4

Agency Characteristic	The World Bank's knowledge portal on climate change, owned by an intergovernmental organization.
Cooperation Type	Knowledge partner
Specialization	Mitigation and adaptation
Main Activities	Climate finance, renewable energy, energy efficiency, natural disasters, environmental-economic indicators related to climate impacts, provision of various visualization tools

• Climate Change Knowledge Portal(CCKP) [37]

[36] The International CCS Knowledge Centre[Website]. (2021, Jun 30). http://www.ccsknowledge.com
[37] Climate Knowledge Portal[Website]. (2021, Jun 30). https://climateknowledgeportal.worldbank.org/

Korean Network members

Case 1

- The Green Technology Center is the dedicated supporting organization for Korea's NDE, the Ministry of Science and ICT (MSIT).

Technical Assistance

- Since 2016, the Green Technology Center has participated in a total of 4 TAs (see Table III-1).

Knowledge Sharing

- Since 2018, the Green Technology Center has shared information on Korean technology patents with the CTCN Secretariat.

Networking

- The 'Conference for Korean Network Members' and the 'Pro bono Conference' hosted by the MSIT are held annually to provide a platform for information sharing and networking among the member institutions.

[Table Ⅱ-5] CTCN TA Contract Status of the Green Technology Center

TA Title	Country	Period	Budget (USD)	Implementing Agency
Optimising Guinea's access to climate change adaptation funding	Guinea	2016.10 ~ 2017.04 (6 months)	160,000	Green Technology Center, Group for the Environment, Renewable Energy, and Solidarity (GERES)
Catalysing low-cost green technologies for sustainable water service delivery (1)	Kenya	2017.12 ~ 2017.07 (7 months)	49,655	Green Technology Center, Korea Institute of Construction Technology, Korea Electric Power Corporation
Catalysing low-cost green technologies for sustainable water service delivery (2)	Kenya	2017.10 ~ 2017.07 (7 months)	32,705	Green Technology Center
Saline water purification for households and low-cost durable housing technology for coastal areas of Bangladesh	Bangladesh	2017.12 ~ 2018.07 (7 months)	167,000	Green Technology Center, Korea Institute of Construction Technology, Glory & Tech

Case 2

Agency Characteristic	A private environmental consulting firm that provides expertise in climate change response, emissions trading, carbon reduction CDM projects, and renewable energy projects
Cooperation Type	Network member
Specialization	Adaptation > Infrastructure/Urban Planning
Main Activities	Provided technical support for the establishment of a climate smart city in Kurunegala City, Sri Lanka; determined priority climate technologies for emissions reduction and adaptation; presented technology roadmaps by sector

• Eco Network Inc. (http://econetwork.co.kr/)

Case 3

Agency Characteristic	A private company specializing in renewable energy project development
Cooperation Type	Network member
Specialization	Mitigation > Renewable Energy
Main Activities	Provided technical support for Cambodia's low-carbon transportation transition; delivered results in the form of a policy roadmap and GCF concept note; involved in the process of providing TA for a rainwater collection system for Mozambique this year

• Envelops Inc. (https://en-velops.com/)

Case 4

KIGAM 한국지질자원연구원

Agency Characteristic	A government-funded research institute with expertise in Korea's top mineralization technology.
Cooperation Type	Network member
Specialization	Mitigation > Carbon Capture·Utilization·Storage (CCUS)
Main Activities	Conducting technical support to verify the applicability of technology to collect and process carbon dioxide from coal-fired power plants in Kaonan, Vietnam; the goal is to cooperate with the Vietnam Institute of Geological and Mineral Resources (VIGMR) and VINACOMIN to promote MSIT's ODA.

• Korea Institute of Geoscience and Mineral Resources (KIGAM)[38]

Case 5

GIST | 국제환경연구소

Agency Characteristic	A public institution with expertise in environmental issues that are specific to developing countries
Cooperation Type	Network member
Specialization	Adaptation > Potable Water Supply and Heath·Sanitation
Main Activities	Provided technical support to introduce sustainable drinking water supply technologies in Cambodia; upon selection of the project site, a gravitational water purification system was installed; capacity building training was conducted for its proper operation and maintenance ❖ See p.26 for a complete list of the CTCN pro bono TA projects executed by Korean network members

• Gwangju Institute of Science and Technology (GIST) International Environmental Research Institute[39]

[38] Korea Institute of Geoscience and Mineral Resources[Website]. (2021, Jun 8). https://www.kigam.re.kr/main
[39] Gwangju Institute of Science and Technology (GIST) International Environmental Research Institute[Website]. (2021, Jun 8). https://ieri.gist.ac.kr/ieri/)

III

Annex

1. CTC Network Members in Korea (As of 2021.10)
2. CTCN Taxonomy

1. CTC Network Members in Korea (As of 2021.10)

List of Korean CTCN Members (Total of 81)[40]

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
1	한국에너지공단 KOREA ENERGY AGENCY Korea Energy Corporation	- (Established) 1980 - (Type) Agency under the Ministry of Trade, Industry and Energy - (Personnel) 502	- Energy management diagnosis and technical guidance, efficiency improvement and safe management of energy equipment, funding to promote investment in energy-saving facilities, energy demand management, and vitalization of power distribution. - Research, promotion and education on energy management, renewable energy supply and green industry fostering (2015.02)
2	KITECH 한국생산기술연구원 Korea Institute of Industrial Technology	- (Established) 1989 - (Type) Research Institute under the Ministry of Science and ICT	- Transfer and distribution of technology for small and medium-sized enterprises, technical support technologies, human resources, and infrastructure, support SMEs and develop demand-oriented production technologies (2015.03)
3	GREEN TECHNOLOGY CENTER 녹색기술센터 Green Technology Center	- (Established) 2013 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 59	- Support national R&D policy planning and establishment of green technology; establishing international cooperation system in the field of green technology, and analysis and data management of green technology levels and trends, analysis of future green technology (2021.06)

40 Network Members[Website]. (2021, Aug 12). https://www.ctc-n.org/network/network-members

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
4	한국환경공단 Korea Environment Corporation	- (Established) 2010 - (Type) quasi-governmental agency under the Ministry of Environment - (Personnel) 2,340	- Support for research and development of policies related to environmental pollution prevention, environmental improvement and resource circulation, waste management, installation and operation of complex environmental facilities, and management of environmentally harmful chemicals - Operation of environmental measuring network and control center and management of projects to support the creation of eco-friendly cities (2015.09)
5	한국에너지기술연구원 KOREA INSTITUTE OF ENERGY RESEARCH Korea Institute of Energy Research	- (Established) 1977 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 442	- Energy technology development and distribution - Fostering of small and medium-sized enterprises - Support for energy technology policy establishment (2015.09)
6	KRICT 한국화학연구원 Korea Research Institute of Chemical Technology	- (Established) 1976 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 429	- Research and development of eco-friendly chemical engineering technology, chemical materials, new substances, chemical-based fusion and complex technologies - Establishment and operation of public infrastructure for chemical-related safety, analysis, evaluation, standardization, certification, and information on compounds (2015.10)
7	KERI 한국전기연구원 Korea Electrotechnology Research Institute	- (Established) 1976 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 415	- Power technology and renewable energy power system linkage technology, electrical equipment, parts, materials, electronic medical device and electrical technology-based convergence technology, electrical equipment testing and certification services and R&D related technologies (2015.11)
8	KIMM 한국기계연구원 KOREA INSTITUTE OF MACHINERY & MATERIALS Korea Institute of Machinery and Materials	- (Established) 1976 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 383	- Future original technology, social issue resolution technology, industrial core technology development, reliability evaluation and test evaluation functions - Technology transfer and support (2016.01)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
9	KIMS 한국재료연구원 Korea Institute of Materials Science Korea Institute of Materials Science	- (Established) 2007 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 279	- R&D on metal materials, ceramic materials, surface-related materials, fusion and composite materials, authorized evaluation and certification of materials and components, cooperation in related industries, and technical commercialization (2016.07)
10	KFE 한국핵융합에너지연구원 KOREA INSTITUTE OF FUSION ENERGY Korea Institute of Fusion Energy	- (Established) 2015 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 270	- Joint use of fusion plasma scientific research and research devices - Participation in ITER international joint development projects and securing of original technology - Development of fusion derivation and plasma application technology - R&D for nuclear fusion energy verification (2016.07)
11	한국생명공학연구원 Korea Research Institute of Bioscience and Biotechnology Korea Institute of Bioscience and Biotechnology	- (Established) 1985 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 409	- Development and distribution of original technologies in advanced life science and technology fields and driving the bio-economy - Supporting public infrastructure for domestic and international life science research (2016.07)
12	KRISS 한국표준과학연구원 Korea Research Institute of Standards and Science Korea Research Institute of Bioscience and Biotechnology	- (Established) 1975 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 440	- Establishment and maintenance of national measurement standards - Research and development of measured science and technology - National measurement standards promotion and services (2016.07)
13	KIGAM 한국지질자원연구원 Korea Institute of Geoscience and Mineral Resources Korea Institute of Geoscience and Mineral Resources	- (Established) 1976 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 473	- Geological science research, development and provision of geological resource-oriented information, and efficient use of ground and underground spaces - Securing underground energy resources, responding to earthquake and geological disasters and changes in the global environment - R&D on the exploration, development and conservation of groundwater resources (2016.07)
14	DGIST 대구경북과학기술원 Daegu Gyeongbuk Institute of Science & Technology Daegu Gyeongbuk Institute of Science and Technology	- (Established) 2004 - (Type) Specialized university under the Ministry of Science and ICT - (Personnel) 259	- Training of high-end science and technology talent, R&D for local high-tech industries, joint research with domestic and international universities, research institutes, and industries (2016.07)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
15	Korea Institute of Construction Technology	- (Established) 1983 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 453	- Development of high-performance infrastructure, disaster response, eco-friendly land creation, construction-based convergence, and high-performance construction materials - Quality certification, recognition, designation, inspection, test, evaluation, certification of construction work and construction equipment (2016.07)-
16	Korea Institute of Science and Technology	- (Established) 1966 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 807	- A comprehensive research institution that creates original technology, and R&D in the field of basic and leading technology - R&D for national mid- to long-term R&D projects and national science and technology development (2016.07)
17	Korea Environmental Industry and Technology Institute	- (Established) 2009 - (Type) Quasi-governmental agency under the Ministry of Environment - (Personnel) 341	- Planning, evaluation, and management of environmental technology development projects, fostering and supporting export of environmental industries, new technology certification, technology verification, and operation of environmental mark and carbon performance labeling systems, and collection and distribution of environmental industry and technology information (2016.07)
18	Korea Railroad Research Institute	- (Established) 1996 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 325	- R&D on high-speed, general, urban and light-weight railway systems, railway safety, standardization, railway policy and logistics technologies, inter-Korean railway and continental railway connection technologies, and original core technologies of public transportation systems (2016.07)
19	Korea Institute for Advancement of Technology	- (Established) 2009 - (Type) Quasi non-governmental agency under the Ministry of Trade, Industry, and Energy - (Personnel) 313	- Establishment and policy planning of industrial technology strategies, development of human resources specialized in industrial technology, and fostering and supporting the material parts industry - International cooperation in industrial technology, support for fostering global medium-sized enterprises, and operation and management of industrial technology advancement and the commercialization fund (2016.07)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
20	Sunjin Engineering and Architecture	- (Established) 1975 - (Type) Private engineering firm - (Personnel) 751	- Provide all engineering services such as construction, urban complex, water supply, environmental plant, landscape leisure, rail, road design, water resources, renewable energy, civil structure, ground tunnel, transportation plan, construction project management, power, etc. (2016.07)
21	Korea Astronomy and Space Science Institute	- (Established) 1974 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 205	- Research and projects on astronomy and space science, operation of large observational facilities and development of equipment - Performance of national astronomical tasks, such as space environmental monitoring technology development projects, managing stations and time zones, and disseminating information to the public (2016.08)
22	Gwangju Institute of Science and Technology	- (Established) 1993 - (Type) Specialized university under the Ministry of Science and ICT - (Personnel) 352	- Basic and applied research for fostering advanced scientific and technical talent and national R&D - Joint research with domestic and international industries, universities, and associations for the development of local industries. (2016.08)
23	Korea Technology Finance Corporation	- (Established) 1989 - (Type) Quasi-governmental agency under the Ministry of SMEs and Startups - (Personnel) 1,362	- Technical guarantee, technology evaluation, guarantee-linked investment, support for technology innovation (support for technology transfer and commercialization, selection of venture and innovative companies), management guidance, comprehensive management of credit and credit information, credit guarantee system, and research (2016.08)
24	Korea Environment Institute	- (Established) 1993 - (Type) Research institute under the Office for Government Policy Coordination - (Personnel) 176	- R&D of environmental policies and climate environmental policies, establishment of environmental plans, and evaluation of environmental policy operation performance - Development and distribution of policies and techniques to preserve the natural ecosystem and secure environmental stability, global and regional environmental issues, and environmental impact assessment techniques (2016.08)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
25	Pohang University of Science and Technology	- (Established) 1986 - (Type) Research-oriented private university - (Personnel) 648	- Training global leaders of the future through excellent education, conducting and applying pioneering research in the field of science and technology, education, research, industry-academic cooperation (2016.08)
26	Samil PwC International Limited	- (Established) 1971 - (Type) Private accounting firm - (Personnel) 3,600	- Audit financial statements, consultation on accounting processes, tax advice, support for tax issues, establishment of acquisition strategies and patent infringement, dispute settlement and real estate development advice (2016.08)
27	Korea Institute of Ocean Science and Technology	- (Established) 2012 - (Type) Research institute under the Ministry of Oceans and Fisheries - (Personnel) 437	- Studies on the development and practical use of original technologies necessary for the development of marine science and technology and marine industry - Establishment and operation of scientific and technological infrastructure for training excellent experts in the marine field, the global environment, and the use of common heritages (2016.08)
28	Korea Electric Power Corporation	- (Established) 1961 - (Type) Public enterprise under the Ministry of Trade, Industry and Energy - (Personnel) 21,325	- Operation, research and technology development related to electric power development, transmission, subversion, distribution, overseas projects, investment or contribution, and real estate utilization projects (2016.09)
29	Byucksan Engineering	- (Established) 1979 - (Type) Private engineering firm - (Personnel) approx. 700	- Provide R&D, design and construction, operation and supervision services in areas such as plants, power generation, infrastructure, construction, etc. (2016.09)
30	Korea Atomic Energy Research Institute	- (Established) 1959 - (Type) Research Institute under the Ministry of Science and ICT - (Personnel) 1587	- Specialized studies on climate technology to develop new high-value varieties of plant items to protect varieties and combat climate change. (2017.02)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
31	Science and Technology Policy Institute	- (Established) 1987 - (Type) Research institute under the Office for Government Policy Coordination - (Personnel) 107	- Analysis and research on scientific technology, R&D activities and technological innovation, development of alternatives for scientific and technological policies, and development of technological management strategies (2016.10)
32	K-water	- (Established) 1967 - (Type) Public enterprise under the Ministry of Land, Transport, and Maritime Affairs - (Personnel) 5,057	- Construction and operation management of facilities for comprehensive use and development of water resources, construction, management of wide-area water supply facilities (including industrial water) and development of industrial complexes and special areas - Installation, operation, and management of local governments' water supply and water resources, technical support and education, and renewable energy facilities (2016.10)
33	ECO&PARTNERS	- (Established) 2014 - (Type) Environmental consulting firm - (Personnel) 31	- Professional institution established by experts with more than 12 years of experience in the field of sustainable development, supporting the development and implementation of sustainability strategies for industrial and financial institutions, local governments, and overseas institutions (2016.11.22.)
34	BSPower	- (Established) 2009 - (Type) Engineering firm	- The Energy Business Headquarters and the Power IT Business Headquarters are composed of each field's technical skills to expand their entry into overseas markets such as Korea, Southeast Asia, and Africa. (2017.01.03.)
35	Green Asia Network (GAN)	- (Established) 1998 - (Type) Private non-profit organization	- Establish sustainable regional development models such as Mongolia Desertification Prevention Project; spread climate change mitigation and adaptation models; promote climate change, education, policy research, campaign, and knowledge sharing to establish a common vision and network in Korea and Asia (2017.01.07.)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
36	Korea Forestry Promotion Institute (KOFPI)	- (Established) 2012 - (Type) Promotion agency of the Korea Forest Service - (Personnel) 230	- Mountain village promotion project - Spreading forestry technology - Supporting the growth of the timber industry - Quality control of forestry products - Forest Information Service - Forest carbon and certification projects - Forest-type prospective social enterprise - Strengthening the pine tree pest control system - Support for overseas forest resource development (2017.02.13.)
37	Forcebel	- 2000 - (Type) Construction company - (Personnel) 31	- Groundwork - Disposal of landfill waste - Manufacture of screening machinery, etc. (2017.03.01.)
38	Climate Change Center (CCC)	- (Established) 2008 - (Type) Foundation	- Cooperation, support, and training of public officials in developing countries - Global Partnership - Asia Recording Organization (2017.03.01.)
39	POSCO Energy	- (Established) 1999 - (Type) Electricity, electronics, and semiconductor manufacturer - (Personnel) 817	- Power generation (LNG combined power generation, regenerative gas combined power generation, bituminous coal) - Renewable energy (sunlight, wind power) - Fuel cell (technical development, manufacture, installation, operation) - Resource circulation (fueling household waste, power generation project, district heating supply project using sewage heat) - Overseas projects (2017.03.27.)
40	Samjong KPMG	- (Established) 2001 - (Type) Business and accounting consulting - (Personnel) 2,700	- Accounting, financial consulting, audit, M&A, investment advisory (2017.03.27.)
41	Korea Productivity Center Quality Assurance	- (Established) 1994 - (Type) R&D institute - (Personnel) 78	- ISO certification, green building certification, energy efficiency certification, evaluation of multi-family housing condensation prevention, etc (2017.06.09.)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
42	LS Industrial Systems Co.	- (Established) 1975 - (Type) Electricity, electronics, and semiconductor manufacturer - (Personnel) 3,264	- Electricity equipment/transmission/distribution, automation solutions, green energy projects (2017.06.29.)
43	Korea Carbon Capture & Sequestration R&D Center	- (Established) 2010 - (Type) Foundation under the Ministry of Science and ICT - (Personnel) approx. 500	- 3rd generation CO_2 capture technology - Development of small-scale storage - CO_2 conversion technology - CCS-based composition study (2017.06.29.)
44	SLG glow	- (Established) 2009 - (Type) Manufacturing	- Production of LED lighting products - Production of lighting related parts - Promotion of ESCO private sector (2017.07.07.)
45	Haekang Co.	- (Established) 2009 - (Type) Switchboard and electric automatic control panel manufacturing - (Personnel) approx. 50	- Manufacture of switchboard cubicles and steel enclosures, power control systems, switchboards, high and low pressure MCC (2017.07.26.)
46	APEC Climate Center (APCC)	- (Established) 2005 - (Type) Public institution under the Korea Meteorological Administration - (Personnel) 90	- Asia-Pacific Climate Information Service and R&D (Contribution, R&D) (2017.07.26.)
47	Pyunghwa Engineering Consultants	- (Established) 1995 - (Type) Civil engineering firm - (Personnel) 671	- Building and civil engineering service companies such as civil engineering design, supervision, soil survey, environmental impact assessment, safety diagnosis, electrical, firefighting facility design management/software development services, etc. (2017.11.20.)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
48	International Center for Urban Water Hydroinformatics Research & Innovation (ICUH)	- (Established) 2009 - (Type) Research foundation - (Personnel) 12	- Water resources and river research - SWG and water supply research - Sewage and environmental studies - Social safety and disaster prevention research (2017.12.15.)
49	Korea Rural Community Corporation (KRC)	- (Established) 2000 - (Type) Public enterprise under the Ministry of Agriculture and Forestry - (Personnel) 6,738	- Agricultural production based - Water management for farming and fishing villages - Strengthening agricultural competitiveness - Development of rural areas - Farmland management fund - Studies on farming and fishing villages (2018.04.25.)
50	Mine Reclamation Corporation (MIRECO)	- (Established) 2006 - (Type) Corporation under the Ministry of Trade, Industry, and Energy - (Personnel) 253	- Mining damage prevention project - Assistance project for stabilization of Tanga - Waste mining countermeasure project - Briquettes support project for low-income families - Work Daycare Center Assistance Project - Mining Management Corporation's own projects (2018.05.11.)
51	Korea Invention Promotion Association (KIPA)	- (Established) 1994 - (Type) Promotion Agency under the Korean Intellectual Property Office - (Personnel) 179	- Fostering intellectual property human resources - Member projects - Activation of patent technology transactions - Patent technology evaluation and fee support - Activation of inventions - International cooperation - Knowledge information - Management and operation of the Korea Intellectual Property Center (2018.05.11.)
52	National Forestry Cooperative Federation (NFCF)	- (Type) Research Institute under the Ministry of Science and ICT	- Private management guidance - Creating forest resources - Establishing a foundation for forest management - Forest product distribution - Overseas forestry resource development (2018.06.29.)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
53	ALG Systems (ALG)	- (Established) 2015 - (Type) General-use electrical lighting, manufacturing	- LED lighting, Wi-Fi communication business (free call and data), Bluetooth, IP camera, IOT (Internet of Things) system business - Manufacture of security lights and streetlights (2018.07.16.)
54	The Bridge	- (Type) Private non-profit organization - (Type) 5	- Funding through cloud funding - Donation delivery and business support - Activating local subject business (2018.07.25.)
55	Hongik University Industry-Academia Collaboration Foundation	- (Established) 1946 - (Type) Private university - (Personnel) 1,958	- Planning and activation of cooperative research by industry, university, and association - Management of research funds and spread of research results (2018.08)
56	ASEM SMEs Eco-Innovation Center (ASEIC)	- (Established) 2011 - (Type) Asia-Pacific region international organization	- ASEIC Eco-Innovation Consulting - ASEM inclusive eco-innovation program - ASEM Eco-Innovation Index (ASEI) - ASEIC Global Forum - Green Business Center (GBC) (2018.08)
57	Yooshin Engineering Corporation	- (Established) 1966 - (Type) General engineering service company - (Personnel) 1,195	- Transportation facilities, structures, water projects, national land development, environment, ground engineering and tunnels, overseas projects, and supervision projects (2018.08)
58	Korea District Heating Corporation (KDHC)	- (Established) 1985 - (Type) Public enterprise under the Ministry of Trade, Industry, and Energy	- Operation and construction of collective energy projects, regional cooling CES, power projects, renewable energy, overseas projects (2018.08)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
59	KRIC 한국기후변화연구원 Korea Research Institute on Climate Change Korea Research Institute on Climate Change (KRIC)	- (Established) 2009 - (Type) Research Foundation - (Personnel) 41	- Establish mid- to long-term climate change reduction strategies through systematic R&BD on global climate change, develop clean energy. (2019.03)
60	고려대학교 KOREA UNIVERSITY Korea University Industrial Academic Cooperation Center	- (Established) 1997 - (Type) Private university	- Korea University's Institute of Environment & Ecology aims to evaluate vulnerabilities for climate change impact and disaster risk reduction (2019.07)
61	NDT 엔디티 엔지니어링 (주) NDT ENGINEERING & AEROSPACE CO., LTD. NDT Engineering & Aerospace Co.	- (Established) 1991 - (Type) Special-purpose machinery manufacturer - (Personnel) 80	- Commercialization of smart security lights and disaster prevention systems through long-term research and development as part of environment-friendly energy projects (2019.09)
62	ivs 아이브스 Intelligent Video & Sound Intelligent Video and Sound	- (Established) 2010 - (Type) System application software development and supply industry - (Personnel) 25	- Development of deep learning-based video analysis technology for artificial intelligence, security protection and life protection - Development and commercialization of intelligent CCTVs that can be broadcasted by detecting abnormal sound sources such as screams and explosions (2019.09)
63	eco ne-t-work Econetwork	- (Established) 2007 - (Type) Environmental consulting firm - (Personnel) 22	- Company specializing in environmental consulting for three main areas: climate change, sustainability, and ESH. Solar energy development work is also performed. (2020.01)
64	icec International Climate & Environment Center (ICEC)	- (Established) 2012 - (Type) Climate change response policy research institute - (Personnel) 15	- Policy research, development, and education on climate change response and environment - Development and distribution of programs to support the low-carbon, green life movement - Exchange and cooperation with domestic and international research institutions and organizations related to climate change response and environment (2020.01)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
65	Datam	- (Established) 2007 - (Type) Carbon reduction and blockchain linkage - (Personnel) 19	- Based on the Proof of Carbon Reduction (PCR) blockchain patent technology, which was developed to track CO2 reduction credits from a vehicle compared to a baseline, Datam enables users to trace, track and trade carbon credits using the blockchain-based platform (2020.01)
66	Envelops	- (Established) 2018 - (Type) Renewable energy project development company - (Personnel) 7	- Projects addressing sustainable development such as solar, wind, biomass, waste energy, etc. (2020.01)
67	Yujin Energy Consulting Co.	- (Established) 2007 - (Type) Consulting, engineering, project-management, and R&D - (Personnel) 8	- Consulting to optimize energy and manage processes for exergy technologies such as renewable energy systems, power plants, and utilities. - Feasibility tests and basic design operations of renewable energy systems (2020.01)
68	Da Won Electronics Co.	- (Established) 1993 - (Type) Printed circuit board laser hole processing company - (Personnel) 120	- Develop eco-friendly solar photovoltaic products and renewable energy parts (2020.01)
69	Korea Western Power Co.	- (Established) 2001 - (Type) Electricity generation and power supply company - (Personnel) 2,432	- Expansion of renewable projects to fulfill the obligation to Renewable Portfolio Standard (RPS) - Contributing to domestic industrial development by creating new renewable energy technologies - Strengthening the role of public power generation companies in large-scale renewable projects (2020.01)
70	SK Securities	- (Established) 1995 - (Type) Private securities company - (Personnel) 756	- Increase of stocks/derivatives, etc. equivalent to securities operations - IB (real estate, IPO, equity investment, bond issuance, etc.) and trading. - Issuance and consultation of ESG bonds (green bonds, social bonds, sustainable bonds, etc.) in ESG finance. Renewable Energy PF, Overseas CDM Project (2020.06.12.)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
71	KT	- (Established) 1981 - (Type) Telecommunications operator - (Personnel) 23,000	- ICT-based shared value creation activities such as AI, Big Data, 5G, etc. - Implementation of technology-based social problem-solving projects to achieve UN SDGs - Promoting global social contribution activities through cooperation with international organizations such as UNEP, UN FAO, UNGC, etc. (2020.07.08.)
72	Korea East-West Power Co.	- (Established) 2001 - (Type) Public enterprise - (Personnel) 2,378	- Supporting emission trading and planning for climate change - Support for CDM projects that reduce greenhouse gas emissions (2020.07)
73	Korea Research Institute for Human Settlements	- (Established) 1978 - (Type) Public institution under the Office for the Prime Minister's Secretariat - (Personnel) 300	- Studies on the establishment of a comprehensive long-term plan and regional plan for national territories - Studies on national land use, conservation, water resources, rivers, and climate change policies - Studies on national land policies, including land, housing, urban and construction industries - Systematic management and supply of national spatial information - Joint research and research cooperation projects with international organizations, etc. (2020.08)
74	Ecosian	- (Established) 2001 년 - (Type) Private environmental consulting firm - (Personnel) 89	- Consulting on carbon asset management, sustainability strategy, product environment management, and international cooperation projects - ICT: Greenhouse gas regulation response system, plant energy management system, building energy management system, logistics center energy system, integrated chemical regulation management system, environmental safety and health management system - Responsible for energy diagnosis, building energy and renewable energy projects (2020.08.18)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
75	LG International Corp.	- (Established) 1953 - (Type) Merchandise brokerage and environmental company - (Personnel) 392	- Experience with UNFCCC CDM projects related to SF6 (2010), including CDM projects for a hydroelectric power plant and palm farms in Indonesia (2020.11.04)
76	Weatherpia	- (Established) 2005 - (Type) Meteorological agency - (Personnel) 19	- Conducted policy and academic research in the field of weather and climate for more than 15 years - Korea's largest ODA project to modernize the Korea Meteorological Administration for developing countries - Weather assessment business (first in Korea) - R&D for weather environment equipment (affiliated institute: particulate matter research institute) - Planning for and implementation of international events in the field of weather and climate (2020.11)
77	Korea South-East Power Co.	- (Established) 2001 - (Type) Public enterprise under the Ministry of Trade, Industry, and Energy - (Personnel) 2700	- Thermal power generation and renewable energy (Yeongnonghyeon solar power, offshore wind power, aquifer power (Nepal, Pakistan)) generation industry - Other greenhouse gas reduction projects (CCU, waste refrigerant recovery and destruction, support for greenhouse gas reduction projects in small and medium enterprises/agriculture sectors, etc.) (2020.12)
78	Kyungpook National University Institute for Global Climate Change and Energy	- (Established) 2016 - (Type) Public university	- Provide academic and industrial services - Development of climate technology solutions according to international and regional climate policies (2020.12)
79	EnSTAR	- (Established) 2014 - (Type) Academic research and R&D consulting firm - (Personnel) 14	- Evaluation of the impact of (new) technology and policies on climate change (greenhouse gas emissions) and performing a full-process evaluation - International Environmental Policy Study (2021.02.19)

	Agency	Organizational Status	Characteristics and Features (CTCN membership date)
80	YOLK	- (Established) 2019 - (Type) Private - (Personnel) 6	- Low-power local electricity supply through the supply of solar energy generation facilities - Expand educational opportunities for children in developing countries - Contribute to the implementation of carbon reduction and carbon neutral policies and the expansion of global education related to energy (2021.04.27)
81	Korea Meteorological Institute	- (Established) 2005 - (Type) Education center under the Korea Meteorological Administration - (Personnel) 176	- Development and implementation of projects to modernize the weather information system - Training weather experts (2021.06)

2. CTCN Taxonomy

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
Carbon Fixation and Abatement	Fugitive emission control	Oil and gas flaring reduction
		Coal mine methane
		Natural gas pipeline leaking
	Carbon capture and storage (CCS)	CO_2 transport technologies
		CO_2 storage technologies
		CO_2 capture technologies
Transport	Inland water and maritime	Maritime freight
		Maritime support systems
	Land transport	Traffic management
		More efficient heavy duty vehicles
		More efficient light duty vehicles
		Modal shift from car to cycling
		Modal shift from road to rail

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
		Road pricing
		Intelligent transport systems
		Scrappage programmes
		Transport Demand Management
		Freight Management
		More efficient train system
		Transit-oriented development
		Bus Rapid Transit
		Cable cars
		Promotion of non-motorized transport
		High-speed rail
	Vehicle and fuel technologies	Compressed Natural Gas as fuel
		Biogas as fuel
		Advanced biofuels
		Energy-efficient motors
		Liquefied Natural Gas in trucks and cars
		Electric vehicles
		Regenerable braking
		Liquefied Petroleum Gas in transport
		Fuel cells for mobile applications
		Hybrid electric vehicles
	Aviation	Aviation support systems
		Air cargo
Energy efficiency	Energy distribution	Hydrogen infrastructure
		District heating and cooling
		Micro-grid
		Smart grid
		Connection of isolated grid
	Appliances and equipment	Water efficiency
		Residential water heaters
		LPG and LNG for household and commercial cooking
		Lighting

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
		Community-based energy services
		Appliance standards
		Efficient server and network technology
		Improved cook stoves
		Fuel cell technologies
		Appliances
		Water purification
		Energy labeling
		Water pumping
	Buildings	Sustainable design
		Daylight harnessing
		New building design
		Insulation in buildings
		Building envelope thermal insulation
		Building materials
		Building life cycle and integrated design process
		Building standards and codes
		Greening the built environment
		Retrofitting of existing buildings
		Building automation
		Building Energy Management Systems
		Carbon sink and low-carbon building materials
		Heating - Ventilation and Air Conditioning
		Design for Deconstruction
		High performance building facades
		Passive house design
		Traditional building materials and design
		Sustainable spatial planning
		Cool roofs
		Efficient air conditioning systems
		Indirect evaporative cooling

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
	Energy storage	Compressed air energy storage
		Phase change materials for thermal energy storage
		Capacitors
		Batteries
		Pumped hydroelectric energy storage
		Flywheels
		Superconducting magnetic energy storage
		Underground thermal energy storage
Renewable energy	Solar	Solar cooking
		Solar cooling and hybrid systems with heating and hot water
		Solar towers (updraft)
		Solar water purification
		Building-integrated PV
		Solar water pumps
		Solar heating
		Solar lamps
		Solar PV
		Solar thermal power
		Solar dryer
		Energy tower (downdraft)
		Solar water heater
	Renewable energy infrastructure	Hydrogen technologies
		Off-grid systems
		Fuel cells
		Fuel cells for stationary applications
		Renewable energy resource mapping
		Grid integration for renewables
	Hydro	Run-of-river hydropower
	Ocean energy	Osmotic power
		Ocean thermal energy conversion
		Wave energy

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
		Tidal energy
	Wind	On-shore wind
		Building-integrated wind turbines
		Offshore wind
		Windwater pumping
		Small-scale wind
	Bioenergy	Biofuels from algae
		Switch from fossil fuel to biomass
		Biogas for heating
		Energy supply from waste
		Biogas power
		Biomass briquettes or pellets
		Biomass for heating
		Black liquor
		Biomass power
		Ethanol fuel
		Biodiesel
		Biodiesel from waste oil
		Charcoal production for cooking and heating
		Household biogas
		Biodiesel from waste oil
	Geothermal	Heat pumps
		Geothermal electricity
		Geothermal heating
Waste Management	Solid waste	Landfill aeration
		Gasification of waste
		Integrated solid waste management
		Landfill biocovers
		Landfill composting
		Industrial solid waste
		Municipal solid waste

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
		Landfill gas power
		Incineration of waste
		Landfill gas flaring
	Recycling	Recycling of Waste Electronic and Electrical Equipment
		Glass recycling
		Advanced paper recycling
		Product component and materials recycling
	Wastewater	Wastewater management systems
		Aerobic wastewater treatment
Forestry	Sustainable forest management	
	Mangroves conservation and rehabilitation	
	Forest management techniques for mitigation	
	Urban forestry	
	Afforestation	
	Soil carbon measurement	
	Carbon stock measurement, monitoring and verification	
	Reforestation	
	Biomass carbon measurement and monitoring	
Agriculture	Grassland management	
	Demand efficiency	Minimizing food waste
		Dietary changes
	Cropland	Crop varieties with enhanced carbon sequestration
		Nutrient management： mycorrhiza
		N2O reduction
		Cropland management
		Machinery
		Mineral fertilisers
		Irrigation

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
		Rice cultivation
		CH4 reduction
		Soil management
		Restoration of organic soils
		Restoration of degraded lands
		Organic agriculture
		Reduction of energy use in traction
		Field burning of agricultural residues
		Precision agriculture
		Conservation tillage
		Peat carbon management
		Biochar
		Landscape multifunctionality
		Cover crop technology
		Manure coverage
		Crop drying
	Wetland management	
	Soil carbon measurement	
	Carbon stock measurement, monitoring and verification	
	Improvement of Agri-food processes	
	Livestock management	Manure management
		Selective breeding via controlled mating
		Methane emission mitigation of ruminants
		Straw ammoniation and silage
		Temperature regulation for livestock
		Enteric fermentation
		Livestock disease management
		Grazing land management
		Fodder banks
		Climate tolerant livestock

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
		Domestic manure
		Pasture management
		Livestock feed optimisation
	Biomass carbon measurement and monitoring	
Industry	Mining & production	Non-ferrous metals
		Reducing air and steam leaks
		Blast furnace slag granulation
		Direct casting for iron and steel sector
		Coke dry quenching for iron and steel sector
		Inert anode technology for aluminium smelters
		Iron & steel processing
		Aluminium industry
		Scrap preheating for iron and steel
		Improved efficiency in mining and resource extraction
		Smelt reduction for iron and steel sector
		Advanced wet quenching for iron and steel sector
	Fossil fuel shift	Oil to electricity
		Oil to LPG
		Fossil fuels to natural gas
		New natural gas plant
		Fuel switch in industry Construction
		Efficient brick kiln
		Clinker replacement
		CCS from cement production
		Cement production
		Cement heat
		Glass production
	Manufacturing industry	Machinery
		Efficient supply chains
		Mitigation in the textiles and leather industry

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
		Industrial symbiosis
		Electronic control systems
		Eco-design
		Wood products
		Mitigation in the pulp and paper industry
		Electronic devices
		Bioplastics
	Conventional power plant efficiency	Power plant rehabilitation
		Stirling engine
		Natural gas combined cycle plants
		Integrated gasification combined-cycle
		Single cycle to combined cycle power generation
		Replacement of district heating boilers
		Higher efficiency oil power
		Higher efficiency steam boiler
		Waste heat recovery
		Trigeneration
		Small-scale Combined Heat and Power
		Large-scale Combined Heat and Power
	Chemicals management	N_2O reduction
		Shift to coolants and refrigerants with lower GWP
		SF6 reduction
		Adipic acid
		Biopolymer production for petrochemical sector
		CH4 reduction
		CO_2 replacement
		CO_2 recycling
		PFCs reduction
		Carbon black
		Ammonia
		Nitric acid
		NF3 reduction

CTCN Mitigation Sectors		
Sector	**Technology Group**	**Technology**
	Transport of raw fuels	Coal transport
		Biomass transport
		Liquefaction plants
		LNG and LPG carrier

CTCN Adaptation Sectors		
Sector	**Technology Group**	**Technology**
Early Warning and Environmental Assessment	Remote sensing & GIS	
	Hazard mapping	seasonal to interannual weather forecast
		Disaster risk assessment tools
		Hazard mapping solutions
		Flood hazard mapping
	Early warning systems	Early Warning Systems Communication
		Community-run early warning systems
		Climate scenario development
		Flood forecasting systems
		Landslide and mudflow warning systems
	Monitoring systems	Monitoring of invasive species
		Climate change monitoring
		Light detection and ranging
		Water resource assessment
		Ecosystem monitoring
	Improved weather forecasting & hydrometeorological networks	
Agriculture and Forestry	Terrestrial ecosystems management	Ecological corridors
		Ecological buffer zones
		Bushfire reduction and prescribed fire
		Wetland restoration and rehabilitation
		Control of sand encroachment
		Biodiversity management systems
		Forest fire control
	Agro-forestry, Silviculture & Mixed farming	Rainguard for rubber trees
		General agro-forestry - silviculture and mixed farming solutions
		Agroforestry

CTCN Adaptation Sectors		
Sector	**Technology Group**	**Technology**
	Seed, grain & food storage	Crop storage
		Ex situ conservation and seed banks
		Food banks and distribution of food surplus
	Increasing crop resilience and productivity	Sustainable fertilizers
		Terracing
		Integrated nutrient management
		Soil moisture monitoring
		Soilless agriculture
		Fodder crops
		Wind breaks
		Greenhouse crop management
		Organic agriculture
		Fertilizer management
		Fungal symbioses
		Precision agriculture
		Biochar technology
		Pest and insect control
		Biotechnology for crop adaptation
		GMO crops
		Conservation tillage
		Improved cultivation techniques
		Crop diversification and new varieties
		Aeroponic seed production
		Crop rotation
	Livestock management	Manure management
		Selective breeding via controlled mating
		Methane emission mitigation of ruminants
		Straw ammoniation and silage
		Temperature regulation for livestock
		Enteric fermentation
		Livestock disease management
		Grazing land management
		Fodder banks
		Climate tolerant livestock
		Domestic manure

CTCN Adaptation Sectors		
Sector	**Technology Group**	**Technology**
		Pasture management
		Livestock feed optimisation
	Land management training	Community-based agricultural extension
		Forest user groups
		Farmer field schools
Water	Water efficiency and demand management	Water efficiency in industry
		Leakage management in piped systems
		Water accounting
		Irrigation efficiency and information systems
		Progressive water pricing
		Water savings requirements in building codes
		Public water conservation campaigns
		Water licensing and permits
	Adaptation planning	Hazard mapping
		seasonal to interannual weather forecast
		Disaster risk assessment tools
		Hazard mapping solutions
		Flood hazard mapping
		National plan
		Technology Needs Assessment
		National Biodiversity Strategies and Action Plan
		National Adaptation Plan
		National adaptation programmes of action
		Stakeholder consultations
		Open source climate data and tools
		Climate change vulnerability assessment
		Downscaling of climate model projections
	Water augmentation (increasing capture and storage of surface run-off)	Rainwater harvesting
		Integration of green spaces in planning
		Watershed conservation
		Source water protection
	Hydropower	Multi-purpose dams
		Small hydropower
		Large hydropower
		Embedding climate variability in hydropower design

CTCN Adaptation Sectors		
Sector	**Technology Group**	**Technology**
	Water pollution	Point of use water treatment
		Korean water treatment & management
		Wastewater treatment plant
		Flood-proof sanitary latrines
		Water Safety Plans
	Riverine flood protection	River restoration
		Flow-through dam for flood control
		Artificial lowering of glacial lakes
		Re-connecting rivers with floodplains
		Disaster preparedness plans
		Accommodation for flooding
		Sandbags against flooding
		Flood proof wells
		Floodplain zoning
	Urban storm water management	Canals and drainage systems
		Runoff control structures to temporarily store rainfall
		Permeable parking lots
		Drainage gradient
		Bioswales
	Water storage	Ponds and tanks
		Natural wetlands and green infrastructure
		Water reservoirs
		Limiting land conversion & deforestation
		Designing protected areas
		Soil moisture conservation techniques
		Indigenous water storage structures
	Use of alternative water sources	Seawater desalination
		Interbasin transfers
		Solar water distillation
		Water recycling and reclamation
		Fog harvesting
	Integrated planning	Basin level planning
		Integrated Water Resources Management
		Hydrological modelling
		Groundwater extraction and monitoring

CTCN Adaptation Sectors		
Sector	**Technology Group**	**Technology**
	Limiting nutrient leakage	Riparian buffers
		Land use limitations
		Designing protected areas
		Change in land use practices
	Water allocation	Seasonal water restrictions
		Basin level modelling for water allocation
		Water reallocation
Human Health	Emergency medical services	
	Advanced IT systems in the health sector	Disease surveillance systems
		E-Health
	Public health services	Education of health personnel
		Heat wave plans and emergency response
	Vaccination programs	
	Vector-borne diseases	Rapid diagnostic tests
		Malaria protection and prevention programs
		Long-lasting insecticidal bed nets
Infrastructure an`d Urban planning	Ground surface material	Engineered cementitious composite (ECC)
		Warm-mix asphalt
	Sewerage infrastructure	
	Land use in human settlements	
	Grid resiliency	
	Building design and material	Elevated buildings
	Urban design and spatial planning	
	Building construction	
	Water supply infrastructure	
	Urban planning	Urban infrastructure development
		General planning solutions
	Building codes	
	Resilient transport systems	Resilient railway systems
		Resilient road systems
Coastal Zones	Retreat	Coastal setbacks
		Managed realignment
	Accommodation	Flood and cyclone shelters
		Flood-proofing
		Floating houses

CTCN Adaptation Sectors		
Sector	**Technology Group**	**Technology**
		Management of seagrass beds
		Floating agricultural systems
		Groundwater management
		Flood warning systems
		Coastal zoning
	Integrated coastal zone management	Sediment management
		Restoration and protection of coral reefs
		Coastal monitoring
		Ecosystem restoration and conservation plans
	Protection (hard engineering)	Storm surge barriers and closure dams
		Breakwaters
		Jetties
		Dikes
		Sea walls
		Groynes
		Geosynthetics
		Coastal infrastructure rehabilitation
		Revetments
	Protection (soft engineering)	Cliff stabilisation
		Land claim
		Beach nourishment
		Constructed wetlands
		Dune construction & stabilisation
Marine and Fisheries	Active motion-dampening systems for marine ports	
	Seaweed farming	
	Marine protected areas	
	Fisheries management	
	Artificial reefs	
	Aquaculture management	

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