

**Terms of Reference**  
**Climate Technology<sup>1</sup> Innovation Centers**  
*A joint infoDev and UNIDO Project*

**Context:**

**infoDev's Climate Technology Program**

***Accelerating Innovation in the Development, Deployment and Transfer of Clean Technologies***

infoDev ([www.infodev.org](http://www.infodev.org)) is a research, capacity building and advisory service organization that seeks to help developing countries and their international partners use information and communication broadly and effectively as tools of poverty reduction and sustainable economic growth. infoDev is a partnership of public international development organizations and other partners, facilitated by a secretariat at the Global Information and Communication Technologies (GICT) Department of the World Bank Group.

infoDev has a global innovation and entrepreneurship network consisting of over 175 business incubators in 75 developing countries with initiatives dedicated facilitating the growth of sustainable small and medium enterprises in the technology sector and to capturing and disseminating knowledge and best practices on promoting innovation and entrepreneurship globally. infoDev's unique value-add is being in close proximity with grass-roots, private sector development – This enables entrepreneurs, technology managers, governments and donors to take advantage of new business opportunities to grow and expand competitive and wealth generating enterprises and sectors from the 'bottom up'.

Building on infoDev's business incubation experience, the Department for International Development (DFID) of the UK government and infoDev have launched a Climate Technology Program. This program will pilot climate technology innovation centers in a number of developing countries with the aim to accelerate the development and deployment of innovative technologies at the SME level. The timing of the project is in advance of the COP15 Copenhagen Climate Summit in December 2009, and will be showcased at in Copenhagen where appropriate to provide practical and implementable examples for future action.

**Context:**

**UNIDO**

The United Nations Industrial Development Organization (UNIDO) is a specialized agency of the United Nations. Its mandate is to promote and accelerate sustainable industrial development in developing countries and economies in transition, and work towards improving living conditions in the world's poorest countries by drawing on its combined global resources and expertise. In recent years, UNIDO has assumed an enhanced role in the global development agenda by focusing its activities on poverty reduction, inclusive globalization and environmental sustainability. Today, the Organization is recognized as a highly relevant, specialized and efficient provider of key services in support of the interlinked challenges of reducing poverty through productive activities, promoting the integration of developing countries in global trade through trade capacity building, fostering environmental sustainability in industry, and improving access to energy.

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<sup>1</sup> 'Climate technology' encompasses all similar terminology such as clean, low-emission, low-carbon, sustainable and green technologies inclusive of both mitigation and adaptation technologies.

### **Purpose of work:**

The purpose of this project is to generate a deeper and broader understanding of the concept of climate technology innovation centers and their relevance to developing countries. The work will compliment *infoDev's* country-specific climate technology pilot studies in India and in other countries. *infoDev* and UNIDO have agreed to partner on this initiative in order to create a coherent and inclusive approach to this topic, with *infoDev* taking the lead in the oversight of the report deliverables.

The project's intended audience covers a range of stakeholders including entrepreneurs, technologists, technology managers, industry, NGOs, donors, government and policy makers that have varying degrees of expertise and knowledge on the concepts of climate technology innovation and innovation centers. The report must therefore be accessible to a varied audience in both developed and developing countries and provide concrete and practical insights to inform policy makers in developing countries.

### **Background:** **Innovation Centers**

Centers of excellence, centers of expertise, technology incubators, innovation centers, technology advisory centers, technology development and diffusion centers, proof-of-concept centers, technology seed funds, and other similar entities<sup>2</sup> and various associated networks have been established or have been proposed as a key tool to support research and development, demonstration, deployment, diffusion and transfer of technologies for adaptation and mitigation of climate change while also providing important social and economic growth opportunities.

There are many different models for these centers and existing centers function at different scales from the local and sub-national to the national, regional and international levels. They also have different functions regarding the innovation cycle. Some are focused exclusively on research and development of new technologies, others focus on the adaptation of technologies to local circumstances, some promote technology deployment and diffusion, and others work across the full spectrum from research to diffusion. Existing centers also have varying mandates with some working on specific technologies and others working across a wide range of technology areas. ***Very few address both mitigation and adaptation technologies.***

Much of the literature on the topic of climate technology innovation addresses important issues concerning the development and scale-up of mitigation technologies but much less attention is given to the importance of technologies for adaptation.

Within the context of the international climate change negotiations, various stakeholders have promoted the enhancement of innovation systems and technology innovation centers in developing countries. Early in 2008, the UK's Carbon Trust released a paper entitled 'Low Carbon Technology Innovation and Diffusion Centers: Accelerating low carbon growth in a developing world'. This paper proposed an integrated model for a series of innovation centers drawing from the experience of the Carbon Trust and the experiences of experts and officials in developing countries.

While there appears to be widespread support for enhancing national and regional technology innovation centers, there has been limited evaluation of existing innovation centers and how these experiences may offer insights into how to expand existing centers, and develop of new centers.

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<sup>2</sup> Throughout these terms of reference the term Technology Innovation Center(s) is used to encompass all of the various types listed.

## **Objectives of the work**

The objectives of this work are to:

1. Illustrate and explain the concept of climate technologies, climate technology innovation and associated economic and employment opportunities within the context of developing countries.
2. Illustrate and explain how climate technology innovation centers can help developing countries overcome the challenges of accelerating and widely deploying climate technologies and assist the creation of sustainable SMEs in the space.
3. Provide an inventory of existing national, regional and global climate technology innovation centers;
4. Identify gaps in the existing national, regional and global technology innovation centers.
5. Explore innovative options to enhance access to early stage financing for climate technology SMEs.
6. Provide general recommendations on enhancing the role and effectiveness of technology innovation centers including developing a matrix/guide to help developing countries use these centers within their current development contexts.

## **Scope of the work**

The work should cover technologies for mitigation and adaptation at all stages of the innovation and commercialization cycle. It should recognize the need to retain flexibility in the characteristics of technology innovation centers and networks so that they can be tailored to meet national and regional circumstances, the needs of funding and partnering organizations, as well as the specific characteristics of sectors and technologies that they support.

A distinction should be made throughout the work between how innovation systems differ in middle versus low-income countries making reference to BRIC (Brazil, Russia, India and China), SIDS (Small Island Developing States) and IDA (International Development Agency) countries using examples where appropriate.

The work should also draw upon previous work, including any previous reviews of technology innovation centers, such as UNEP affiliated centers for the promotion of technology transfer and development of environmentally sound technologies, and UNIDO/UNEP Cleaner Production Centers; infoDev's small business incubators and select information on any other initiatives, entities and organizations involved in the establishment and management of climate technology innovation centers.

Case studies should be used where appropriate to provide the reader with concrete examples of the concepts and analyses provided within the report.

## **The work is divided into four tasks:**

Many low-income countries will rely more heavily on adapting technologies from developed countries (technology transfer) rather than commercializing endogenous innovations. Therefore is it important to understand the innovation process of adapting technologies to meet local needs.

### ***Task 1: Climate Technology Innovation***

This section of the report will draw on work already done in the field and secondary sources to explain 'climate technology innovation' in the context of developing countries. It will define the scope of 'climate' technologies and signify the relevancy from 'low-tech' to 'high-tech' products and services in this sector for developing countries. It will describe the innovation cycle for climate technology ***including non-linear or***

**'adaptive' (technology transfer) innovation.** It will also differentiate mitigation versus adaptation technologies and describe the importance of each, ***focusing particular attention to the importance of technologies for adaptation.***

- A. Key output: *Develop a framework or matrix to allow developing countries to easily identify and evaluate their "Climate Technology Natural Endowments" including elements such as presence of natural resources, domestic and regional markets sizes, needs, market opportunities and competitive advantages.***

### **Task 2: The role of Climate Technology Innovation Centers**

Task 2 will outline both the opportunities and the barriers to innovation in this sector and identify the ways in which innovation center in developing countries can maximize the opportunities and overcome the barriers of developing and deploying climate technologies and scaling up promising enterprises in the sector. It will include why they are important and how they compliment other climate technology and innovation supporting policy measures.

- A. Key output: *Describe how climate technology innovation centers fit into a broader national policy strategy for climate change and complement/enhance other policy mechanisms to support climate technology innovation.***

### **Task 3. Inventory of Existing Centers**

Create an inventory of existing national, regional and global climate technology innovation centers, identifying the scope of their current activities and functions in a consistent and comparable format. Key information to be collected includes, but is not necessarily limited to, size of the center, sectoral, regional and technological coverage, scale and sources of funding, focus in terms of the stages of the technology cycle (research and development, demonstration, deployment, diffusion, transfer). Finally, the inventory should be analyzed to determine which of the centers already focus on climate technology or have an institutional model that could be relevant to climate technology innovation.

- A. Key output: *Compile 5 detailed case studies of successful climate technology innovation centers, their focus, business models, successes and lessons learnt. Using at least 2 of the case studies, describe how climate technology innovation centers have complimented or enhanced other climate change policy mechanisms (feed-in-tariffs, etc.) which lead to the successful deployment/diffusion of new technologies. A maximum of 2 of these case studies can be drawn from other industries.***

### **Task 4. Gaps in Climate Technology Innovation and Innovation Centers**

Based on the information collected in Task 2 and 3, the experiences of experts and practitioners, evaluations of climate technology innovation centers and networks, and other sources of information, identify the gaps and lessons learned from existing technology innovation centers.

- A. Key output: *Develop a framework or matrix to allow developing countries to easily identify their current market gaps and barriers to climate technology innovation (e.g. lack of technical expertise, absence of risk capital etc) and identify their current opportunities and assets to climate technology innovation (e.g. strong base of university research centers, emerging entrepreneurial culture etc).***

### **Task 5. Financing Mechanisms Climate Technology Innovation**

Task 5 will look at access to finance mechanisms for emerging Climate Technology entrepreneurs and enterprises in developing countries by investigating the full gamut of financing options available in these markets. The task will look beyond traditional developing country financing for climate tech SME's and ideally include innovative "out-of-the-box" methods for financing early stage ventures in developing countries. Such methods may include (but not limited to) trade sales, public procurement schemes, trade credit offsets by multinationals, international climate funds (GEF, CTF etc).

- A. ***Key output:*** *Develop a guide on how to easily identify and evaluate appropriate financing options for developing country markets and technologies within the climate technology space and list what some of these options are.*

**Task 6. Options for Enhancing Technology Innovation Centers**

Drawing upon the lessons learned as identified in Task 3, and taking into account the questions listed in annex 1, make general recommendations on how existing climate technology innovation centers can be improved, identify priorities for the development of new centers and explain how centers can be better networked or coordinated.

- A. ***Key output of report:*** *Develop a practical visual guide illustrating what different models or approaches to climate technology innovation centers are relevant given a country's level of development (reference BRIC, SIDS & IDA – What will technology innovation centers look like in Chad vs. China?).*

**Dissemination**

*infoDev* and UNIDO will establish a peer review panel and organize a review workshop for the purposes of gaining feedback on the work from a broader range of experts, with a final presentation of the fully revised report to take place upon completion of the work. The selected firm will produce a fully formatted, edited and designed report at the end of the assignment following the themes of the Climate Technology Program (colors and logo available from *infoDev*)

Separately, *infoDev* and UNIDO will arrange an event at which to present the completed parts of the work prior to the Copenhagen Summit. The report upon completion will be shared among *infoDev's* incubator network, showcased on *infoDev's* website, distributed within the World Bank and DFID and shared among UNIDO and the wider UN network of agencies.

**Budget**

The budget for this project will be USD 150,000.

**Deliverables and Timeline**

The work shall result in outputs to be delivered in the following time line:

	<b><i>Deliverable</i></b>	<b><i>Timing</i></b>	<b><i>Dates</i></b>
1.	Detailed work program	contract signature date + 1 week	Start October, 2009
2	Draft version of tasks 2 & 3	contract signature date + 4 weeks	End October, 2009
3	Completion of revised draft of tasks 2 & 3, including editing	contract signature date + 5 weeks	Start November, 2009
4	Draft version of task 4 & 6, including draft version of Task 3.A	contract signature date + 8 weeks	End November, 2009

	<b><i>Deliverable</i></b>	<b><i>Timing</i></b>	<b><i>Dates</i></b>
5	Completion of revised draft of tasks 4 & 6, including editing	Contract signature date + 9 weeks	Early December, 2009
6	Draft version of tasks 1 & 5	Contract signature date + 11 weeks	Mid December, 2009
7	Completion of revised draft of tasks 1 & 5, including editing	Contract signature date + 14 weeks	Mid January, 2010
8	Completion of ALL KEY OUTPUTS	Contract signature date + 16 weeks	End January, 2010
9	Presentation of revised draft report at revision workshop (Washington DC -TBD).	Contract signature date + 16 weeks	End January, 2010
10	Completion and delivery of full report	contract signature date + 18 weeks	Mid February, 2010
11	Presentation of final report at full stakeholder workshop (Europe- TBD)	contract signature date + 18 weeks	Mid February, 2010

## **Annex 1: Background questions to guide the study**

In order for the concept of innovation centers to move toward full implementation, many questions have been raised, including:

1. What should be the objectives of innovation centers and what outcomes should be expected in the short-, medium-, and long-term? How should performance be monitored and evaluated?
2. How to effectively harness existing resources and technology innovation centers?
3. Where gaps exist in the current infrastructure and related support mechanisms?
4. What the functions of new national and regional centers could be, and how existing centers might evolve?
5. What international coordination arrangements would be useful, if any?
6. What relationship should be between the centers, national governments, the private sector and other stakeholders?
7. Whether technologies for adaptation and mitigation might be integrated in common centers or if they should be in separate institutions?
8. Should centers provide a basis for sharing intellectual property? If so, how might these arrangements would function in practice? If not, what conditions would be required within the centers to ensure collaborative technology development?
9. What financing conditions within centers would allow for joint development and deployment of technologies and what financing mechanisms will support rapid development and deployment of technologies, and what financing mechanisms would be less suited to this task?
10. Whether the centers should address technology across all stages of the technology cycle or focused on research and development and diffusion of technologies separately?<sup>3</sup>
11. Whether the centers, as proposed by the Carbon Trust, would provide a means for the delivery of finance, and if so what the fiduciary relationships might be between the centers and the Convention?
12. What incentives will the centers provide to forge additional collaborative research and development in developing countries?
13. What the governance arrangement might be necessary and the possible relationship to the COP or other bodies under the Convention?
14. How can centers overcome human skill and talent shortages needed to push innovation forward? How can entrepreneurs be linked with the necessary social capital and domain expertise if it doesn't exist locally?
15. How can centers be designed in a 'market pull' model to ensure maximum engagement from the private sector and open markets?
16. What business models will centers use to ensure long-term financial sustainability?

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<sup>3</sup> For example see ECN, 2009, Note on the concept of International network of energy innovation centers, circulated during the sixth session of the AWG-LCA in Bonn, June, 2009.

## **Annex 2: UNFCCC & COP15 Copenhagen**

Decision 3/CP.13 requested the UNFCCC secretariat to facilitate the implementation of the actions for enhancing the technology transfer framework further elaborated in annex I to this decision, and of the work of the Expert Group on Technology Transfer in cooperation with Parties, the Global Environment Facility and other relevant international organizations, initiatives and intergovernmental processes.

Annex I of Decision 3/CP.13 includes:

1. an action under the theme of the 'Promotion of endogenous development of technology through provision of financial resources and joint research and development' as follows:

"To consider options for encouraging the setting up of institutions such as national systems of innovation that could lead to the endogenous development of technologies in developing countries and countries with economies in transition;" (paragraph 21 (b)); and

2. an action under the theme of the 'Promotion of collaborative research and development on technologies' as follows:

"To consider options for promoting regional research platforms, making use of existing networks of centers of excellence, where possible;" (paragraph 23 (d)).

These actions were included in the EGTT work program for 2008-2009, under the theme of mechanisms as Activities 11 and 12.

At the second session of the AWG-LCA several Parties, including China, the Cook Islands representing AOSIS, and Bangladesh representing the LDCs proposed a network of centers for adaptation (FCCC/AWGLCA/2008/11).

Later that year at the AWG-LCA in-session workshop on research and development, as summarized in the document FCCC/AWGLCA/2008/CRP.8, India proposed the creation of a network of climate technology innovation and diffusion centers. During this workshop many Parties emphasized the importance of enhancing existing innovation centers for strengthening collaborative research and development.

These proposals have been reflected in the AWG-LCA negotiating text in paragraphs 197-198 (FCCC/AWGLCA/2009/8). While there appears to be widespread support for enhancing national and regional technology innovation centers, including the creation of new networks and centers, there has been limited detailed discussion and development of the proposal.



### **Annex 3: UNIDO and NCPC Program**

In 1994, a joint UNIDO-UNEP National Cleaner Production Centers' Program (NCPC Program) was launched with the objective of increasing the competitiveness and productive capacity of industry, specifically Small and Medium-sized Enterprises (SMEs), through the implementation of CP and the application, adaptation and diffusion of Environmentally Sound Technologies (ESTs). Cleaner Production (CP) is a preventive environmental strategy that aims to reduce waste and emission generation and improve the productive use of natural resources. This UNIDO-UNEP Program currently covers activities in 42 countries. The Program supports UNIDO's mandate to foster sustainable industrial development and is thereby a building block of its Green Industry initiative.

UNIDO also has other networks such as:

- The UNIDO International Technology Centers (ITS) were created to promote industrial development through technology transfer programs.
- The UNIDO Investment and Technology Promotion Offices (ITPO) Network provides a unique combination of value-added services to entrepreneurs and institutions seeking international alliances in industrial investment and technology commercialization in and from developing countries and economies in transition.
- UNIDO has established Subcontracting and Partnership Exchanges (SPXs) with the objective of helping local enterprises to successfully meet the challenges of globalization and to take advantage of the emerging opportunities that evolve from industrial subcontracting, outsourcing and supply chain opportunities.