



National Systems of Innovation

ENABLING SYSTEMS TRANSFORMATIONS BY
STRENGTHENING NATIONAL INNOVATION
GOVERNANCE AND EXPERT CAPABILITIES
ON CLIMATE TECHNOLOGIES

CTCN works with developing countries to accelerate, develop and transfer technologies for low carbon, climate resilient development.

Why national systems of innovation matter

Countries' capabilities to drive and enable climate technology innovation are crucial for climate mitigation and adaptation, and for inclusive sustainable development.

These capabilities¹ 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; and



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.

CTCN case studies, pilot projects, RD&D, and concept notes can be leveraged/are pivotal to attract investments and funds. CTCN collaborates with The Green Climate Fund, The Global Environmental Facility, The Adaptation Fund Climate Innovation Accelerator, and several regional and national development banks, supporting systems transformation in over 30 countries.

How CTCN caters to the NSI needs of developing countries

For over a decade, CTCN has worked with National Designated Entities (NDEs)² and over 800 Network members³, to provide technical assistance, capacity-building and knowledge-sharing to assist the development of national systems of innovation. This includes:

- ▶ strengthening collaborative approaches to climate technology research, development and demonstration (RD&D);
- ▶ creating and promoting policy to incentivize and nurture a supportive environment for innovation;
- ▶ supporting policy, institutional and regulatory framework development, and planning processes;
- ▶ aiding with the advancement of technology transition pathways to stimulate the uptake of climate technologies; and
- ▶ strengthening collaboration between the public and private sectors.

NSI must strengthen links with international innovation activities and systems to implement and benefit from technological change. This helps to spur economic growth while improving policy environments, strategies, legal and regulatory frameworks, and institutional arrangements for establishing and/or strengthening their national systems of innovation.⁴

“Enhancing technology innovation systems can provide opportunities to lower emissions growth, create social and environmental co-benefits, and achieve other SDGs.”

IPCC, 6th Assessment Report

Three key complementary actions are needed to strengthen NSI⁵:

1. Build and develop the core infrastructure:
 - a. a strong school curricula that foster innovation
 - b. investments in RD&D
 - c. implementing enabling policies (including support-to-market creation)
2. Focus on specific climate technologies that help meet national climate and development priorities; and
3. Build strategic partnerships (or linkages) and coordination capabilities to facilitate interaction and exchange among national actors.

How CTCN is strengthening national systems of innovation

CTCN delivers tangible improvements in the way countries leverage climate technologies within their national climate-resilience strategies and development frameworks: **connecting policy-makers to RD&D and industry leaders**, and **catalysing and amplifying know-how and expertise**.

This helps build the capacity of countries to generate national systems of innovation.



32 technical assistance projects involving 36 countries and totaling US\$7 million



7 technical assistance projects focused on RD&D of technologies



700+ participants attended capacity-building initiatives targeting NSI enhancement



203 technical assistance projects (of 297) included strengthening of NSI as a systems transformation enabler



12 concept notes or road maps developed



100+ organizations selected as innovative network members, and participated in innovative technology development and transfer

Led by a demand-driven process working with NDEs, CTCN also supports national decision-making, sectoral technology roadmaps, market assessments and feasibility studies to create an enabling environment for climate technology development and transfer.

Selected examples of CTCN technical assistance, including anticipated country impact

Examples of the CTCN technical assistance	Countries	Impacts
Technology assessment/analysis		
Feasibility study and development of an action plan to manufacture components of small power wind turbines and implementation of a pilot project	Benin	New wind turbine system generating 7.7 GWh/y (supplying 200,000 people) and cutting 5 kilotons of CO ₂ e
Benchmarking energy and greenhouse gas (GHG) intensity in the metal industry	Thailand	Technologies using low nox regenerative combustion
Technology RD&D		
Establishment of a laboratory for accreditation and quality control of photovoltaic modules	Algeria	Creation of a laboratory to test photovoltaic modules and increased capacity for PV module testing protocols.
Accreditation of the national Energy Efficiency Lighting Laboratory (JSMO)	Jordan	The international accreditation was granted to JSMO, which will ensure energy efficiency testing as well the enforcement and compliance with existing lighting standards and technical regulations.
Scaling-up sustainable wood fuel systems	Tanzania (Pwani, Lindi, and Mtwara regions)	Charcoal production for cooking and heating, improved cooking stoves
Technology Diffusion		
Incubating climate technologies in small and medium enterprises	Chile	Engagement of 31 micro, small, and medium enterprises and green investment banks for agricultural market creation
Integrated agroforestry policy	Belize	Identification of mechanisms with the private sector for promotion of agroforestry and mainstream women's participation in agroforestry
Development of circular economy road maps	Latin America and the Caribbean	Country roadmaps as a management tool for implementation with the private sector, to create new business models and job creation

Developing a framework and roadmap for Zambia's national system of innovation to foster climate-resilient economic development



Climate variability and change are a major threat to sustainable development in Zambia. The country is experiencing climate-induced hazards, including drought and dry spells, seasonal and flash floods, and extreme temperatures.

Some of these hazards, especially droughts and floods have increased in frequency and intensity over the past few decades and have adversely impacted food and water security, water quality, energy and livelihoods, especially in rural communities, with an



Zambia National Systems of Innovation (NSI)
Inception Workshop 2023

aggregated estimated total GDP loss in the range of US\$4,330–5,440 million.

Innovation is seen as mission-critical to respond to the adverse impacts of climate change, generate economic growth, and achieve Zambia's vision of becoming a prosperous low-carbon and climate-resilient middle-income country by 2030.

CTCN is helping Zambia:

- ▶ Develop a framework and roadmap for the introduction of a national system of innovation,
- ▶ Streamline and structure the national approach to innovation,
- ▶ Ensure continuous engagement with key stakeholders.

Chanelling Zambia's innovation efforts into a single national innovation framework and roadmap can optimize the return on innovation investments and secure a positive spillover effect across institutions and industries for low-carbon and climate-resilient economic development.

Next-generation NSIs

Public policies can support training and RD&D, complemented by both regulatory and market-based instruments that create incentives and market opportunities⁶ in three ways:

1. National systems of innovation are instrumental to keeping the impacts of climate change at bay and building resilience in communities and ecosystems.
2. Policy packages tailored to national contexts and technological characteristics have been effective in supporting low-emission innovation and technology diffusion.
3. The success and sustainability of NSI will depend on the degree of national, international and sectoral collaboration in RD&D, connecting policy-makers, stakeholders, research and the innovation community, bridging knowledge and know-how gaps, and ensuring women, youth and vulnerable groups are involved.

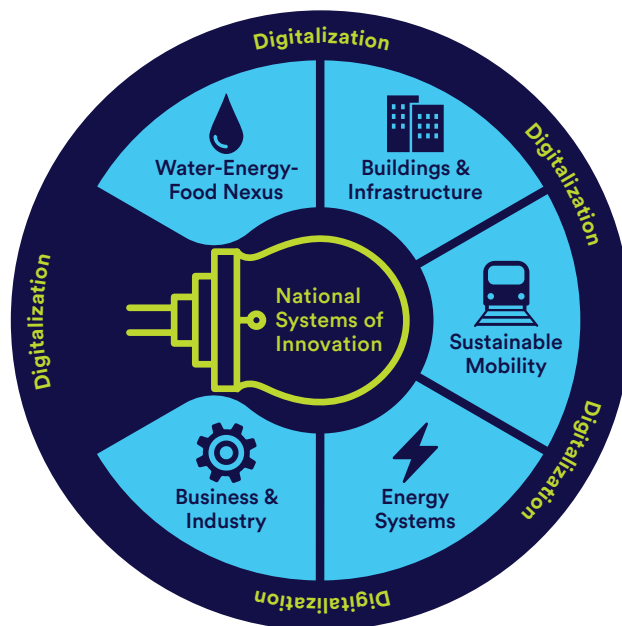
CTCN is devising new forms of resource mobilization and partnerships to foster collaboration and learning exchange, consolidating an ecosystem where national systems of innovation can flourish:

- a) Strengthening countries' capabilities to drive and enable climate technology innovation.
- b) Supporting countries in incentivizing innovation through policy, institutional and regulatory development.
- c) Providing opportunities to lower emissions growth, create social and environmental co-benefits, and achieve other SDGs.
- d) Facilitate the development and transition to a circular economy, whereby NIS can stimulate economic growth and create new job opportunities, and contribute to a more resilient environment.

About CTCN

The Climate Technology Centre and Network (the implementation arm of UNFCCC's Climate Change Technology Mechanism, mandated under the Paris Agreement) provides accelerated development and transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries.

CTCN provides a portfolio of technology solutions, capacity building and advice on policy, legal and regulatory frameworks tailored to the needs of individual countries by harnessing the expertise of a global network of technology companies and institutions. CTCN is hosted by the UN Environment Programme and is headquartered in Copenhagen, Denmark.



¹ Defined as "a network of actors, institutional contexts and linkages that underlie national technological change".

² NDEs are technology representatives selected by each country's government representing 164 parties to the UNFCCC
<https://www.ctc-n.org/about-ctcn/national-designated-entities/national-designated-entities-by-country>

³ CTCN's Network includes members from: National technology and regional climate technology centres, intergovernmental, international, regional or sector organization, research, financial, non-governmental, industry, SMEs, and private sector organizations.



⁴ The Technology Framework of the Paris Agreement aims to deliver on the Technology Framework's five key themes: innovation, implementation, enabling environments, collaboration, and support.

⁵ Add TEC brief reference

⁶ IPCC AR6 SYR SPM C7.5, p36.

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Become a CTCN member,
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