

# CTCN <sup>22</sup>/<sub>23</sub>

## Progress Report

Catalysing innovation  
for system transformation



# CTCN<sup>22</sup><sub>23</sub>

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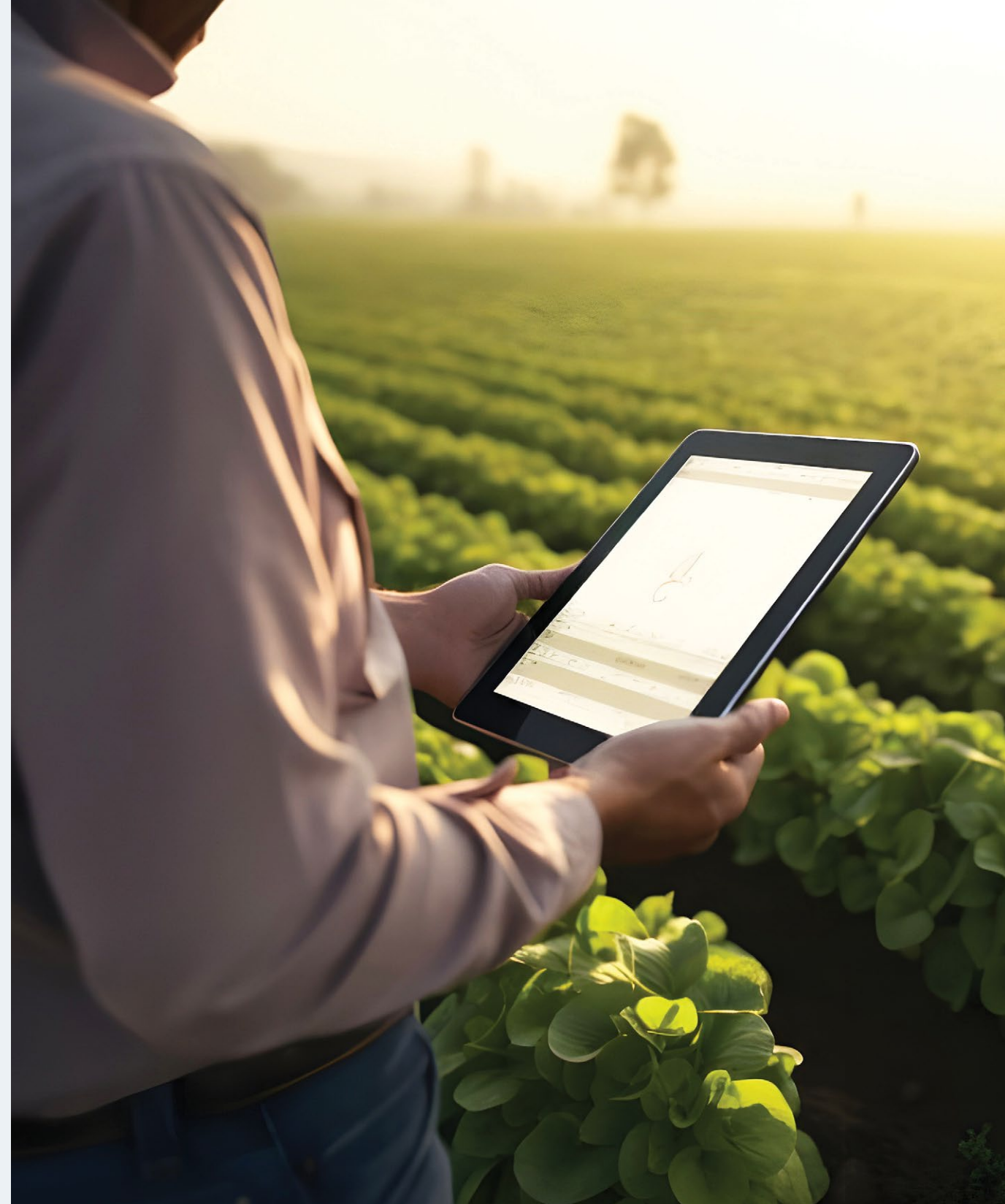
Catalysing innovation  
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# Acronyms

<b>AR6</b>	IPCC Sixth Assessment Report
<b>COP</b>	Conference of Parties
<b>CTCN</b>	Climate Technology Centre & Network
<b>EV</b>	electric vehicle
<b>GCF</b>	Green Climate Fund
<b>GEF</b>	Global Environment Facility
<b>GHG</b>	greenhouse gas
<b>GJCS</b>	Gender Just Climate Solutions
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>MV&amp;E</b>	monitoring, verification and enforcement
<b>NbS</b>	nature-based solutions
<b>NDC</b>	Nationally Determined Contribution
<b>NDEs</b>	National Designated Entities
<b>NGO</b>	non-governmental organization
<b>NSI</b>	national systems of innovation
<b>PALO</b>	Partnership and Liaison Office
<b>PV</b>	photovoltaic
<b>RD&amp;D</b>	research, development and demonstration
<b>SADC</b>	Southern African Development Community
<b>SDGs</b>	Sustainable Development Goals
<b>TEC</b>	Technical Executive Committee
<b>TERI</b>	The Energy and Resources Institute
<b>TNA</b>	Technology Needs Assessment
<b>UNEP</b>	United Nations Environment Programme
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>WEF</b>	water, energy and food
<b>WIPO</b>	World Intellectual Property Organization



# CTCN

## At a glance\*

\* Resulting from the 2022-2023 technical assistance.

# 106

developing countries served



# 169 million

anticipated beneficiaries



# 90

technical assistance completed



USD

# 287 million

anticipated funding leveraged for developing countries, 21% leverage ratio

# 34 million

expected tonnes of CO<sub>2</sub>eq reduced per year



Network members from

# 840

technology companies and institutions around the world



# Foreword by 2022–2023 CTCN Advisory Board Chairs



## In 2022–2023, CTCN went through a turning point.

In September 2022, CTCN and TEC developed their first Joint Work Programme (JWP) of the Technology Mechanism for 2023–2027. Under the JWP, CTCN is encouraging developing countries to capitalize on two key enablers of systemic change (national systems of innovation and digitalization) and five system transformation areas (water-energy-food nexus, buildings and infrastructure, sustainable mobility, energy systems, and business and industry).

This joint TEC-CTCN approach – informed by the IPCC AR6<sup>1</sup> – is already delivering instrumental knowledge such as work on technology and Nationally Determined Commitments (NDCs) to stimulate the uptake of technologies in support of NDC implementation, and advancing new initiatives such as Artificial Intelligence for Climate Action.

Through focusing on the two enablers and five system transformation areas, CTCN is devising transformative solutions for adaptation and mitigation. While CTCN remains “demand-driven”, responsive to requests from National Designated Entities (NDEs) from developing countries, this new approach builds upon the parties’ call for a more programmatic approach. It aims to channel CTCN resources more efficiently, enabling the attainment of substantial long-term impacts through targeted, short-term Technical Assistance, capacity building, matchmaking, and information sharing that generates long-term results.

With a demonstrated track record extending over almost 10 years, successfully delivering innovative technology in developing countries and building on a business model that integrates knowledge, technology proof of concepts, and catalysing actions, CTCN is now ready to support and enable greater large-scale impacts. In alignment with this goal, a major focus of the new work programme is to strengthen partnerships with the private sector and multilateral finance mechanisms.

We live in a dynamic digital age, where information and communications technology have become key economic drivers, and where there is potential for even the poorest communities to benefit from advanced technologies. CTCN is bridging that digital divide and helping developing countries maximize the power of emerging technologies to accelerate progress toward addressing climate change and achieving sustainable development. Artificial intelligence and machine learning, blockchain technology, the internet of things, cloud computing, and open data and digital platforms have the potential to accelerate global climate solutions. We are actively monitoring applications in the areas of clean energy, climate finance, carbon markets and

value chains currently being tested and implemented across sectors by various entities.

CTCN has a key role in spearheading digitalization in developing countries, championing leapfrogging solutions, and ascertaining an enabling environment for return on investment. A major new step in this direction is the Artificial Intelligence for Climate Action initiative, launched in June 2023, a joint CTCN and TEC effort.

This report further reaffirms the impact and potency of the work of CTCN as a catalyst for climate innovation, matching technical assistance in developing countries to small and medium-sized enterprises, technology providers, partners and financing institutions.

Our future depends on innovation and technology for climate action.

CTCN expertise and technical assistance is continuing to strengthen resilience of communities and systems at risk, and empowering millions of people impacted by climate change, we trust that this report makes a compelling case for the role of CTCN for climate action globally.

**Erwin Rose**  
2023 CTCN Advisory Board Chair

**Omedri Moses Jura**  
2022 CTCN Advisory Board Chair

<sup>1</sup> IPCC AR6, Working Group 3, Chapter 16 on Innovation, Technology Development and Transfer. [https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC\\_AR6\\_WGIII\\_Chapter16.pdf](https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter16.pdf)

# Director's overview 2022–2023: a paradigm shift



## 2023 was a pivotal year for the Climate Technology Centre and Network.

2023 marked the first year of implementation of the UNFCCC Technology Executive Committee (TEC) - Climate Technology Centre and Network (CTCN) Joint Work Programme (JWP) and CTCN Programme of Work (PoW) 2023–2027.

In addition, the release of the first UNFCCC Global Stocktake report (GST) and the Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC AR6), both of which underscored the urgency of addressing climate change and the role of climate technology and elevated the expectations of what the 2023–2027 JWP and PoW can accomplish, particularly when synergized with appropriate partnerships and financial support.

Meanwhile, the 2023 UNEP Emission Gap Report highlighted the devastating impacts of climate change. The deadly heat waves, droughts, wildfires, storms and floods, and global carbon dioxide emissions record highs make it clear that human-induced climate change is here, and it is already costing lives and livelihoods.

Against this backdrop, the urgency for taking system transformative climate actions has never been more pressing. Countries must accelerate innovative, sustainable and context-specific solutions to address the impacts of climate change, while developing systems and roadmaps towards long-term sustainable development.

Technology plays a pivotal role in addressing global challenges, also evidenced by the surge in requests to CTCN for Technical Assistance. In 2022–2023, over 300 Technical Assistance ideas were presented, underscoring the indispensable contribution of technology in accelerating system transformations through digitalization and national systems of innovation.

The AR6 report makes it evident that the technology and innovation required to expedite mitigation and adaptation measures are readily available. For instance, green technologies for renewable energy systems and agriculture have already been developed in many nations. However, access to such technology remains limited for developing and the least developed countries due to various factors including institutional capacity gaps, inadequate infrastructure and limited financial resources. These limitations hinder these countries from harnessing the benefits of current and ongoing technological advancements.

Despite these challenges, climate innovation and technology, from traditional and endogenous solutions to digitalization and artificial intelligence (AI) are advancing rapidly, and the both the TEC-CTCN JWP and CTCN PoW for 2023–2027 set out a framework for achieving synergies and systemic changes for climate action.

CTCN is poised to play a lead role in responding to developing countries' requests for accelerating the development and transfer of environmentally sound technologies alongside low-carbon and climate-resilient development.

In this report, readers will discover how developing countries have harnessed the power of technology to forge their own path toward a sustainable future. From 2022 to 2023, CTCN supported more than 75 countries and enhanced capacity building for climate technology development and transfer across the five systems' transformation areas:

- Water-Energy-Food Nexus
- Buildings & Infrastructure
- Sustainable Mobility
- Energy Systems
- Business & Industry

And two proven technology enablers:

- Digitalization
- National Systems of Innovation (NSI)

CTCN has unlocked resources and maximized partnerships for system transformation. In 2022, we inaugurated the Partnership and Liaison Office (PALO) in Songdo, which quickly established itself as a major asset for CTCN and its global community, catalysing and amplifying knowledge and capacity building, as well as mobilizing vital partnerships.

CTCN has established strategic partnerships with leading private and public institutions and has continued to strengthen links with the Financial Mechanism, i.e., the Global Environment Facility (GEF) and the Green Climate Fund (GCF). A good example of this is CTCN's partnership with the West African Development Bank (BOAD), the US National Renewable Energy Laboratory (NREL), the Economic Commission for Latin American and the Caribbean, PwC- India and Nigeria, HEAT GmbH, etc., which successfully delivered a number of CTCN services to the developing countries.

In 2022–2023, CTCN bolstered its Network by welcoming 177 new members, reaching a total of 840 members, of which 55 per cent are from the private sector and 15 per cent from academia including government-affiliated research centres and universities. This injection of fresh perspectives and expertise enhances the vibrancy of the Network, serving as the engine behind the Technical Assistance initiatives implemented in developing countries.

I am happy to state that this report shows more than ever the success of CTCN in serving as a catalyst for climate innovation and technology advancement, creating pathways for national strategies, aggregation of regional markets and de-risking of private and public investments, and opening opportunities for scaling up and leveraging climate finance.

In 2022–2023, CTCN achieved the full implementation of Phase 1 of the Adaptation Fund Climate Incubator and Accelerator (AFCIA 1) programme and submitted a new proposal for Phase 2. At the same time, CTCN secured resources from the European Union to support innovative solutions for 10 developing countries at risk of conflict due to climate change impacts.

In 2022–2023, CTCN was able to deliver on its mission and grow stronger also thanks to the relentless engagement of our Advisory Board members, the Network of National Designated Entities (NDEs), and members of key constituencies such as youth, women and indigenous communities, who helped us move the needle towards more inclusive and equitable climate action. At the same time, the Business and Industry NGOs (BINGO) helped strengthen relationships with the private sector and philanthropic organizations.

As 2023 draws to a close, I am aware of the challenges that lie ahead, especially when it comes to matching resources to ambitions in delivering the new Programme of Work. Yet, I am confident in the capacity of the CTCN's team and its Network to catalyse and accelerate system transformation through the implementation of climate innovation and technology transfer, serving the communities most at risk of the impacts of climate change.

**Rajiv Garg**  
CTCN Director (ad interim)

# CTCN timeline and milestones

**1992 to 2001**  
Commitments established guiding Parties to the Convention for transfer of technology to developing countries. At **COP1** (1995) and **COP4** (1998), inventories were made, needs outlined and private sector investment identified.

**May**  
1st CTCN Advisory Board Meeting.

**February**  
1st request for CTCN technical assistance received (from Chile).

**March**  
1st Network members join the Centre: REEEP, REN21 and WIPO.

**August**  
1st regional request for technical assistance submitted (from Ghana, Kenya, Mauritius, Namibia).

**April**  
1st CTCN Regional Forum held (in Thailand).

**April**  
100th technical assistance request received (from Laos).

**May**  
1st CTCN proposal to GCF Readiness Programme approved.

**June**  
Decision to allocate minimum 1% of technical assistance budget to gender is made.

**August**  
First pro-bono technical assistance (provided by NEDO-Japan to Thailand).

**July**  
CTCN completes its first 50 technical assistance cases.

Launch of CTCN first Youth Climate Innovation Labs.

Launch of the AFCIA programme.

CTCN operationalized its regional approach, to be more responsive to developing countries' climate technology needs.

**21 July 2022**  
Launch of CTCN Partnership and Liaison Office in Songdo, established in partnership with the Korean Ministry of Science and ICT and Incheon Metropolitan city.

**COP27**  
High-level launch of the first joint work programme of the Technology Mechanism for 2023-2027.

**COP27 (SBI 57)** – First periodic assessment of the effectiveness and adequacy of support provided to the Technology Mechanism in supporting the implementation of the Paris Agreement on matters relating to technology development and transfer.

1992–2001 2001–2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

**2001 to 2012**  
An Expert Group on Technology Transfer was established (**COP7**, 2001) and a Financial Mechanism requested to support technology framework implementation. At **COP13** and **COP14** (2007, 2008) an action plan focused on long-term cooperation and technology transfer.

**COP16** (2010) a Technology Mechanism consisting of a Technology Executive Committee (TEC) and CTCN were created. Terms of reference were established in 2011 at **COP17** and in 2012 (**COP18**), UN Environment and consortium partners were selected as CTCN host.

**December**  
1st training for National Designated Entities (NDEs) held in Thailand.

**COP21**  
CTCN operational launch announced.

**September**  
1st consultations for Least Developed Countries under the Incubator programme occur.

**COP21**  
Technology Framework established.

**December**  
100th Network member welcomed.

**COP22**  
welcomes increased engagement of GCF and CTCN.

**September**  
CTCN Gender Policy and Action Plan drafted.

**October**  
400th member joins the Network.

**COP23**  
Hosting agreement of CTCN by UNEP is renewed.

CTCN requested to support integration of gender considerations in Technology Needs Assessments.

First year of operationalization of the Technology Framework.

**COP26**  
Second Independent Review of the effective Implementation of CTCN.

Renewal of the MoU between the COP and UNEP for the hosting of CTCN.

**January**  
Start of the third work programme of CTCN for the period 2023 – 2027.

Conclusion of the first Global Stocktake of the Paris Agreement.

Launch of the EU climate security programme.

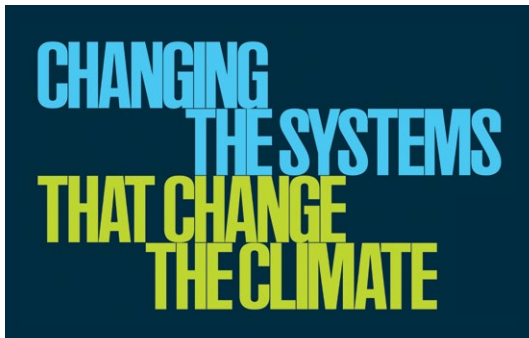
**December**  
CTCN reaches 840 members.

307 requests for technical assistance received.

106 developing countries served.

The impact of technical assistance includes an anticipated 21.1 million tonnes of CO<sub>2</sub>-equivalent per year in greenhouse gas emissions reduced or avoided.

New CTCN gender policy approved, increasing budget allocation of up to 5 per cent for gender mainstreaming activities.



## The new TEC-CTCN Joint Work Programme 2023–2027

Launched at COP 27, the new Technical Executive Committee and CTCN (TEC-CTCN) Joint Work Programme 2023–2027 aims to accelerate climate action through technology development and transfer, supporting countries to achieve the goals of the Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC), and implement national climate plans through transformative technologies.

The joint work programme brings together the long-term strategies of the TEC and CTCN and defines areas of focus for the Technology Mechanism as a whole, in order to elevate its performance and increase its impact.

The two bodies share common areas of work in addressing national systems of innovation, industry and the water-energy-food nexus.

Specific joint activities to be implemented include:

- technology roadmaps,
- gender and technology,
- technology and Nationally Determined Contributions (NDCs), and
- digitalization.



John Kerry, United States Special Presidential Envoy for Climate



Simon Stiell, UNFCCC Executive Secretary (left) with Inger Anderson, Executive Director of UNEP (centre) with John Kerry at COP 27

“The launch of this joint work programme is an important opportunity for us to step up rapidly efforts to deploy technology to address mitigation and adaptation.”

*Inger Andersen, Executive Director of UNEP*

“The UNFCCC Technology Mechanism is galvanizing action in this decisive decade through smart technology solutions for climate resilience and mitigation.”

*John Kerry, United States Special Presidential Envoy for Climate*

“Time is running out to achieve the key goals of the Paris Agreement. The rapid scaling up and effective transfer of climate technologies is imperative to limit the global average temperature rise to 1.5 degrees Celsius and to build resilience to climate change. A reinvigorated Technology Mechanism is needed to unlock appropriate climate technologies everywhere in the world, and that is what this new work programme is designed to achieve.”

*Simon Stiell, UNFCCC Executive Secretary*

“Technology transfer is crucial for the success of the global green transition. Whether it’s in energy, infrastructure, mobility or food: we need to make sure that knowledge is shared to help build up industrial capacity and support developing countries to tackle the climate crisis. The new joint programme for the UNFCCC Technology Mechanism opens up new possibilities for innovation and targeted action.”

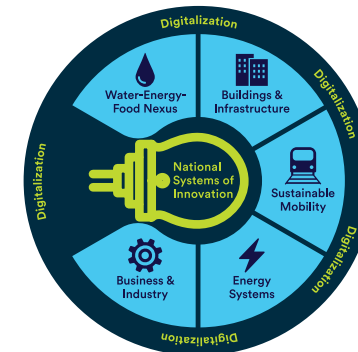
*Frans Timmermans, Executive Vice President of the European Commission*

# 1 2022–2023: Making an impact across the five system transformations and two technology enablers





New technologies and innovative adoption of existing technologies are essential to accelerate progress on mitigation and to respond to climate change impacts that are wreaking havoc on food security, infrastructure, livelihoods, health, natural systems and biodiversity, among others.

CTCN's 3rd Programme of Work 2023–2027 was launched as part of the TEC-CTCN Joint Work Programme to accelerate the deployment of transformative climate technologies that are urgently required to tackle climate change. It aims to enhance transformational impact across CTCN's core service areas through two proven technology enablers and five system transformations, serving the global imperative to rapidly accelerate the shift towards climate resilience and emissions reduction.



CTCN's new five-year strategy ensures that it remains responsive to developing countries' needs while continuing to align with the guidance from the parties to the UNFCCC and Paris Agreement. This new Programme of Work emphasizes the transformative potential of two key enablers of technology development and transfer:

-  **National Systems of Innovation**
-  **Digitalization**

Digitalization is already proving crucial for sustainable growth across every sector. The power of these advanced technologies must be harnessed to accelerate progress on resilience and mitigation, including in the poorest communities, bridging the digital divide and promoting equality. Supporting local innovation through an NSI approach, strengthening key institutions, and providing capacity building can be equally transformative, as highlighted in the IPCC's Sixth Assessment Review, 2022 (Working Group III, Chapter 16).

In this new Programme of Work, CTCN prioritizes requests from developing countries focusing on the following five system transformation areas:

-  **The Water-Energy-Food Nexus:** this is critical for all countries to conserve precious and often dwindling resources, such as water and viable soil, in the face of climate impacts, as well as to transform entire food supply chains. This is necessary to reduce emissions, build resilience, and meet climate and sustainable development goals.
-  **Buildings & Infrastructure** need to be made more resilient, but also present opportunities for increased energy efficiency and emissions reductions using new building standards, business models, nature-based solutions and digital technologies.
-  **Sustainable Mobility** has rapidly picked up speed across the globe and is increasingly essential for climate mitigation and broader quality of life and development concerns.
-  **Energy Systems** transformations remain fundamental to reducing emissions, while cities and urban systems offer substantial opportunities for decarbonization.
-  **Business & Industry** are both a major source of emissions and an essential sector for developing and implementing climate technology solutions.

## 1.1 The Water-Energy-Food Nexus

With a global population expected to reach nine billion people by 2050, approaching water, energy and food (WEF) as a nexus with complex relationships is crucial for sustainable climate strategies and solutions.

Climate change is threatening livelihoods by accelerating water scarcity and energy and food insecurity, and contributing to a set of other issues affecting health, land use, peace and security: with women, children and vulnerable communities paying the highest toll.

The WEF nexus approach integrates aspects of hydrological, biological, social and technological spheres to address the complex interactions

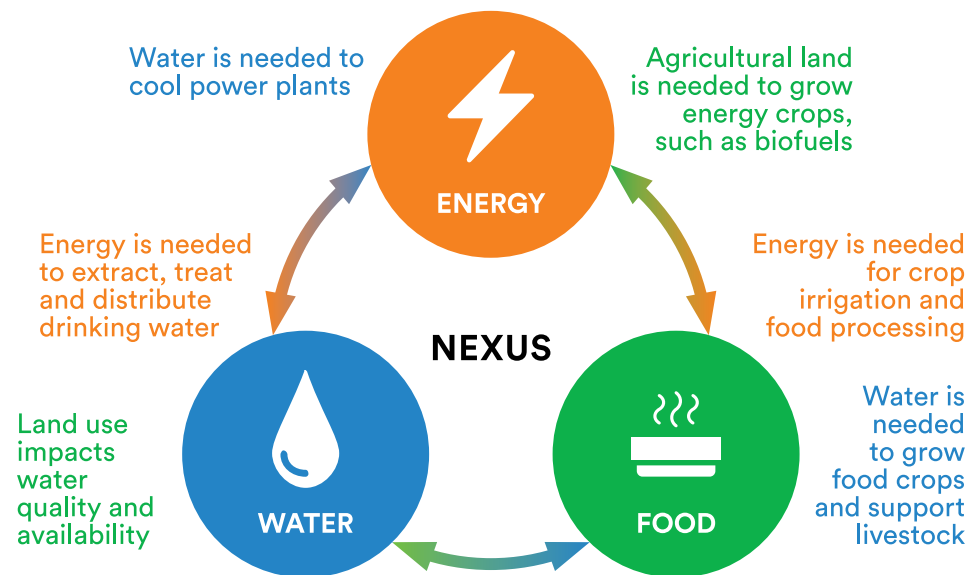
between water, energy and food production, and distribution and consumption.

The approach helps determine how these interactions are affected by policies and various other factors, and demonstrates how technology and innovation can enhance efficiency and efficacy.

**The Water-Energy-Food Nexus system transformation advances progress toward SDGs 2 and 13.**



### The water, energy and food ecosystem



## Cameroon: Developing climate-resilient dairy value chains using low-carbon technologies

Agriculture and animal husbandry are the leading sectors of the Cameroonian economy both in terms of assets and resources generated. Yet, Cameroon's production and consumption of milk per capita is the lowest in the world, and approximately 350,000 people in the nation are food insecure and are being impacted by climate change in the form of extreme weather conditions, droughts and floods.

There are an estimated 12 million livestock animals in Cameroon that produce around a total of 125,000 tons of milk. It is estimated that actual milk production represents only 45 per cent of potential production, with the country's dairy processing and distribution sector still in its infancy.

In the far north region of Cameroon, milk is one of the staple foods. However, due to a lack of conservation and processing facilities, and the generally low level of electrification in the region, large quantities of milk are wasted along the dairy value chain. In addition, to generate energy for processing and preserving milk, farmers use gasoline-powered generators that create greenhouse gas emissions.

The Ministry of Livestock, Fisheries and Animal Industries, and the Ministry of Agriculture and Rural Development reached out to CTCN to develop innovative low-carbon solutions that address the needs of the entire dairy value-chain in North Cameroon. The solutions needed to be in line with Cameroon's NDCs (2021) that commit to a 25 per cent share of renewables in energy mix (excluding hydropower) by 2035 and its National Adaptation Plan of 2021.

Working with the municipalities of Petté and Wina and the communities (including women's constituencies) engaged in farming and dairy production, CTCN identified the appropriate type of technology for dairy processing and piloted the creation of a solar-powered dairy processing facility and equipment. These are already directly benefitting the lives and business outcomes of over 150 dairy producers, processors and milk collectors. CTCN involved Avenir Femmes – a community-based women's association – in the management of the piloted technology solution. This helped to strengthen the inclusion and leadership of women in managing the milk collection facility and the cooling centre in Petté.

In Petté, the increase in the production and consumption of dairy products, and the reduction of food waste, is leading to increased income for the families working on the dairy value chain. Sustainable low-carbon solutions applied to the dairy value chain are transforming and enhancing the resilience of communities in these two municipalities where 70,000 inhabitants depend on farming and dairy production.

**“The work done on the food-energy nexus is crucial to create transformative solutions for sustainable and inclusive development. Renewable energy can secure food on our tables, and increase the resilience of communities addressing the impact of climate change and climate security.”**

*Jean Rapahel Djob, Director of Help Community, Project Proponent, Cameroon*

## 1.2 Buildings & Infrastructure

The building and construction sector accounts for almost one third of total final energy consumption. The end-use sector of direct CO<sub>2</sub> emissions is 15 per cent, and its share of emissions rises to around 30 per cent if indirect emissions from the electricity and heat used within the buildings are included. The sector has been moving at two speeds. One is the speed of energy needs that have steadily been on the rise, driven by the growing energy access in developing countries and by the increasing demand for air conditioning and energy-consuming appliances. The other speed is that of energy efficiency and emissions reduction that has progressed at a much slower pace, with two thirds of countries still lacking mandatory building energy standards. This is important, as most new construction is slated to occur in countries without or with low energy standards.

Climate technology and innovation, including for newly built infrastructure and buildings, retrofitting and the redesign of existing infrastructure, combined with nature-based solutions and grey infrastructure, has a key role in strengthening communities' resilience while helping boost energy efficiency and emissions reduction within the building and construction sector. Smart solutions can ensure buildings and infrastructure are adapted for climate change and greater resilience and safety of the people using them.

**The Buildings & Infrastructure system transformation advances progress toward SDGs 11, 12 and 13.**



### Zimbabwe: Developing green building standards to improve energy use in residential buildings, office buildings and commercial complexes

The energy sector is currently the second biggest contributor to total greenhouse gas (GHG) emissions in Zimbabwe, accounting for 33 per cent of emissions in 2017. The built environment, including residential, office and commercial buildings, is a major source of GHG emissions, with electricity and heat generation contributing 47 per cent of the energy sector's GHG emissions in 2015. In addition, the lack of mandatory building standards and the increase in urbanization have led to the development across the nation of infrastructure that is not environmentally responsible or sustainable.

In response to the urgent need to evaluate domestic buildings and infrastructure, CTCN is assisting the Government of Zimbabwe in the development of **Green Building Standards**. This includes policy guidelines and a Monitoring, Verification and Enforcement (MV&E) Framework to **reduce the energy use in existing residential buildings, office buildings and commercial complexes**, and to improve the environmental and economic performance of new buildings. The energy efficiency assessment looks at the building envelope roofing, comfort system and controls, lighting and controls, and rooftop solar photovoltaic (PV) potential. Building on the MV&E Framework, a training the trainers programme has been developed and conducted in order to build the capacities of qualified energy auditors in the sector.

**The Technical Assistance is aligned with Zimbabwe's 2021 NDCs**, which are aimed at energy efficiency improvements, in particular energy efficiency at a commercial and domestic level, as key mitigating measures. The adoption and operationalization of Green Building Standards for Zimbabwe will contribute to its NDC targets by significantly reducing energy consumption and GHG emissions in the buildings sector.

**“The planned Green Building Standards can trigger a system transformation in the building sector jointly led by the public and the private sector with positive spillover effects on various other areas, including energy systems and urban planning.”**

*Munasho E.S. Mukonoweshuro, Climate Change Scientist, Climate Change Management Department, Ministry of Environment, Water and Climate, NDE Zimbabwe*

## 1.3 Sustainable Mobility

In 2021, CO<sub>2</sub> emissions from the transport sector accounted for 36 per cent of the total, with an annual increase of 8 per cent, to nearly 7.7 Gt CO<sub>2</sub>. Reducing GHG emissions and transiting towards net-zero mobility is essential to combat climate change, representing not only a significant challenge but also a great opportunity for a comprehensive innovation-driven transformation throughout the entire value chain and in policy and research and development.

In recent years, electric car markets have seen exponential growth boosted by strong regulations, fiscal incentives, and investment in zero and low-carbon vehicle operations. But countries need stronger innovation capacities to deploy cutting-edge technologies, including battery, electric and fuel cell electric vehicles, and alternative fuels. Digital technologies can bring additional services to transform the sector by making car sharing, battery charging and smart monitoring services available to users.

CTCN enables transformational change in systems by supporting sustainable mobility including:

- Mobility regulations development
- Deployment of low-emissions vehicles
- Improvement in vehicle fuel economy
- Use of digital technologies to enhance intelligent urban transport systems.

Investing in innovative solutions unlocks economic opportunities. As countries transition to low-carbon transport systems, new markets for electric vehicles, renewable fuels and smart mobility services emerge.

**The Sustainable Mobility system transformation advances progress toward SDGs 3, 5, 7 and 13.**



## Papua New Guinea: National policy for deploying and scaling up e-mobility and sustainable infrastructure

It is expected that with increasing urbanization and the expansion of Papua New Guinea's state road network planned to increase from 8,460 km to 25,000 km by 2035, the use of land transport will increase substantially. This will result in an increased number of vehicles on roads from approximately 155,000 in 2005 to more than 600,000 by 2030. It is also estimated that the demand for transportation fuel, which is fossil fuel-based in Papua New Guinea, could increase by a factor of three or four, resulting in emissions increasing from 1.6–2.4 to 3.3–4.5 Mt CO<sub>2e</sub> by 2030.

The rapid development of electric and hybrid vehicle technology at the global level offers an opportunity for Papua New Guinea to deploy electric vehicles, which could result in a substantial drop in oil consumption and offer a reduction of 22 per cent in emissions in 2035.

To accelerate the transition to e-mobility, identified as a priority area in Papua New Guinea's enhanced NDC (2020) and adaptation targets, CTCN took a whole-of-system approach in addressing e-mobility, first conducting a market analysis, and then supporting the draft of a policy and implementation roadmap to introduce low-carbon transport through e-vehicles. Building on actions identified in the roadmap, CTCN conducted a feasibility study of electrified bus rapid transit systems in urban centres and climate-resilient supporting infrastructure to support readiness to access financing.

To respond to some of the findings identified by the research, an analysis was carried out by CTCN of what factors are hindering the uptake of electric mobility in Papua New Guinea. From this information, CTCN worked with national stakeholders to:

- Improve the framework conditions for policies and actions to adopt and scale up e-mobility services.
- Enhance capacity within the government to promote the uptake of electric vehicles (EVs) by adapting existing policies and regulations, implementing the national EV policy, submitting a funding proposal to GCF, and planning an EV trial.
- Increase awareness of the need for the transition.

Anticipated annual GHG emission reductions from CTCN Technical Assistance (resulting from the shift from ICE to EV) range from 659,852 tCO<sub>2e</sub> (Net Zero Scenario) and 868,282 (Net Zero b Scenario) for the period 2024-2050, with estimated totals ranging from 17,815,118 tCO<sub>2e</sub> to 23,443,611 tCO<sub>2e</sub> in that period. The GHG assessment conducted is restricted to the estimated emissions from vehicles on the road; it does not take into account emissions from manufacturing processes, imports, etc. of vehicles.

The project adopted a gender-responsive approach to e-mobility, aiming to advance gender equality by accelerating the provision of accessible, affordable, reliable and safe public transport, with a spill-over effect on greater autonomy as well as new jobs and economic opportunities for women.

## 1.4 Energy Systems

Energy systems are the largest source of CO<sub>2</sub> emissions globally, and achieving net zero will require a paradigm shift in energy production, conversion and use. But these systems are complex, entailing both physical infrastructure and equipment (supply), and societal elements (demand). Energy systems are linked across all economic sectors, and are controlled by laws, regulations, exemptions and subsidies.

Therefore, any ongoing technology innovation must develop and integrate rapidly, and create transformation through system-wide transitions

across entire value chains. This is where CTCN can bring its expertise. Recognizing the complexity and urgency of energy system transformation, CTCN offers support to developing countries to build resilient and clean energy as one of its core priorities of 2023–2027 Programme of Work.

### The Energy Systems transformation advances progress toward SDGs 5, 7 and 13.



## The Southern African Development Community: National framework for leapfrogging to energy efficient appliances and equipment (refrigerators and distribution transformers) through regulatory and financing mechanism

As electricity infrastructure is expanding and households are increasingly using electric appliances and electrification, reliability of energy supply is high on the agenda of all countries in the Southern African Development Community (SADC).

Low efficiency electrical appliances and equipment result in huge losses, impacting national budgets and hampering a countries electrification potential. The lack of information, awareness, and dedicated policies for energy efficient products and appliances including the lack of minimum energy performance standards prevents SADC countries from moving toward a sustainable market transformation in favour of higher efficiency products.

For example, the average lifetime of a refrigerator is 10 years. Distribution transformers (DTs) have a typical lifetime of 40 years and are typically responsible for 30 per cent of distribution losses. With the government plans to increase electricity access, adopting higher efficiency refrigerators and DTs is crucial to leapfrog to energy efficient appliances.

CTCN prepared parallel readiness projects in Botswana, Eswatini, Lesotho, Malawi, Namibia, Zambia and Zimbabwe to create an enabling regulatory and financial environment to transition to energy efficient refrigerators and distribution transformers. The seven national readiness projects have set the regulatory and financial framework for phasing out inefficient domestic appliances and leapfrogging to energy efficient domestic refrigerators and distribution transformers.

For this purpose, Minimum Energy Performance Standards (MEPS) and labelling schemes, as well as financing mechanisms, were developed to facilitate the transition to energy efficiency, aiming to reduce strain on electricity grids and extend the electricity grid, increase disposable income for households by reducing electricity bills, and potentially reduce GHG emissions.

Several countries have since already progressed with the adoption of MEPS.

## 1.5 Business & Industry

In 2019, industry accounted for 24 per cent of global GHG emissions, as manufacturing processes, such as the cement and steel industries, are extremely energy and emissions intensive. Business and industry are threatened by climate change with increasingly extreme weather events damaging critical infrastructure for manufacturing and logistics. Climate action in the industrial sector is required to reduce its carbon footprint and in parallel increase climate resilience of businesses and industries.

With an increasing portfolio of low-carbon and cost-competitive technology alternatives, there is a valid business case for climate action, for big businesses and industries, small and medium enterprises (SMEs), and large corporations,

which can:

- Stimulate economic growth by boosting human capital, including healthier lifestyles and better education
- Enhance natural capital, increasing valuation through ecosystem services
- Boost technological change
- Increase productivity and efficiency with the result of getting more with less

**Business & Industry transformation advances progress toward SDGs 2 and 13.**



## Mongolia: Designing climate-resilient and sustainable farming solutions for rural communities

A major part of Mongolia's land is degraded through overgrazing, deforestation and climate change. Climate change is having significant impacts on Mongolia's grassland ecosystems and livestock farming which consequently threatens the food security of the country.

In the entire value chain of the livestock sector, nomadic livestock herders are most vulnerable as they are directly facing the adverse impacts of climate change on the animals, pasture lands and of the ensuing scarcity of water and grazing for animals. Due to loss of the livestock to erratic weather events and climate disasters (e.g., dzud), the herders are increasing the livestock headcount, in turn leading to an overgrazing of pastures. The pastures are lacking in nutrition, challenging the health and weight gain of the animals.

To respond to the downward spiral of ecosystem degradation, increasingly threatening livelihoods and food security, CTCN worked with national and local communities to identify adaptation solutions for pastoral livestock breeding to:

- Increase productivity and flock structure in line with grazing capacity
- Reduce grazing and land deterioration, and increase the rehabilitation of pastures
- Support businesses and economics of herders and herder groups, and small- and medium-sized farms
- Provide modern techniques, technologies and electricity
- Create a financial, economic and legal environment for sustainable production

The analysis undertaken by CTCN looked at both:

- Mitigation solutions such as grassland management, soil carbon measurement, carbon stock measurement, monitoring and verification, improvement of agri-food processes, livestock management and manure management.
- Adaptation solutions such as terrestrial ecosystems management, biodiversity management systems, increasing crop resilience and productivity (fodder crops, crop diversification and new varieties and crop rotation), livestock management (pasture, grazing land management, fodder banks, livestock feed optimization, straw ammonization and silage, livestock disease management and selective breeding via controlled mating).

The solutions were successfully piloted in the Bayantümen Soum herding community, paving the way to possible scale up among other Mongolian herding communities.

A comprehensive gender assessment was conducted to leverage women's roles to mitigate and adapt to climate risks, protect natural resources, and safeguard livelihoods. The assessment included the potential impact on women's employment in slaughterhouses and feedlots, income and resilience against climate disasters.

A total of 113,000 tCO<sub>2</sub>e are expected to be reduced annually in the Bayantümen Soum if the identified livestock population measures are taken, such as restructuring cattle herds and sheep flocks and preventing further increases in the populations of other livestock types. This will benefit and increase the resilience of a total of 11,017 people, including 2,840 residents of Bayantümen Soum through the new strategies available and 4,000 consumers of a meat processing plant if it is built. This is in addition to the almost 300 trained members of the community and local institutions.

Multiple other positive impacts are expected from this project, including:

- Increased resilient low-carbon infrastructure with the operation of a climate change resilient meat processing facility in Bayantümen Soum, which incorporates renewable energy and energy efficiency features providing energy savings from efficient technologies that range up to 50 per cent.
- Increased ecosystem resilience to climate-induced disturbances and improved recovery rates through the adoption of improved pasture management methods and decreased herd size to match carrying capacity.
- Increased economic resilience through value-added meat production and wage employment.
- Increased health and wellbeing of Bayantümen Soum households, with expected 1,000 urban householders (approximately 4,000 people) consuming the output of the slaughterhouse, benefiting from higher quality meat processed in safe conditions, thus improving their food security.

Building on the results of the Technical Assistance provided by CTCN, the government accessed USD 7.5 million to scale up action to improve resilience of livestock farming in Mongolia, with the support of the Government of Canada.

## 1.6 National Systems of Innovation

Countries' capabilities to drive and enable climate technology innovation are crucial for climate mitigation and adaptation, and for inclusive sustainable development. These capabilities<sup>2</sup> are determined in part by the effectiveness of a nation's national system of innovation (NSI), consisting of:

- Organizations participating in technology development and transfer, e.g., technology firms, universities and finance institutions.
- Institutional context, such as norms, laws, incentives (or lack thereof) and cultural practices that stimulate or hinder actors' green innovation efforts, e.g., government policies that affect how the private sector invests in a particular sector.

- A Network of interactions and relations between the actors and the institutional context, e.g., flows of information and knowledge, and collaboration between firms, universities and research institutions.

**National Systems of Innovation enable progress toward SDGs 1, 2, 3, 5, 6, 7, 9, 13, 15 and 17.**



<sup>2</sup> Defined as "a Network of actors, institutional contexts and linkages that underlie national technological change".

## Chile and Cameroon: Advancing NDC implementation through Technology Needs Assessments and Technology Action Plans

### Chile

Chile is leveraging the new Technology Needs Assessment (TNA) and a Technology Action Plan (TAP) developed with the assistance of CTCN to advance the implementation of climate technologies in the area of adaptation and mitigation in the country and to strengthen the fulfilment of the technology component of the country's NDC.

The TNA looks at low-carbon technologies that can drive Chile's economic growth, particularly in the forestry, agriculture, water, energy and waste sectors, as prioritized in its NDC (2015).

Based on the TNA, Chile accelerated adoption of technologies for climate change mitigation and adaptation leading to a reduction in national GHG emissions and an enhanced resilience of its population to climate change. These prioritized technologies included:

- **Energy:** Battery-based storage, bus rapid transit system and green hydrogen as fuel for heavy-duty vehicles.
- **Waste:** Biological treatment of municipal organic waste using black soldier fly larvae, community-based vermicomposting of municipal organic wastes, anaerobic digestion for biogas, and electricity production from microturbines.
- **Drinking water:** Machine learning for detecting and locating leaks in water distribution Networks, rainwater harvesting, treatment and storage, and reuse of grey water.
- **Silvoagropecuaria (forestry, livestock and farming development):** Early warning system, machine learning and artificial intelligence, and intelligent irrigation system.

Chile's TNA has enabled the development and submission of technology concept notes and project proposals for private and/or public sector funding to implement the technology prioritized in the TAP. Some examples are currently under discussion. This includes concepts notes on improvements in the distribution system of the energy sector, with more participation of renewable energy, community vermicomposting in Ñuble, and an intelligent irrigation system for fruit farming.

### Cameroon

In Cameroon, both the Action Plan of the National Policy for Adaptation to Climate Change and NDC prioritize adaptation and mitigation actions in specific socioeconomic sectors. CTCN Technical Assistance focused on strengthening the country's capacity to stimulate a consultative approach in the TNA preparation, enabling effective coordination to devise strategies for long-term, participatory transformational measures across priority sectors – including agriculture and energy – that will drive climate resilience and low carbon growth.

As an outcome of the TNA, a concept note on agroforestry was developed, which covered identifying and prioritizing technologies in various sectors:

- **Agricultural sector:** 19 technologies were identified and 3 were prioritized: conservation agriculture, early warning systems and climate change monitoring.
- **Forestry sector:** 6 technologies were identified and 3 were prioritized: reforestation, agroforestry and forest monitoring.

- **Transport sector:** 11 technologies were identified and 3 were prioritized: bus rapid transit, rail rapid transit and modal freight transport.
- **Energy sector:** 11 technologies were identified and 3 were prioritized: solar energy, hydropower and energy-efficient cooking stoves

To strengthen inclusion and ownership, the process involved and engaged with a series of stakeholders including ministries, national institutes, syndicates, financing institutions, civil society organizations, universities and national institutions, as well as the private sector.

Technology transfer in these sectors will play a part in reducing the vulnerability of the population through increased resilience to climate change and steer the country towards a low carbon development path.

**“Thanks to the progress made through the Technology Needs Assessment (TNA) and Technology Action Plan (TAP), we are in a position to assess the best low-carbon technologies to drive Chile's economic growth.”**

*Ximena Ruz, Agency of Sustainability and Climate Change, NDE Chile*



## 1.7 Digitalization

Digital technologies have the potential to mitigate and help adapt to climate change, playing an increasingly significant role in every sector, from energy generation, distribution and consumption, to transport and agriculture, where digitalization is becoming essential to the transition to smart and climate resilient practices.

CTCN recognizes digitalization as a key enabler for climate action, facilitating the deployment of innovative and sustainable digital technologies across all sectors to support climate action in developing countries. Digitalization is needed from initial design through to the financing of climate action.

### Digitization enables progress toward SDGs 1, 2, 3, 5, 6, 7, 9, 13, 15 and 17.



### Saint Kitts and Nevis: Drought risk modelling for climate change adaptation

The small island developing state of Saint Kitts and Nevis is already experiencing some of the effects of climate variability and change. These effects include damage caused by an increase in average atmospheric temperature, a reduction in average annual rainfall, and the potential for an increase in the intensity of tropical storms.

According to data from the national Meteorological Service, Saint Kitts and Nevis is currently experiencing the driest rainy season on record. In August, the average rainfall of 741.8, dropped to 594.1 in 2022, and further decreased to 472.1 in August 2023.

Given that rainfall is the sole source of water in St. Kitts and Nevis, and with water demand expected to double in the next ten years due to tourism and agriculture, securing access to both a sustainable water system and a drought prevention system is crucial for the livelihoods of the island communities.

To develop a long-term strategy to address climate change impacts, Saint Kitts and Nevis partnered with CTCN to incorporate drought risk modelling as a planning tool for climate change adaptation measures.

The system looks at the entire **water ecosystem**, combining and analysing several datasets and technologies, which feed into a drought forecasting tool which supports climate change adaptation measures and decision-making. Together with a committed stakeholder working group, the Technical Assistance team generated:

- **Hazard mapping solutions:** Development of maps that highlight areas that are affected by or are vulnerable to drought.

- **Water resource assessment:** Determination of the current status and future trends in both water resources and water supply services, with a particular focus on issues relating to availability and demand.
- **Open-source climate data and tools:** Use of freely available satellite data, hydrological models and seasonal weather forecasts.
- **Hydrological modelling:** Simplification of a real-world system that aids in understanding, predicting and managing water resources.
- **Early warning systems communication:** Integrated system of drought monitoring, forecasting and communication that enables government stakeholders to take timely action to reduce drought risks.

These activities fed into:

- [A drought risk and water resources assessment](#) in Saint Kitts and Nevis<sup>3</sup>
- [Benchmarking, design and implementation of a drought forecasting system](#)<sup>4</sup>
- Training in Saint Kitts and Nevis for administrators and users of the drought prediction model

In addition, the project identified areas and vulnerable groups, including smallholder farmers, and the tourism sector, which are most susceptible to water supply shortages. Women and youth were also actively engaged in the implementation phase through training and stakeholder consultations.

The comprehensive drought forecasting system: How does it work?

The comprehensive drought forecasting system created through CTCN's Technical Assistance combines data from Earth Observations (EO) satellite imagery, land surface model simulations, weather and climate forecasting, hydrological data, and hydrological modelling. Climate forecasts, ranging from monthly to seasonal timescales, are used to drive a hydrological model. The outputs, combined with EO datasets, are translated into indicators of water stress, including commonly used drought indicators such as the Standardized Precipitation Index. The system generates monthly forecasts of water stress while calibrating results against historical data.

Data and patterns are analysed to produce a reliable forecast and risk map, which feeds into a visualization tool to assist stakeholders in making data-informed decisions. The model also serves as an alert system for emergencies and the activation of contingency plans. By providing timely information in advance of, or during the early onset of a drought, action can be taken to reduce potential impacts and increase resilience in the water sector of Saint Kitts and Nevis.

**“Thanks to the support of CTCN, we are now moving towards a comprehensive national plan for water management. This plan integrates all available hydrological and meteorological data, monitors consumption, and raises awareness of available tools and practices for water storage and reduction of consumption, both for farming and households. By securing water, we are building resilience and securing a future for the people of these islands.”**

*Cheryl Jeffers, Ministry of Environment, Climate Action, and Constituency Empowerment in Saint Kitts and Nevis*

<sup>3</sup> <https://www.ctc-n.org/content/22-assessment-water-resources-skn>.

<sup>4</sup> <https://www.ctc-n.org/content/31-benchmarking-drought-prediction-models>

## Cambodia: Mainstreaming climate risk assessment and local climate information system for data-informed decision making in climate change adaptation

Cambodia is recognized as a country particularly vulnerable to natural hazards, ranking 16th at most risk globally. Due to limited adaptive capacity, poor infrastructure, and substantial reliance on the use of natural resources, the country is particularly vulnerable to the impacts of climate change. The impact of climate change on its economy is expected to increase – with a projected reduction of the country’s annual average GDP growth to 6.6 per cent and absolute GDP by 2.5 per cent in 2030, and up to 9.8 per cent in 2050 – impacting the country’s population, especially those who live in more vulnerable rural areas.

Surveys conducted by the Department of Climate Change indicate that policymakers, planners and other practitioners working at the sectoral national and sub-national levels often lack the information and knowledge they need to effectively assess climate-induced vulnerabilities, and plan, monitor and evaluate actions that can help increase resilience of their communities.

To support data-informed decision-making in defining climate change adaptation plans and actions in Cambodia, CTCN supported the development of a local climate information system for climate change adaptation (LISA), which is an intuitive and user-friendly web-based data visualization platform that enables users to explore future climate scenarios and to gain an appreciation of potential impacts and adaptation options for future climate resilient planning. CTCN helped in testing LISA for the municipality of Batabang.

Leveraging climate risk assessments and combining future climate change scenarios derived from climate models and findings from the climate change risk analyses, LISA serves the needs of relevant policymakers, planners and other practitioners working at national and sub-national levels.

The enhanced accessibility to information and reliability of the risk-related data leads to:

- Improved awareness of local government stakeholders to climate change impacts and adaptation.
- Evidence-based decision-making at the local level improved through access to climate and data information that is integrated into the LISA platform.

With more than half of Cambodian women dependent on local natural resources for their livelihoods, and hence being more vulnerable to the impacts of climate change, the importance of accessing climate risk information and data.

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**Thanks to the data coming from the web-based local climate information system we are now moving towards risk-informed decision making and the mainstreaming of climate change into policy making and planning. This will have a tremendous impact on livelihoods, local economy, and overall resilience of our communities.**

*Dr. Hak Mao, Director of the Department of Climate Change, General Secretariat of the National Council for Sustainable Development, NDE Cambodia*

## Uganda: Defining the vulnerability index and national-level indicators for measuring resilience

Uganda is highly sensitive to climate variability and change and is already experiencing negative impacts through increased frequency and intensity of climate related disasters such as droughts, floods, and landslides. Climate change continues to threaten Uganda’s development and economic growth aspirations with severe negative impact across all sectors, including agriculture with climate-induced yield losses for key export earnings, such as coffee, cotton, tea; disruption in the energy and mineral development sector and infrastructure (buildings and transport); and impacts on the population’s health and quality of life.<sup>5</sup>

In this context, understanding regional climate change impacts and assessing vulnerabilities across different sectors is crucial to effectively prepare for future risks imposed by climate change. Such an assessment enables practitioners and decision-makers to identify the most vulnerable areas, sectors and social groups, and develop targeted interventions to mitigate the risk. This is instrumental for the implementation of Uganda’s National Climate Change Policy (2015), which is aimed at ensuring national development is climate change resilient.

CTCN in collaboration with UNEP-CCC assisted the Government of Uganda to design national climate vulnerability index and national level indicators to monitor climate action under NDC implementation and enhance the country’s capacity to assess national climate adaptation efforts and resilience in selected sectors.

In addition, an interactive risk management map was designed for tracking adaptation efforts and resilience in selected sectors exposed to 4 types of hazards to operationalize the national vulnerability assessment.

The digital map prototype was successfully tested in 2022, and a follow-up project entitled “Verifying Uganda’s climate vulnerabilities indicators” was implemented in 2023 to verify the proposed national vulnerability indicators initially developed. Uganda is currently exploring opportunities for additional funding sources to support data collection, integrate of data into the prototype digital map and deliver of capacity-building trainings on the use of the map.

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**“Our communities, especially those relying on farming and agriculture are already bearing the brunt of climate change. It is not a matter of if but rather how climate change is going to affect Uganda development. With these tools, including the national climate vulnerability index and national level indicators, we are monitoring efforts and efficacy in building climate resilience ensuring no one is left behind.”**

*Machulu Onduri, CTCN Vice-Chair, Uganda. Knowledge brief, Harnessing Technology in the Circular Economy for Climate Action in Africa*

<sup>5</sup> Economic Assessment of Impacts of Climate Change in Uganda, report

# 2 Accelerating progress for innovative climate action



## 2.1 Adaptation Fund Climate Innovation Accelerator

Launched in November 2020, the first edition of the Adaptation Fund Climate Innovation Accelerator (AFCIA) programme aimed to foster innovation in climate change adaptation in developing countries. It began as a USD 10 million small-grant aggregator programme implemented by the United Nations Development Programme (UNDP) and UNEP working in conjunction with CTCN.

AFCIA targeted a broad range of potential finance recipients, including governments, non-governmental organizations, community groups, entrepreneurs and young innovators to encourage and accelerate innovations and new adaptation practices, tools and technologies, as well as generate evidence of effective, efficient adaptation practices, products and technologies and assess potential scaling up of successful prototypes.

Under this programme, which addresses the economic, institutional and technological barriers that developing countries face in the transfer and acceleration of climate technologies, CTCN implemented 25 projects and developed two concept notes to scale up successful initiatives.

AFCIA supported:

- **Fifteen adaptation technology innovations**, including a flood early warning system in Mali; a radio internet system in Nigeria; the use of mobile phone technologies as a solution to comprehensively collect and digitize water,

weather and climate observations in Malawi; an early warning system for forest fires in Georgia; and a blueprint for action for the uptake of rainwater harvesting systems in Pakistan.

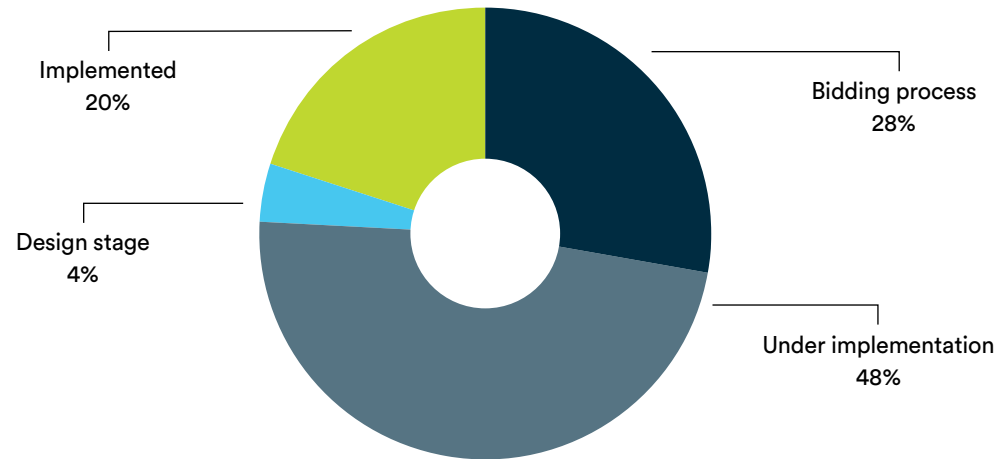
- **Ten Technical Assurances** to enable environments for technology innovations, such as early warning systems, solar-powered irrigation systems, blockchain and flood barriers, to a broad range of audiences and stakeholders from governmental entities (through CTCN's focal points for example), to youth and gender associations, vulnerable people, academia, centres of research and NGOs.

The programme has provided the means to distil the innovations with the greatest potential for transformational impact based on the specific innovation ecosystem in each recipient country. A new proposal for a second phase – AFCIA II – has been submitted, and is currently under review.

The new proposal builds on the success and lessons learned from the first edition and targets 40 innovative, transformative and locally-led climate adaptation technologies to:

- **Strengthen resilience** and adaptive capacity to climate-related hazards and natural disasters in all countries.
- **Integrate climate change** measures into national policies, strategies and planning.
- **Improve education**, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

## AFCIA projects: Implementation stage\*



\* Implementation stage as of November 2023.



## 2.2 Climate change and security: Innovative community-based climate technology for communities at risks of conflict due to climate impact

In 2020, out of the 20 countries most vulnerable and least prepared to adapt to climate change, 12 were in conflict. Data shows that some of the most climate-vulnerable countries host United Nations field missions, with the majority of United Nations peace operations deployed in contexts that are both highly climate exposed and characterized by high levels of gender inequality.

Climate change has become a multidimensional issue with far-reaching implications. Growing evidence suggests that climate change and environmental degradation act as catalysts, drivers, and multipliers of instability, exacerbating already volatile food prices, insecure livelihoods and large-scale displacement.

According to UNEP, by 2050, over 143 million people in sub-Saharan Africa, South Asia and Latin America will have become internal migrants. A major cause of that will be the various climatic impacts, with people leaving less viable areas with higher water scarcity and lower crop productivity, as well as areas affected by rising sea levels and storm surges.

Women, youth and marginalized groups – representing 80 per cent of those displaced by climate change – face increased vulnerability from environmental stresses that lead to intensified competition for scarce natural resources, and potentially lead to migration, instability and conflict.

In 2022, the European Union entrusted CTCN with the Climate Technology for Communities at Risks of Climate-Induced Conflicts programme, which has a budget of EUR 3 million, to develop innovative conflict-sensitive, field-focused, reliable, cost-effective climate technologies solutions that provide Technical Assistance to 10 conflict-prone countries.

Among the first countries requesting assistance in addressing the security impact of climate change are:

- **Burkina Faso:** Reinforcement of the implementation of actions to mitigate and adapt to climate change by developing solar energy systems for off-grid agro-industrial facilities through the establishment of a Community Solar Platform.
- **The Central African Republic:** Production of affordable solar cookers for the commune of Bangui which is at risk of deforestation.
- **Chad:** Rehabilitation of wells in the commune of Liwa using solar-powered pumps.
- **Mali:** Pilot project for the sustainable management of wood resources through the promotion of solar cookers and solar energy for the operation of electric cookers in a context of climate change.
- **Haiti:** Organic waste management project using inflatable tanks and targeting women and young people.

# 3 Distilling knowledge, amplifying capacity building



## 3.1 Enhancing the capacity of national designated entities

In May 2023, CTCN introduced a global programme for capacity building, Network engagement and collaborative research, development and demonstration (RD&D) facilitation, reflecting the actions and ambitions of CTCN's 3rd Programme of Work. The programme consists of eight global modules designed to offer capacity-building programmes more systematically across the five system transformations areas and two enablers. It offers one master programme for each activity area, two joint programmes for Network engagement and collaborative RD&D, and three mega programmes to cover all activities of capacity building, Network engagement and collaborative RD&D.

These modules are the CTCN's response to the need for continuous capacity building of NDEs to strengthen the ideation of TA projects and enhance the endogenous capacity, and global, regional and national collaboration on innovative climate technology transfer of the countries.

## 3.2 Workshops on fostering innovation in water and digital agriculture sectors

In 2022, CTCN offered two in-person training programmes on fostering innovation in water and digital agriculture sectors for 45 NDEs. Reflecting the systems transformation approach, the training integrated lectures and presentations on innovative water and agriculture technologies, policies and available finances with two field visits showcasing innovative technologies that transformed water and agriculture sectors in the Republic of Korea.

Peer-to-peer learning activities, case studies and round-table discussions on perceived climate technology development and transfer challenges and opportunities complemented the training. CTCN facilitated participatory workshops on designing multi-country TA projects among countries with similar water and agriculture technology innovation demands were facilitated. This helped to identify types of climate finance schemes NDEs prefer for scaling up multi-country TA projects for partnerships and collaboration opportunities.



Global Thematic capacity building programme: Innovation in water sector, September 2022, Songdo, Republic of Korea



Global thematic capacity building programme: Digitalization in the agriculture sector, December 2022, Siheung, Republic of Korea



Participatory workshops on designing multi-country TA projects, September 2022, Songdo, Republic of Korea

### 3.3 Embracing SF<sub>6</sub>-free technologies: Paving the way to net-zero energy systems

In 2023, CTCN and NDE of Germany, together with the German Ministry of Economic Affairs and Climate Action (BMWK), hosted a three-day learning exchange entitled [Technologies for Decarbonization of Electrical Transmission and Distribution Grids through F-gas Regulations](#)

and Policies. About 40 participants, including stakeholders from energy ministries and utilities from 11 countries (Chile, Mexico, Ghana, Kenya, Uganda, Egypt, Lebanon, Thailand, Timor-Leste, Viet Nam and Senegal), as well as representatives from technology providers, environmental and financial institutions, gathered to discuss the harmful climate impacts of sulfur hexafluoride (SF<sub>6</sub>), accurate reporting of SF<sub>6</sub> usage reporting and enhancing understanding of available SF<sub>6</sub>-free technologies in the market.





*Technologies for Decarbonization of Electrical Transmission and Distribution Grids through F-gas Regulations and Policies Learning Programme, July 2023, Berlin, Germany*

The event aimed to bridge the knowledge divide and empower stakeholders to make informed decisions regarding their energy system value chain. The participants highlighted “significant deficiencies” in addressing SF<sub>6</sub> in their respective countries and expressed concerns about the lack of awareness, environmental impact, GHG inventory reporting obligations, and the urgency to integrate SF<sub>6</sub> regulations into NDCs and Long-Term Low Emission Development Strategies (LT-LEDS).

As part of the programme, participants visited the technology facilities at Siemens AG, Siemens Energy, and Nuventura to learn more about innovations in SF<sub>6</sub>-free switchgear.

Several NDEs have since expressed their interest in receiving Technical Assistance and more in-depth capacity building on SF<sub>6</sub> and climate friendly technology alternatives. The Government of Kenya will be a pilot country to receive support from CTCN on their national SF<sub>6</sub> phase-out. A global SF<sub>6</sub> programme between CTCN and the BMWK is under discussion.



### 3.4 NDE forums and regional climate weeks

**In 2022**, in conjunction with the Regional Climate Weeks, CTCN organized two NDE forums in the Africa region (in Gabon), and in the Latin America and the Caribbean region (in the Dominican Republic), and, partnering with the Islamic Development Bank, organized a side event in the Middle East and North Africa region.

**In 2023**, in partnership with UNFCCC and TEC, CTCN organized three NDE forums, which covered Africa, Asia and the Pacific, and Latin America and Caribbean regions. During the Africa NDE forum, a total of 125 Technical Assistance requests were submitted and 53 NDEs from the region were engaged in discussions on the new CTCN Programme of Work and shared feedback on the application of artificial intelligence (AI). During the Latin American and Caribbean NDE Forum, a total of 51 Technical Assistance requests were received and engaged 24 NDEs from the region.

### 3.5 Emerging energy solutions for climate action: Green hydrogen

In 2023, CTCN developed a capacity building programme on green hydrogen to increase NDEs’ knowledge related to green hydrogen technologies, including:

- Past, current and future of hydrogen technologies
- National hydrogen policy instruments
- Social and behavioural shift instruments.

The global programme consisted of three regional

modules tailored to the specific needs of each of the regions.

In the Asia-Pacific region, in collaboration with Network members of the Green Energy Institute, the capacity building initiative focused on green hydrogen technology for system transformation in the energy and sustainable mobility sectors, engaging NDEs from Bhutan, Cambodia, Fiji, Lao PDR, Maldives, Mongolia, Nepal, Japan, Papua New Guinea, Republic of Korea, Sri Lanka, Thailand and Viet Nam. Experts and scientists joined from different departments and institutions ranging from the Ministry of Energy and Transportation and university engineering and climate technology faculties to local government research institutes.



*Asia and the Pacific green hydrogen capacity building programme, May 2023, Busan, Republic of Korea*

The Africa regional programme was delivered in collaboration with the West African Development Bank (BOAD), and focused on green hydrogen technology for system transformation in the energy and the business and industry sectors, engaging 16

NDEs. The discussions ranged from the importance of green hydrogen within the African context, the exploration of current and future green hydrogen technologies and applications, to critical factors required for advancing green hydrogen adoption.



*Africa green hydrogen capacity building programme, October 2023, Cotonou, Benin*

The programme helped in mapping the challenges for the green hydrogen uptake in Africa and globally, such as inadequate infrastructure, regulatory and standardization gaps, elevated overall expenses, and a shortage of renewable energy supply. The Latin America and the Caribbean programme was delivered in collaboration with the Economic Commission for Latin America and the Caribbean (ECLAC) and the Sustainability and Climate Change Agency (ASCC – NDE of Chile). It focused on all

types of hydrogen technologies available for future RD&D collaboration, specifically for system transformation in the energy and business and industry sectors, engaging 12 NDEs. The discussions ranged from the green hydrogen technologies applicable to regional contexts, activities to strengthen existing national hydrogen policies and road maps, to the challenges and opportunities for finance and private sector involvement.



*Latin America and Caribbean green hydrogen capacity building programme, November 2023, Chile*

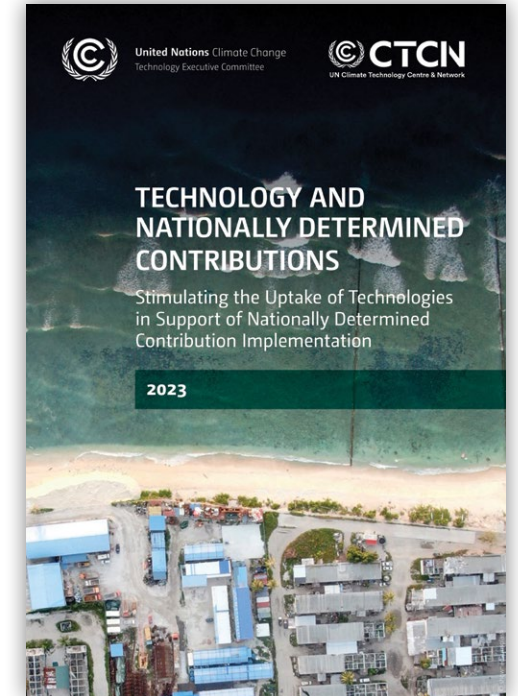
To complement the capacity building programme, CTCN, in collaboration with the Green Energy institute, launched a knowledge report showcasing 10 regional success stories of green hydrogen technology for NDEs, and a #didyouknow campaign series to introduce regional and country experiences and lessons learned on green hydrogen technology.

- Offers a set of specific recommendations for developed and developing countries, financial institutions, multilateral and bilateral development organizations, civil society, academia, businesses and philanthropists on stimulating the uptake of climate technologies.

### 3.6 Technology and NDCs: Stimulating the uptake of technologies in support of NDC implementation

In 2021, the UNFCCC Technology Mechanism, comprised of TEC and CTCN, launched its first joint publication to stimulate the uptake of climate technologies in support of NDC implementation. In 2023, following the positive response to this flagship publication, TEC and CTCN released an updated version, which:

- Highlights the role of technology in NDCs with a focus on technology needs, challenges, linkages between policy and implementation, and national adaptation plans.
- Showcases 12 success stories on the uptake of technologies in support of NDC implementation across different geographic regions and country contexts.



### 3.7 Emerging digital technologies



Emerging digital technologies, such as blockchain, AI and machine learning technology, the internet of things, cloud computing, and open data and digital platforms may have the potential to act as tools to unlock and accelerate global actions toward the Paris Agreement and the SDGs. Applications in the areas of clean energy, climate finance, carbon markets and value chains are being tested and implemented, yielding promising results.

During 2021–2022, CTCN delivered capacity building activities entitled “Emerging Digital Technologies for Climate Policy Implementation” with a focus on blockchain technology, together with its Network member Blockchain and Climate Institute (BCI).

Following a deep-dive online course on blockchain technologies tailored to NDEs, six public webinars were prepared and delivered between November

2021 and January 2022, on the following topics:

- Blockchain 101
- Clean energy
- Adaptation finance
- Mitigation finance
- Carbon markets
- Sustainable value chains

Experts from industry, the public sector and academia were involved in the delivery of the modules covering areas from applications to business and research. The webinar series<sup>6</sup> attracted 1,346 registrations and 388 attendees, and generated several follow-up requests for Technical Assistance, including from Kenya and Thailand. The series was included in the Paris Committee on Capacity-building Informal Coordination Group (PCCB ICG) e-resource on Capacity-building for Climate Technology Development, Deployment and Transfer.

<sup>6</sup> <https://www.youtube.com/playlist?list=PLdL4CIDXOyPeyEPKqDLHn5KcQYNnpWnLt>

### 3.8 Artificial intelligence for Climate Action Initiative

In 2023, the UNFCCC TEC and CTCN launched #AI4ClimateAction – Artificial Intelligence for Climate Action Initiative.

Artificial intelligence is seen as an integral part of the digitalization effort and an enabler across all systems of transformations. It has already proven crucial across various applications ranging from transforming energy systems through enhanced smart grids, to enabling more effective disaster risk reduction and multi-hazard early warning systems, and bolstering the resilience of agricultural communities by improving accuracy and access to weather forecasts for crop management. However, some questions remain, specifically those dealing

with generative AI, data availability, data security and piracy, widening of the digital divide, energy consumption, etc. These factors are being explored to ascertain the business case for climate change impacts.

#AI4ClimateAction was launched during a side event at the 2023 Bonn Climate Conference, and will take centre stage during a high-level event at COP28, where the global roll out of the Initiative will be presented and a call for partnership will set in motion the synergies needed to explore the potential role of AI as a powerful technological tool in advancing and scaling up transformative climate solutions for adaptation and mitigation in developing countries, in particular in least developed countries and small island developing states.



### 3.9 World Intellectual Property Organization Green Technology Book

CTCN partnered with the World Intellectual Property Organization (WIPO) on the 2022 inaugural edition of the Green Technology Book to raise awareness about the breadth of technologies available to us all. They include both proven technologies and those at an earlier stage of development, reaffirming what the IPCC has already made clear – many of the technologies and tools we need are already available to us today. It also affirms the imperative to continue our engagement in critical components of technology transfer, such as research and development.

The 2022 edition focused on climate change adaptation, a necessity for fast-growing parts of the world's population, as well as for natural ecosystems in every region of the globe. As there is no one-size-fits-all approach to adaptation. The Green Technology Book presents solutions in a variety of forms according to local contexts and needs.

In 2023, CTCN continued its partnership with WIPO for the 2023 Green Technology Book. The new edition looks at technology and innovation as enabling factors in addressing a wide range of challenges associated with building sustainable cities, improving agricultural production and transforming food systems, highlighting the role of industry, specifically the decarbonization of the steel and cement sectors.

### 3.10 Knowledge briefs and resources

#### Nature-based Solutions to Emerging Water Management Challenges in the Asia-Pacific Region

In 2022, CTCN launched a new knowledge brief “Nature-based Solutions to Emerging Water Management Challenges in the Asia-Pacific Region”. The brief highlights the potential of nature-based solutions (NbS)<sup>7</sup> in the Asia-Pacific region as a response to emerging climate-related water management challenges that are exacerbated by population growth, urbanization and the rising demand for water. Adding to concerns is the alarming degradation of critical natural assets.



The brief shows how NbS can offer an opportunity, through infrastructure solutions, to address water management and climate change challenges while delivering environmental and socioeconomic benefits. This collection of case studies and lessons learned demonstrates the variety of types and scales of NbS that have been applied in the region. These responses exhibit the significant potential for further utilization and up scaling of NbS in cost-effective and sustainable ways. From urban greening projects and coastal protection initiatives to local wastewater treatment and community eco-engineering projects, all confirm the versatility of NbS options for the Asia-Pacific region.

Findings also confirm that NbS allows for flexible and innovative implementation that can draw on international, national, or local-level mechanisms for implementation and financing. The inherent diversity and flexibility of NbS, along with its broad contribution to sustainable development objectives, make it a crucial mechanism for building the region's climate change resilience.

#### Harnessing technology in the circular economy for climate action in Africa

In Africa, population growth is expected to double by 2050 to reach 2.5 billion. This means the amount of waste generated could triple by 2050, exerting further pressure on resources, economic activities and sustainable livelihoods.

To respond to the need for systems and technologies that increase resource efficiency, African nations are using circular economy strategies to meet their climate change and sustainable development goals while reaping various environmental, social and

economic benefits. Across a diverse range of sectors – including agriculture and food systems, the built environment, electronic waste, plastics and textiles – innovative technologies serve as key enablers of the circular economy in Africa and beyond.

In 2023, CTCN launched a new knowledge brief “Harnessing Technology in the Circular Economy for Climate Action in Africa”. The knowledge brief surveys technologies across African countries, sectors and waste streams (such as organic, plastics and e-waste) that can unlock new opportunities for circularity and ultimately reduce waste, pollution and GHG emissions, advance economic development and job creation, bolster the roles of women, provide opportunities for youth, and benefit human and ecosystem health.



**“The circular economy low and high-tech solutions showcased in this report, often developed by grassroots innovators, are a reminder of the capacity and potential of the African continent and its communities in creating economic development solutions which are effective, sustainable, and inclusive.”**

*Prabhakar Vanam, CEO, Kenya Climate Innovation Center (KCIC) Consulting Ltd.*

<sup>7</sup> Climate technologies are considered by the Intergovernmental Panel on Climate Change (IPCC) to be any piece of equipment, technique, practical knowledge or skills for performing a particular activity that can be used to address climate change. Nature-based solutions (NbS) are part of the wide range of climate technologies and are increasingly being adopted to address climate change challenges.

Countries such as Côte d'Ivoire, Egypt, Ghana, Kenya, Morocco, South Africa and Tanzania, among others, are pioneering various circular economy technologies.

The brief showcases circular economy technology opportunities that exist along the material value chain, from product conception and production to distribution and consumption to end of life and offers solutions that are both low-tech (such as composting and using local building materials), and high-tech (such as anaerobic digestion, material science and digital material marketplaces).

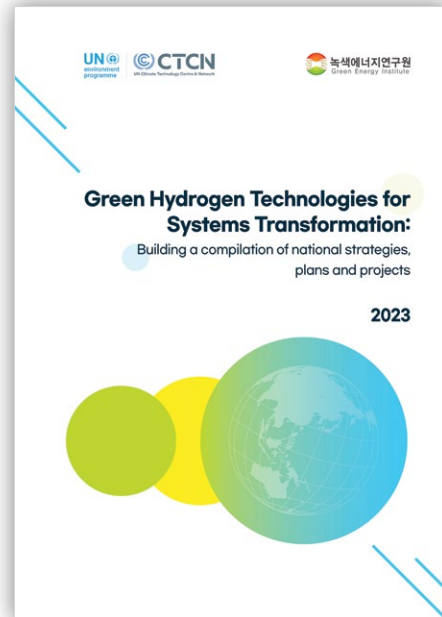
### Green hydrogen technologies for systems transformation

The IPCC Sixth Assessment Report (AR6) identifies hydrogen as one of the most promising alternative fuels of the multiple energy supply options available to reduce emissions over the next decade. Hydrogen produced from electrolysis ('green hydrogen') has great potential to transform systems of heavy industry, residential and commercial buildings, and transport. However, as AR6 shows, the effectiveness of hydrogen will depend on how quickly and how far the technology improves.

In 2023, complementing the regional capacity building programme on green hydrogen targeting NDEs, CTCN published "Green Hydrogen Technologies for Systems Transformation: Building a compilation of national strategies, plans and projects", a compilation of national strategies plans and projects from developing and developed countries, leveraging research, production, storage and export of green hydrogen as part of their national net-zero ambitions and commitments. The collection intends to distil what has been learned to date and equip countries with the knowledge and capacity to understand and assess available system transformation options, including opportunities and challenges, to reach net-zero emission targets.

This report offers a snapshot of the current implementation and future developments of green hydrogen projects, providing examples of green hydrogen technology research, development and deployment efforts, and the impact on increasing renewable energy infrastructure and transformation at the national level. It can be a resource for developing countries, showcasing how green hydrogen technologies can assist national systems' transformation of the energy industry, mobility, agriculture, buildings and business.

This compilation also underscores the significance of regional collaboration. The journey toward systems transformation requires a collective effort, as nations grapple with shared challenges and shared opportunities. By showcasing a range of national and regional perspectives, we are building a bridge between global imperatives and localized solutions, while facilitating the exchange of best practices and lessons learned.



# 4 Inclusive innovation for climate action



## 4.1 Gender mainstreaming

In 2023, CTCN set up a Gender Policy Taskforce, comprised of several of its Advisory Board members and led by the UNFCCC Women and Gender Constituency, to revise the CTCN Gender Policy for the period 2023–2027 and formulate its Action Plan for 2023–2024.

The updated Policy and Action Plan, endorsed at the Advisory Board 22nd meeting, responds to the gender mandate given by the Conference of Parties (COP) to CTCN to promote the deployment of gender-responsive technological solutions to address climate change, and is aligned with CTCN 2023–2027 Programme of Work.

The revised Gender Policy and Action Plan builds on its existing efforts to implement gender mainstreaming in its governance and operations, including Technical Assistance, capacity building and knowledge sharing, and communications and outreach. Priority was given to increasing resources, including an increased budget allocation of up to 5 per cent for gender mainstreaming activities, and the integration of gender considerations throughout the Technical Assistance process,

such as gender-sensitive stakeholder mapping and engagement; gender mainstreaming in project consultation, validation and decision-making processes; gender-sensitive and sex-disaggregated data collection; and developing gender-responsive recommendations.

CTCN has a longstanding partnership with the Women and Gender Constituency to support Gender Just Climate Solutions (GJCS), a programme designed to showcase, support and amplify grassroots initiatives that prioritize gender equality and women's rights in climate action.

To further reinforce gender mainstreaming and women's representation and leadership in innovation for climate action, CTCN and TEC will launch the online Technology Mechanism Gender and Climate Technology Expert Roster during COP28. This global database contains information and contact details of professionals, grassroots experts and indigenous people with ancestral knowledge who have been recognized as gender equality and climate technology experts. It will facilitate access to gender-climate experts for participation in studies, working groups and taskforces, speaking engagements and knowledge sharing.



## 4.2 The Gender Just Climate Solutions awards and mentoring programme

Since 2018, CTCN has collaborated with the UNFCCC Women and Gender Constituency to provide capacity development and mentoring support to winners of the Gender Just Climate Solutions awards, hosted by Women Engage for a Common Future.

These awards highlight transformative solutions for a more just, equitable and environmentally healthy planet. The award recognizes three winners, one in each of the following categories:

- Technical climate solutions
- Non-technical climate solutions
- Transformational climate solutions

Winners are announced during the COP, where they can showcase and pitch their solutions at different events. Winners also have access to an intensive upscaling workshop on advocacy, finance and technology, as well as a year-long mentoring programme to upscale and replicate their projects. A recent impact review of the programme found that 70 per cent of the participants were able to access new funding after programme participation, and all were able to replicate or upscale their projects. Overall, the review suggests that by including gender as a vital aspect of climate action, there is a stronger foundation for multiple transformative benefits.

In 2022, the Gender Just Climate Solutions Awards received 259 applications from 119 countries. The three winners were announced in Sharm El Sheikh during COP 27, and these were as follows.

### Technical solution winner: Yokoumi – Decarbonizing the shea butter value chain

In the village of Kelizio, Togo, 50 women producers of shea butter decided to install a PV solar plant to power their mill, de facto decarbonizing the production and strengthening the sustainability of this sector. They also invested in improved stoves, further reducing their dependence on fossil fuels and biomass. The 8 KWh PV plant also provides electricity to the 1,600 inhabitants of the village.

### Non-technical climate solution winner: Sindh Community Foundation – Advancing the labour rights of women cotton pickers

The Sindh Community Foundation uses a feminist participatory action research approach to support the demands of women working in agriculture – particularly cotton pickers – for better working conditions and health services in response to rising temperatures. Located in the Matiari District of Pakistan, the foundation developed an innovative advocacy strategy linking social and climate justice, with the goal of strengthening climate adaptation measures, establishing a training programme on climate awareness, climate justice and labour rights protection for 100 women working in agriculture. Ultimately, this convinced policymakers to implement the Sindh Agriculture Women's Protection Act of 2020.

### Transformational climate solution winner: Keystone Foundation – Barefoot women ecologists bridge ancestral knowledge with modern science to protect their ecosystems

Twenty indigenous women from Tamil Nadu and Kerala have strengthened their capacities to link traditional ecological knowledge with modern scientific methods to observe and monitor climate impacts on forests, rivers and farms. Practical observation with village elders combined with

data collection and analysis – using digital modelling – enable local women's groups to lead appropriate and adapted climate and conservation actions in their communities. The women ecologists have launched forest nurseries, community kitchen gardens and water source protection initiatives. There is also a seed-keeping social enterprise in the pipeline.

In 2023, GJCS Awards received a total of 973 applications, awards-winners will be announced in Dubai during COP28.



### 4.3 The CTCN's Youth Climate Innovation Labs and Academies

CTCN Youth Climate Innovation Labs and Academies provide young people with youth-centred training and tools to develop solutions to various climate change challenges, and foster the creation of climate start-ups and small- and medium-sized enterprises.

The first edition of the Climate Innovation Labs, organized in collaboration with Seedstars and the Swiss Organization for Entrepreneurship in Emerging Markets (SAFEEM) organized Youth Climate Innovation Labs and Academies in Africa (2020 –2021), Asia (2020 –2021), Latin America and the Caribbean (2021) and the Middle East and North Africa region (2022).

Youth Climate Innovation Labs and Academies received over 1,300 applications from young innovators from across 74 countries. The workshops were attended by 433 participants guided by 97 mentors, which brought forth a series of viable climate innovations across both mitigation and adaptation. There were 35 winning teams of labs that were supported throughout a 2-month Innovation Academy. About 50 per cent of all winning solutions were digital technologies. Several of the winning teams are still active now, and have since incorporated their companies, received external funding, and onboarded their first customers.

Based on the successes and learnings of the first edition, CTCN is currently preparing a new Youth Climate Innovation Programme that further enhances support across ideation, incubation and acceleration of climate technology innovation.



### 4.4 Promoting endogenous and gender-responsive technologies

In response to Timor-Leste's Strategic Development Plan (2011–2030) and energy transition priorities, CTCN and its consortium partner The Energy and Resources Institute (TERI), with support from the Green Climate Fund, developed an educational programme to boost rural community members' capacity and knowledge in installing and maintaining solar PV systems for reliable and sustainable electricity.

The topics for the community-level training and the training-of-trainers programmes were chosen

based on the requirements expressed by the stakeholders involved in the project, ranging from basics of solar radiation and solar potential in Timor-Leste, to design of the solar systems software and hardware implications, performance measurements and maintenance protocols.

The programme tried to address gender inequalities and ensure maximum gender inclusivity in training and workshops by encouraging women's participation through its local partners. This resulted in 26 per cent women participants compared to 17.5 per cent in the previous edition, with 1,491 women trained and 41 women having community-level training, opening employment and economic opportunities for women.



# 5 Unlocking resources and partnerships for systems transformation



## 5.1 The new Partnership and Liaison Office

CTCN has three regional offices that cover the Latin America and the Caribbean region, Africa and Middle East region, and Asia and the Pacific region, and a new CTCN Partnership and Liaison Office (PALO) in Songdo, Republic of Korea. Launched on 21 July 2022, CTCN PALO has two main complementary objectives:

- To enhance the links between the Technology Mechanism and Financial Mechanism under the UNFCCC.
- To strengthen existing efforts on innovation and collaborative RD&D through greater collaboration with various organizations working on climate change issues.

PALO's key roles and activities include:

- Supporting capacity building activities for the NDEs of developing countries by designing and implementing global capacity-building programmes in line with the new Programme of Work 2023–2027.
- Serving as a Centre of Excellence on RD&D on climate technologies, and liaising with universities, research institutes, private sector organizations, and other key RD&D stakeholders.
- Promoting a North-South, South-South and triangular collaboration on climate technology RD&D by actively fostering regional partnerships, including with regional donors, the Asian Development Bank, and regional Network members and consortium partners such as the Asian Institute of Technology (AIT) and the Energy and Resources Institute (TERI).

**“This new Partnership and Liaison Office will build on the CTCN’s efforts to ensure that countries the world over can access the technologies they need to build energy-efficient, low-carbon and climate-resilient societies.”**

*Inger Anderson, Director, UNEP*



CTCN Partnership and Liaison Office (PALO) launch event

## 5.2 Matchmaking and CTCN engagement

PALO has been instrumental in facilitating matchmaking with CTCN members from the private sector and academia, and in RD&D collaboration between institutions.

### The private sector and academia

CTCN involved over 70 private and public sector climate technology providers in 15 voluntary-based matchmaking opportunities to cater to the technology needs of NDEs in designing the follow up Technical Assistance project ideas and developing marketable (sustainable) climate technology and transfer policies.

In 2023, to stimulate members' engagement, CTCN organized three global Networking events:

1. Co-creating Climate Solutions (CCS) event with Korean CTCN members, co-hosted with the Ministry of Science and ICT (MSIT), Republic of Korea
2. Technology talks at the World Climate Industry Expo 2023
3. Technical Assistant Project Ideation meetings with National Institution of Green Technology (NIGT).

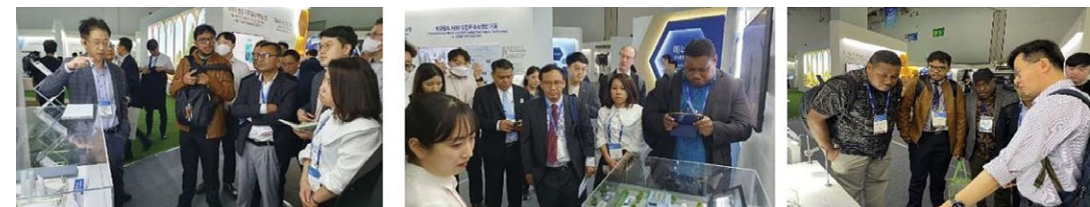
The CCS event led to the engagement of four CTCN members who volunteered to develop innovative technology solutions together with local experts who can mentor on the solutions' feasibility and impact potential. Four technical

assistance concepts in agriculture/food systems and innovative technologies were showcased, and feedback from the finance expert panels led to connections with Climate Technology Network members, funders and technical experts. Subsequent Networking sessions encouraged Korean CTCN members to build connections with local stakeholders, and members who had received positive feedback from the local experts were then invited to the UNFCCC Regional Climate Week's NDE forum. In this forum, CTCN facilitated the further support of selected members technology solutions to be shared with key stakeholders in the UNFCCC forum.

### Research, development and demonstration collaboration

In collaboration with MSIT, CTCN developed a collaborative RD&D scheme, which entails exchanges among institutions from the global South to foster climate technology innovation through partnerships. A total of eight matchmakings for South-South collaborative RD&D partnership facilitations were supported. These were NDE centred and led, with activities focused on identifying research institutions in NDE countries to match with partners from the global South and North. As a result, CTCN received four requests for support in collaborative RD&D, and twelve discussions are undergoing for twinning arrangement.

CTCN hosted a webinar series on introducing regional and sectoral collaborative RD&D opportunities, focusing on the five system transformation areas.



Bridge-building activities engaging with green hydrogen experts from CTCN, May 2023, Busan, Republic of Korea

## 5.3 Catalysing resources and innovation

### Introducing an Internet-of-Things-based district heating smart monitoring system in Serbia

In Belgrade, the capital of Serbia, a district heating smart monitoring system, based on the Internet of Things (IoT), was introduced and demonstrated in April 2023. It was part of a project initiated by CTCN and subsequently supported by the Republic of Korea's government's pro bono technical assistance. The system led to a monthly reduction of approximately 9 per cent in the winter heating energy consumption of households, resulting in an annual reduction of around 1 per cent in carbon dioxide emissions. If implemented nationwide, it could potentially reduce Serbia's annual carbon dioxide emissions by about 420,000 tonnes.

The district heating monitoring system is a cloud-based Home Energy Management System providing real-time energy usage and analysis through web interfaces and applications. It collects data on energy consumption, IoT sensor information, environmental data and more, utilizing machine learning-based AI technology to detect abnormalities.

## 5.4 A thriving global network of world-leading partners and businesses

CTCN harnesses the power of partnerships by connecting countries with technology providers, climate and technology policy experts, decision-makers and the financial community.

Private sector organizations represent half of its Network members (52 per cent), followed by research and academic institutions (17 per cent) and non-governmental organizations (11 per cent). The most common type of climate services they provide include: policy and planning (77 per cent), capacity building (67 per cent), and technology development and transfer (52 per cent) across mitigation and adaptation.

To become a CTCN member, and join a community of 840 global innovators and leaders for climate action, scan the QR code or visit <https://www.ctc-n.org/network/join-network>



## 5.5 Financial Mechanism links

Accelerating, encouraging and enabling innovation is critical for an effective, long-term global response to climate change, and for promoting economic growth and sustainable development. Under these common goals, the Technology Mechanism and Financial Mechanism of the UNFCCC have been strengthening cooperative action on technology development and transfer at different stages of the technology cycle, and facilitating access to financial means to developing countries, including:

- Mobilized additional USD 11 million for 22 developing countries, through a total of 31 Green Climate Fund (GCF) readiness proposals submitted.
- Supported development of USD 460 million worth of projects through two GCF Project Preparation Facility proposals including “Promoting the Adoption of Environmentally

Sound Technologies by Small and Medium Sized Enterprises in Kenya to Enhance Production Efficiency and Business Value” by Kenya Commercial Bank (KCB), and “West African Low Emissions and Climate Resilient Agriculture Financing Facility” by the West African Development Bank (BOAD).

- Supported development of Cambodia’s GCF concept note on agro-based enterprises.

CTCN co-organized Deep Dive Clinic sessions at GCF’s regional structural dialogues for Asia Pacific to facilitate partnership building and enhance collaboration between National Designated Entities and National Designated Authorities. Five NDEs participated in bilateral meetings and discussed their pipeline developments with CTCN and its Accredited Entities. CTCN also joined GCF’s Private Investment for a Climate Conference in Africa during the 2023 Africa Climate Week.

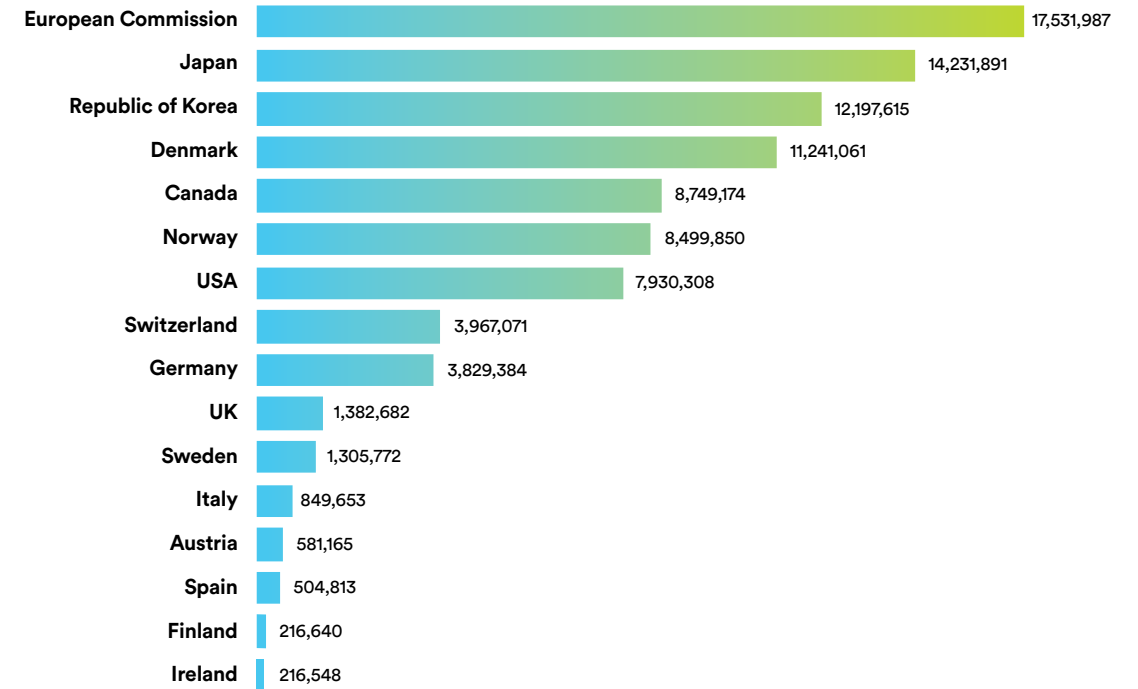


Deep dive clinic sessions with the GCF, August 2023, Songdo, Republic of Korea

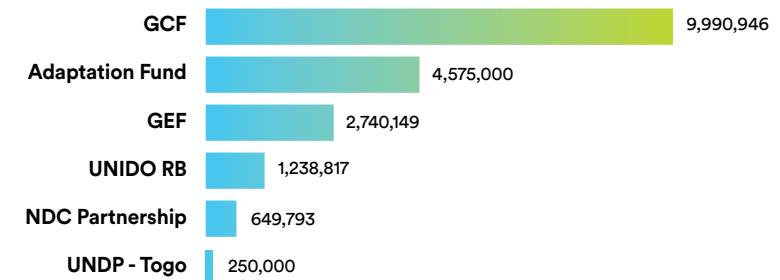
## 5.6 Financial information

**\$112,680,319** CTCN, total secured income as on 15 October 2023

**\$93,235,615** in total voluntary contributions



**\$19,444,704** from other mechanisms

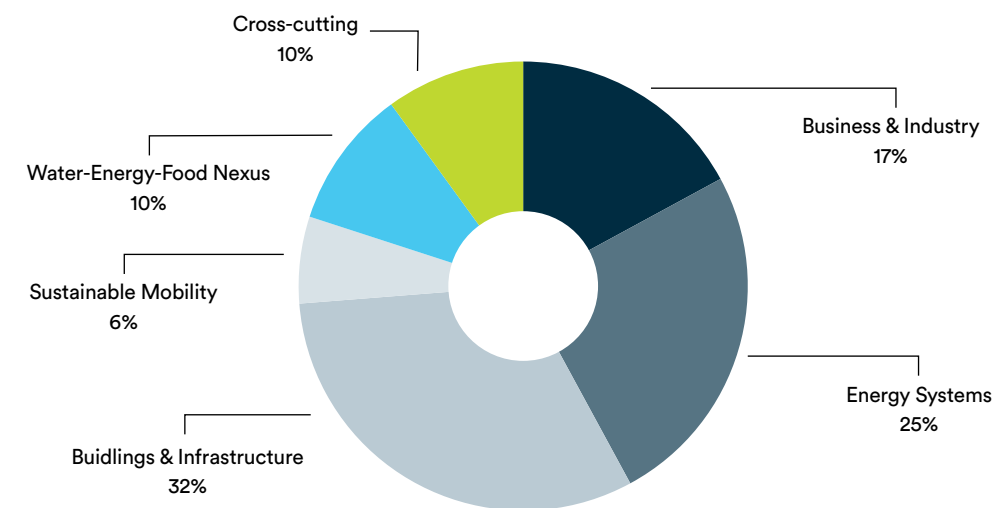


# Fact and figures 2022–2023

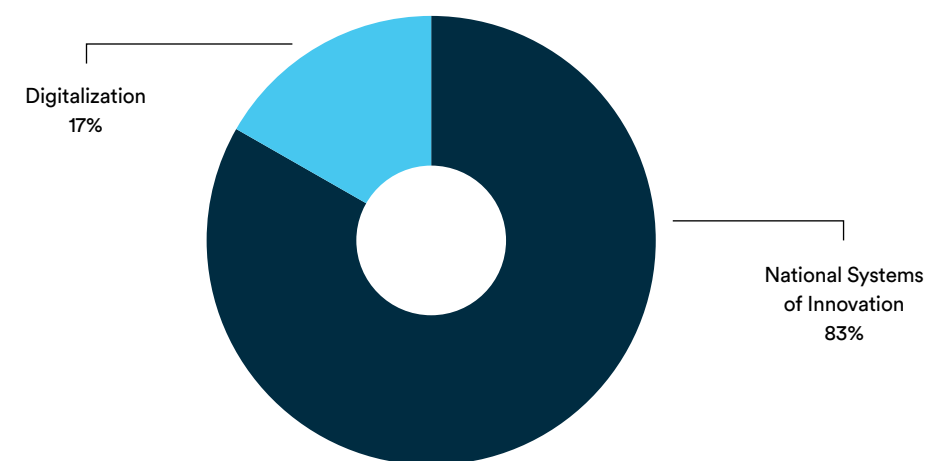
	2022	2023*
Total number of TA projects completed	47	42
Strategic partnerships	3	9
Number of TA requests received	50	122
Number of TA concepts ideated	~220	~320
Number of CTCN members	796	840
Average TA budget per project	168,808	215,997
Total number of CTCN events	64	65
Total number of CTCN events and trainings (including the ones providing TA)	280	324
Number of participants attending CTCN events (disaggregated by gender)	3,440	4,182
Number of deliverables produced with TA (disaggregated by type, excluding mission, progress and internal reports)	147	427
TA that supports the implementation of countries' NDCs	90%	88%
Number of countries which received support from CTCN to develop TNAs and TAPs	5	7
Number of pro-bono projects providing TA	3	4
Anticipated metric tons of CO <sub>2</sub> e reduced or avoided as a result of the TA on annual basis (tCO <sub>2</sub> e/year) <i>**assuming full implementation of the TA results</i>	12,900,000	21,082,983
Anticipated number of direct and indirect beneficiaries as a result of the TA <i>**assuming full implementation of the TA results</i>	100,000,000	69,530,970
Anticipated amount of funding/investment leveraged (USD) as a result of TA (disaggregated by public, private, national, and international sources, as well as between anticipated/confirmed funding)	162,479,000	124,156,750
Leverage ratio	20	22.11
Anticipated number of policies, strategies, plans, laws, agreements or regulations proposed, adopted or implemented as a result of TA	34	31

\* For 2023, data were collected for only 58 per cent of technical assistance (TA) projects that were completed at the time of reporting. Among the 42 TA projects that are to be completed this year, only 26 Closure Reports were collected as of 1 November 2023.

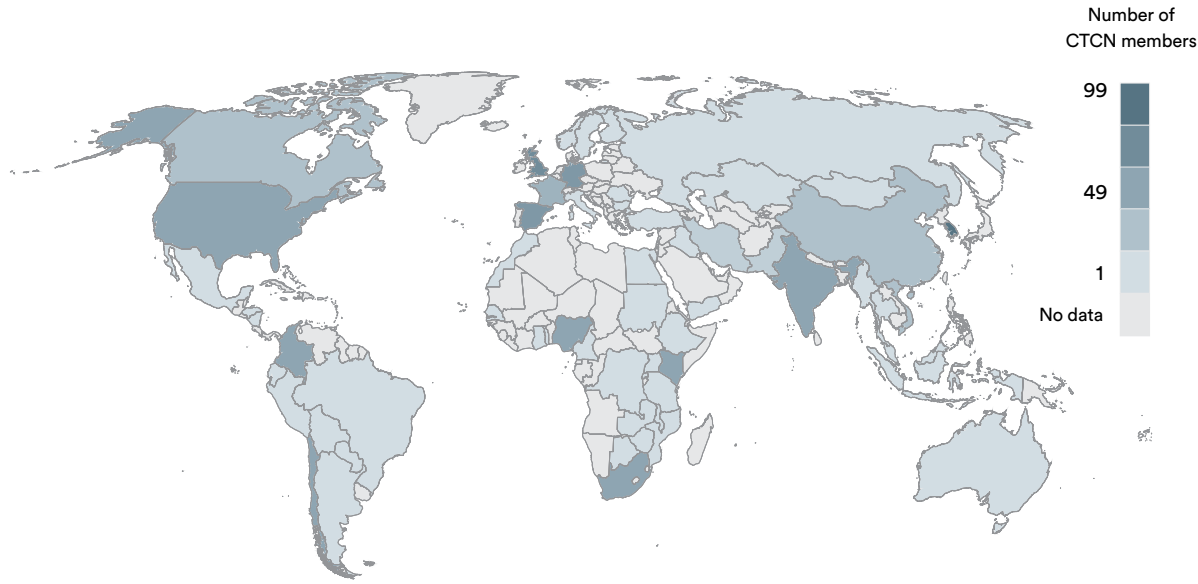
## Technical Assistance completed in 2023 by five system transformation areas



## Technical Assistance distribution by technology enablers

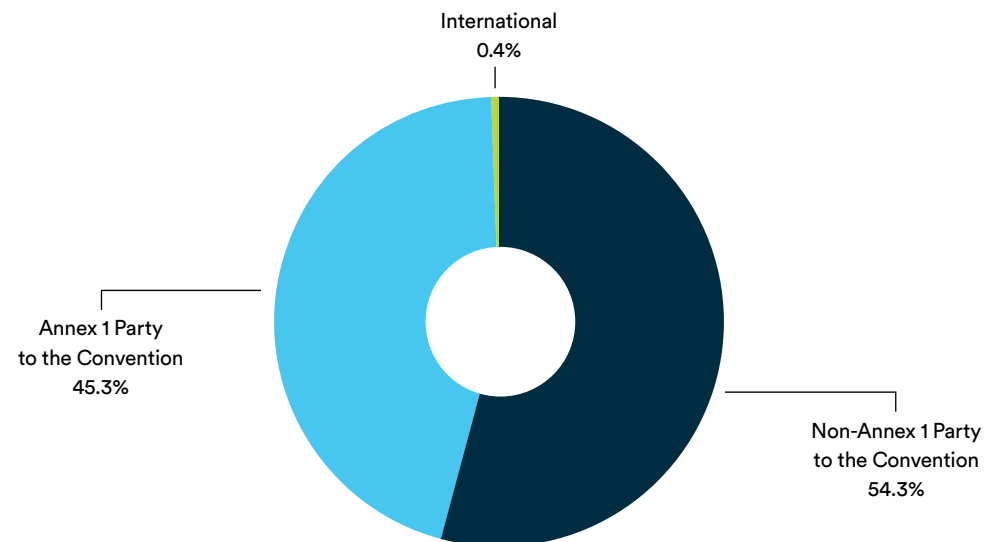


## CTCN members by country of registration

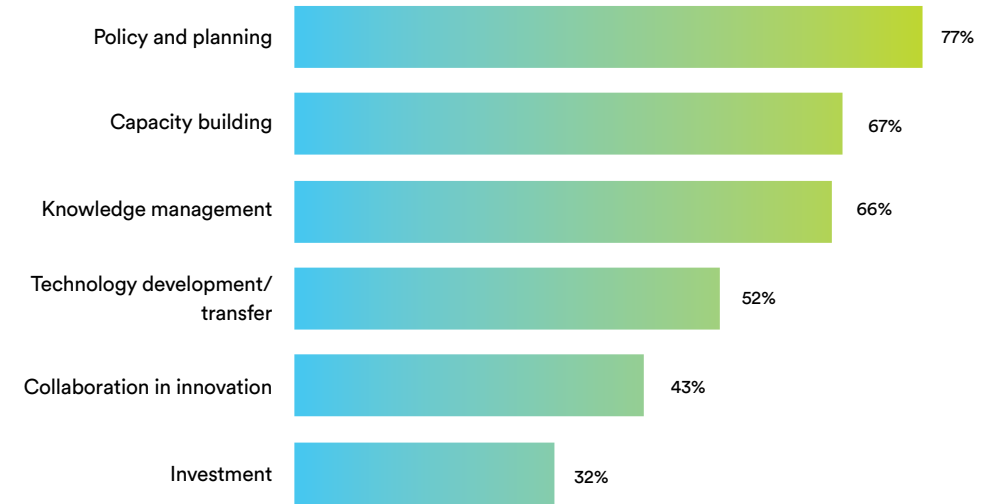


Note: For more information on CTCN members visit <https://www.ctc-n.org/network/network-members>.

## CTCN members by Parties of the UNFCCC

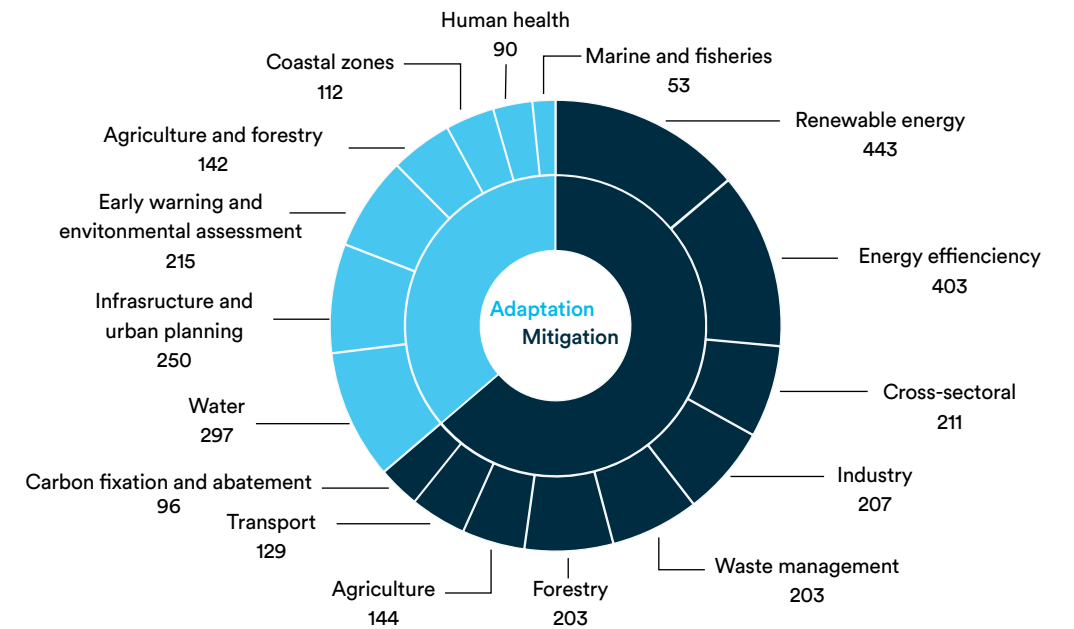


## CTCN members by type of climate services\*



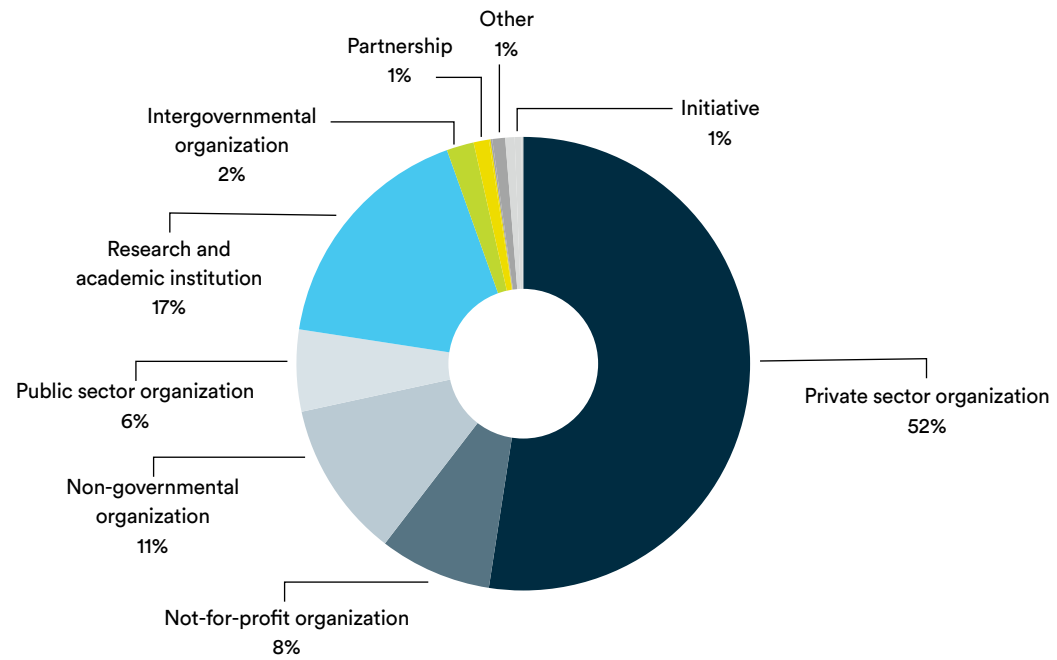
\* Network members may belong to one or more categories.

## CTCN members by sectors of expertise\*



\* Network members may belong to one or more categories.

## CTCN members by type of organization





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