GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Implementing the
Poznan Strategic Program on

Technology Transfer

Foreword

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Technology transfer plays an increasingly critical role in an effective global response to the climate change challenge. Promoting the transfer of environmentally sound technologies (ESTs) and know-how to developing countries is a key priority for *all* countries—rich or poor—that seek to mitigate future climate impacts.

Technology transfer is embedded in the very fabric of the United Nations Framework Convention on Climate Change (UNFCCC) and is a key topic of ongoing talks. Enhanced action on technology transfer is essential to achieve full and effective implementation of the Convention, as stated in Article 4.5.

As an operating entity of the financial mechanism of the UNFCCC, the Global Environment Facility (GEF) holds a mandate to provide financial resources to support technology transfer under the guidance of the Conference of the Parties (COP). Our activities help catalyze the transfer of climate-friendly and country-driven ESTs to meet a broad variety of development priorities.

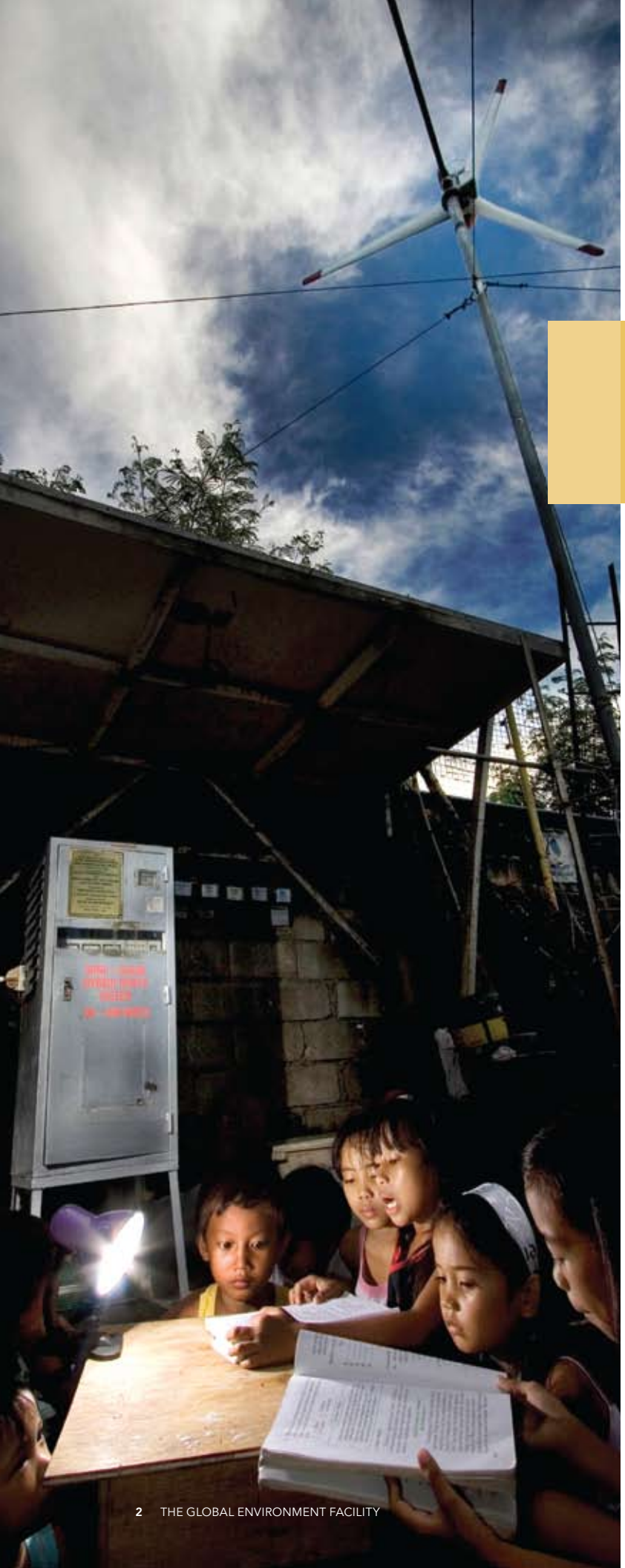
GEF activities on climate change focus on removing barriers to the widespread adoption of technologies and practices that enable energy efficiency, renewable energy, and sustainable transport. In accordance with Convention guidance, the GEF also provides funding for technology needs assessments and other enabling and capacity-building activities. The GEF has also stepped up its programming in land use, land use change and forestry.

Since the inception of GEF in 1991, we have allocated nearly $3 billion to support climate change activities in developing countries and economies in transition and have leveraged more than $15 billion in additional cofinancing. Today, the GEF is the largest public-sector funding source for the transfer of ESTs, supporting technology transfer activities in almost 100 developing countries. Our current project portfolio, upon completion, is expected to eliminate more than 2.5 billion tonnes of CO_2 emissions.

While the GEF is recognized as a key player in this arena, its function as a technology transfer mechanism could be improved and strengthened. Toward this end, and in response to a decision on the development and transfer of ESTs at the 13th meeting of the COP (Bali, Indonesia 2007), the GEF launched the *Poznan Strategic Program on Technology Transfer* in 2008. With $50 million in funding, the Poznan Program signals our renewed commitment to catalyzing real progress in this important effort. Updates on GEF's contribution to this program are featured in this publication.

Record replenishment of the GEF Trust Fund, at $4.34 billion for the GEF-5 funding cycle (2010–2014), has allowed us to intensify our efforts to promote technology transfer activities throughout the technology development cycle. It has enabled us to make the longer-term investments in technology transfer that are critically needed to spur increased investment in ESTs. This publication provides a snapshot of the GEF-5 approach to promote technology transfer and provides additional insight.

All of my colleagues at the GEF, our 182 member governments, as well as the GEF Agencies and other partners would agree that vitally important work is underway—and that far more remains to be done. We hope to inspire partnerships to move toward the next generation of innovative technology transfer programming with renewed enthusiasm.



Introduction: Technology Transfer and GEF Support

What is technology transfer and why is it important?

Developing, demonstrating, deploying, and diffusing environmentally sound technologies (ESTs) are activities in the critical path toward an effective global response to environmental challenges, as highlighted in Agenda 21. Technology lies at the core of the climate change challenge—as the source of greenhouse gas (GHG) emissions, as a means to reduce such emissions and address impacts, and as a foundation for economic development. In essence, technology and its transfer provide both the basis and the catalyst for a global shift toward low-carbon development. Simply put, the global climate change challenge cannot be addressed without technology transfer.

The transfer of ESTs and know-how, as enshrined in Article 4.5 of the United Nations Framework Convention on Climate Change (UNFCCC), is one of the key means to reduce (or slow the growth in) GHG emissions and to stabilize their concentrations.[1] Also, technological change has the potential to significantly reduce the cost of options to meet the climate change goals. Technology transfer creates opportunities for economic growth: innovation is a foundation for industrial development, helping to create or expand markets for products and services, and generating jobs.

1 Article 4.5 of the Convention states: "The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention."

What role does the GEF play in technology transfer?

As an operating entity of the financial mechanism of the UNFCCC, the GEF has a mandate to finance the transfer of ESTs in the context of both mitigation and adaptation, with significant guidance from the Conference of the Parties (COP). The GEF Trust Fund is primarily programmed to support mitigation measures. The GEF also manages two special funds under the UNFCCC: the Special Climate Change Fund (SCCF) and the Least Developed Countries Fund (LDCF). The SCCF has as one of its primary aims the transfer of ESTs to developing countries. The LDCF also supports technology transfer that relates to urgent and immediate adaptation needs.

In recent years, the GEF has invested about $250 million annually in energy efficiency; renewable energy; emerging, low-carbon, energy-generating technologies; cost-effective, short-term response measures; and sustainable urban transport. GEF 's strategic approach to critical technology transfer activities is regularly examined and modified as appropriate to improve its effectiveness and scope in response to changing needs and funding levels. The GEF programming in climate change and its support for technology transfer has evolved from its start during the pilot phase (1991–1994) to GEF-4 (2007–2010), as shown in Figure 1. Establishment of "enabling policy environments" is of equal importance with GEF's work in funding technology pilot and investment projects. GEF works with countries to build legal and regulatory landscapes that actively encourage the adoption of climate-friendly technologies and practices. Ongoing commitments by GEF and its partners further help countries integrate newly demonstrated technologies into wider economies—another element for successful technology transfer.

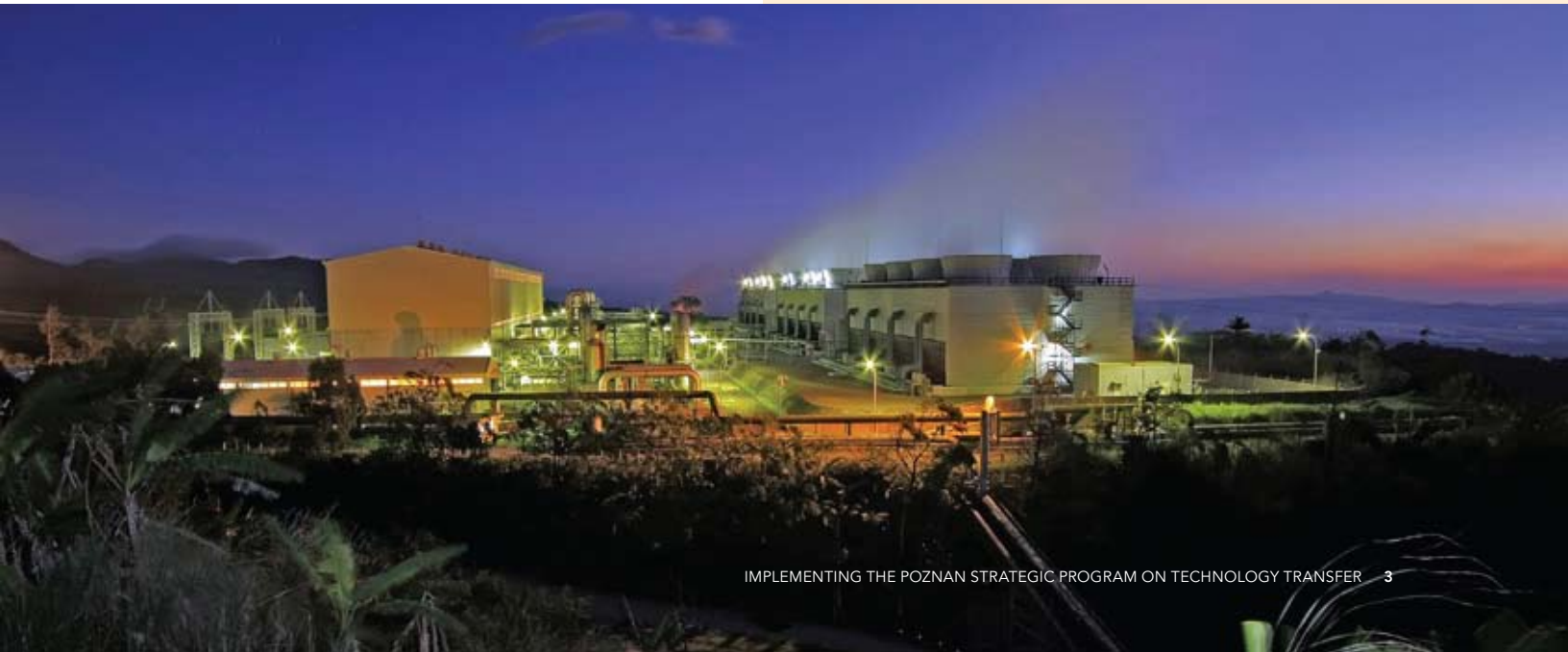
BOX 1: TECHNOLOGY TRANSFER DEFINITION

While there are many definitions of technology transfer, the Global Environment Facility (GEF) has adopted the concept of technology transfer as defined by the Intergovernmental Panel on Climate Change (IPCC) and embodied ian the UNFCCC technology transfer framework. Technology transfer is defined as:

… a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organization (NGOs) and research/education institutions…

…the broad and inclusive term "transfer" encompasses diffusion of technologies and technology cooperation across and within countries. It covers technology transfer processes between developed countries, developing countries and countries with economies in transition, amongst developed countries, amongst developing countries, and amongst countries with economies in transition. It comprises the process of learning to understand, utilize and replicate the technology, including the capacity to choose and adapt to local conditions and integrate it with indigenous technologies (Metz et al. 2001).[1]

This definition includes a wide range of activities and extends to a broad array of institutions. The COP established the Expert Group on Technology Transfer (EGTT) under the Subsidiary Body for Scientific and Technological Advice (SBSTA), which defined the following five-part framework for meaningful and effective actions to enhance the implementation of technology transfer: technology needs and needs assessments; technology information; enabling environment; capacity building; and mechanisms for technology transfer.



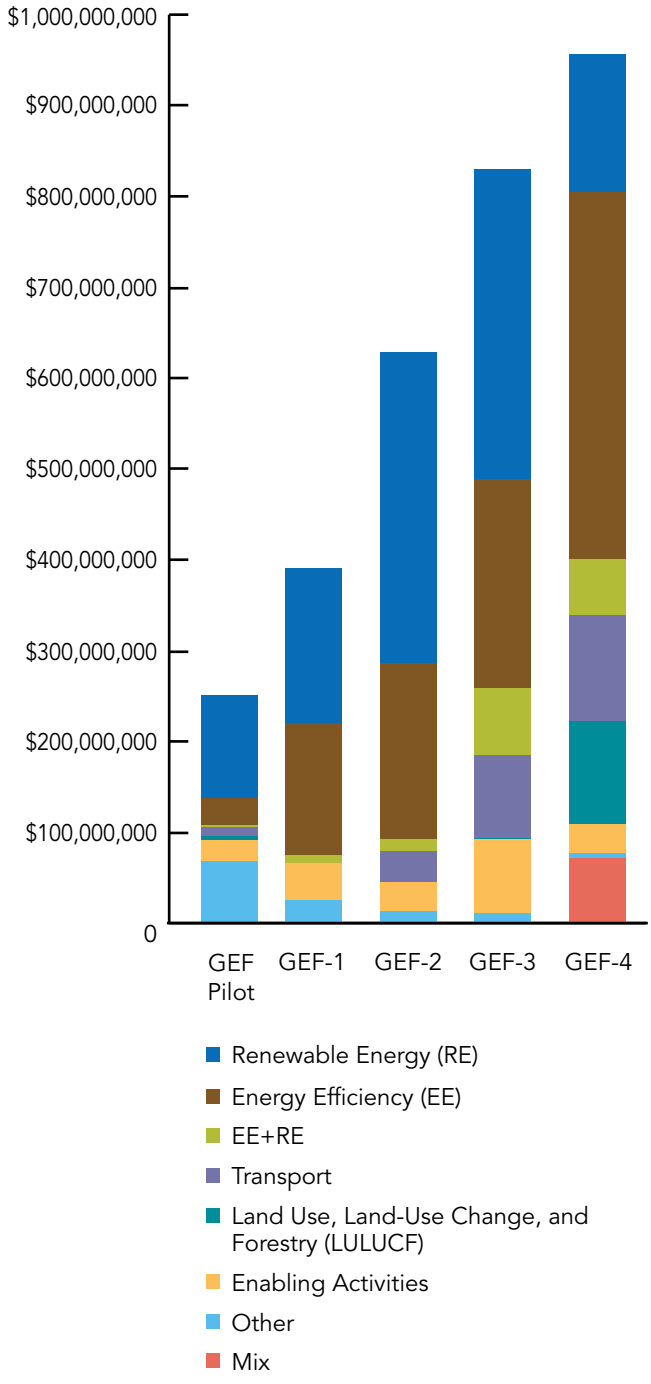
GEF experiences leading up to GEF-4 had generated the following observations about technology transfer to inform subsequent programming:

- Technology is transferred primarily through markets, and barriers to the efficient operation of those markets must be removed systematically;
- Technology transfer is not a single event or activity but a long-term engagement, during which partnerships and cooperation, often requiring time to develop and mature, are mandatory for the successful development, transfer, and dissemination of technologies; and
- Technology transfer requires a comprehensive approach, incorporating capacity building at all relevant levels.

These observations provided important insights into developing a strategic program on technology transfer, which is described in the next section.

Under GEF-5 (2010–2014), funding for the climate change mitigation program has expanded to approximately $1.4 billion, and the climate change strategy now embraces technology transfer as a priority, with the entire portfolio supporting it directly or indirectly. GEF-5 programming is also described in this document.

FIGURE 1: LEVEL OF GEF FINANCING IN CLIMATE CHANGE FROM PILOT PHASE TO GEF-4 (GEF 2010b)



PV installations in Bozcaada Island, Turkey, as part of the Poznan technology transfer pilot project implemented by the United Nations Industrial Development Organization (UNIDO). Photo credit: UNIDO

Poznan Strategic Program on Technology Transfer

In November 2008, the GEF Council and the LDCF/SCCF Council approved the new *Strategic Program on Technology Transfer*. This Program was developed in response to the 13th Conference of the Parties (COP13) to the UNFCCC (Decision 4/CP.13), which requested the GEF to elaborate a strategic program for scaling up investment in technology transfer to help developing countries address their needs for ESTs.

The 14th Session of the Conference of the Parties (COP14) welcomed the GEF's *Strategic Program on Technology Transfer*, renaming it the *Poznan Strategic Program on Technology Transfer* in its Decision 2/CP.14. COP14 deemed the Program a step forward in scaling up the needed investment and also recognized its potential to enhance technology transfer activities under the Convention. Decision 2/CP.14 also requested the GEF to consider the long-term implementation of the strategic program.

The *Poznan Strategic Program* established the following three funding windows within the GEF in support of technology transfer:

1. Conduct Technology Needs Assessments (TNAs)
2. Pilot priority technology projects linked to TNAs
3. Disseminate GEF experience and successfully demonstrated ESTs.

Initiatives supported under each window are summarized in this section. The total funding level for the *Poznan Strategic Program* is $50 million, which includes $35 million from the GEF Trust Fund from GEF-4 and $15 million from the SCCF.

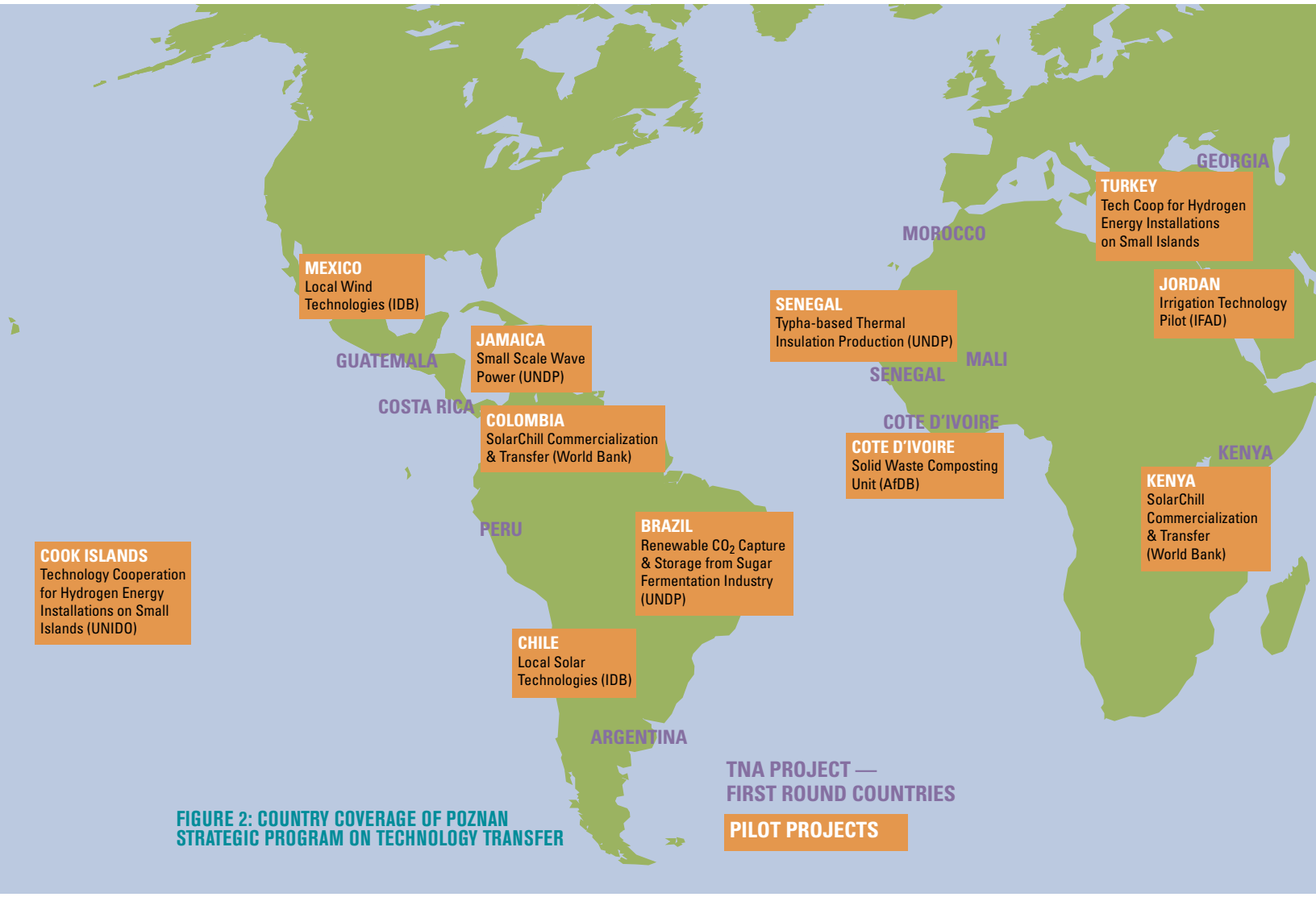


FIGURE 2: COUNTRY COVERAGE OF POZNAN STRATEGIC PROGRAM ON TECHNOLOGY TRANSFER

Technology Needs Assessments

A TNA is a country-driven activity to assist in identifying and analyzing the priority technology needs for mitigating and adapting to climate change, particularly in developing countries. Such analysis can form the basis for developing portfolios of EST projects and programs that will facilitate the transfer of technologies and know-how, in accordance with Article 4.5 of the Convention.

TNAs also present an opportunity, under the *Poznan Strategic Program*, to track evolving needs for new equipment, techniques, knowledge, and skills for mitigating GHG emissions and reducing vulnerability to climate change. The goal of this GEF-supported global program is to enable all parties to better understand their technology needs, prepare technology action plans (TAPs) and facilitate their implementation in a collective and coordinated manner.

This GEF-supported TNA project is executed and implemented by the United Nations Environment Programme (UNEP). The project concept was approved in April 2009, launched in November 2009, and is to be completed within 30 months. The GEF funding for the project is $9 million, with cofinancing adding approximately $2.85 million.

The project has the following three components:

1. Support the development of TNAs in 35 to 45 developing countries or, where these have already been prepared, make the TNAs more strategic and useful in an operational sense;
2. Develop appropriate decision-support tools and provide the technology information needed for preparation of TNAs and TAPs; and
3. Establish a mechanism that facilitates cooperative sharing of TNA and TAP experiences, thereby fostering implementation of identified measures.

The project utilizes the methodologies described in the updated *TNA Handbook*, as indicated in COP decision 2/CP.14. Simultaneously, it is providing feedback through an iterative process involving project partners to fine tune these methodologies.

The following 15 countries were selected as the first-round countries in early 2010.

- **African:** Cote d'Ivoire, Kenya, Mali, Morocco, Senegal
- **Asian:** Bangladesh, Cambodia, Indonesia, Thailand, Vietnam
- **Eastern European:** Georgia
- **Latin American and Caribbean:** Argentina, Costa Rica, Peru, and Guatemala

These countries have initiated and largely completed preparatory actions including the following:

- Formal institutional structures for project implementation have been established in all countries;
- Operating guidelines to govern activities and inter-agency relationships amongst national stakeholders engaged in TNA work have been agreed and disseminated in several countries;
- Awareness of the TNA among stakeholder groups has been raised through workshops and other mechanisms, such as National Inception Workshops in 10 countries;
- TNA workplans have been finalized in 14 countries in consultation with stakeholders; and

Senegal and Argentina have taken the lead in identifying priority sectors to set the stage for identification of technology transfer barriers.

Building on the foundation established in most countries, technical support activities are underway. Three regional capacity building workshops were held in September 2010 in Africa, Asia and Latin America, attended by 54 participants from 13 countries. The objective of the workshops was to build capacity of the country teams to conduct high quality TNAs. Topics covered included: methodology and tools for prioritization of technologies, multi-criteria analysis, financial assessments of technologies, and facilitation of effective stakeholder consultation.

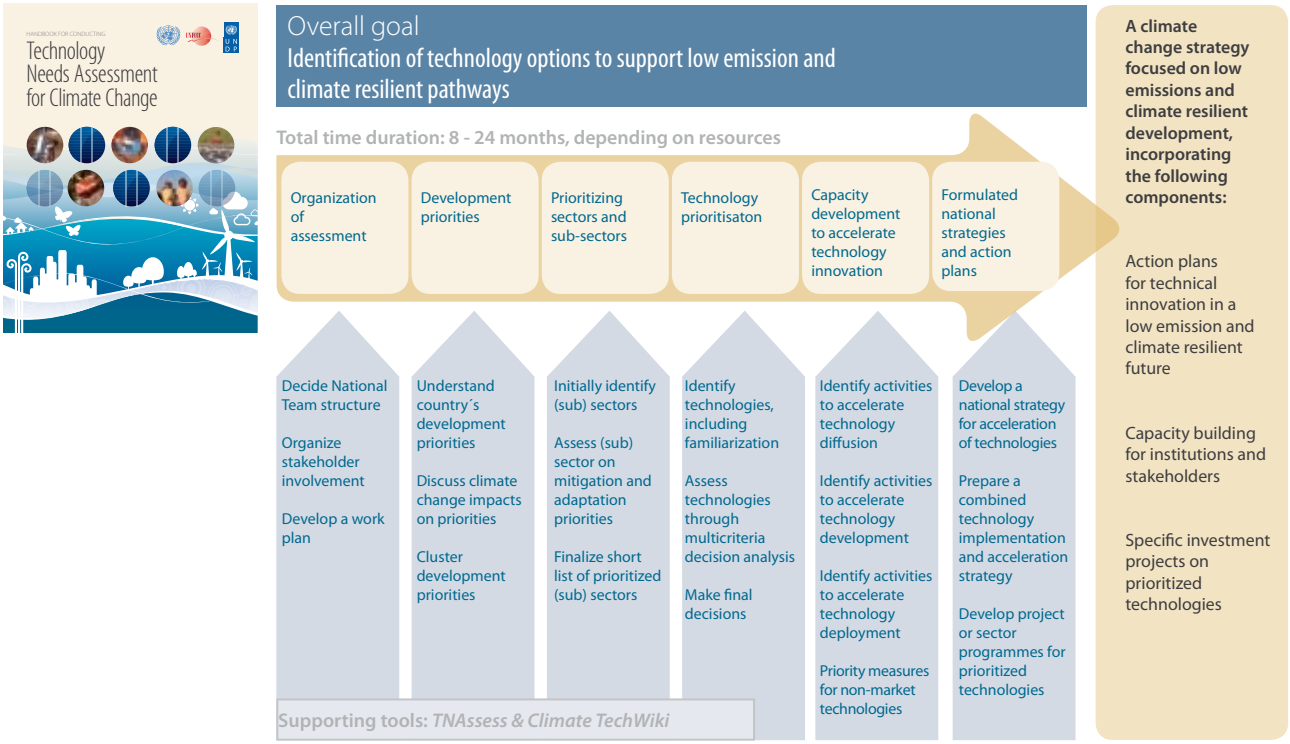
The updated TNA handbook, published by the United Nations Development Programme (UNDP), has been shared with country teams and is being used as the basic resource document on the general methodology of sector prioritization. The project is developing guidebooks to support the efforts of national teams to carry out adaptation TNAs, as there are presently no sectoral guidebooks available on this subject.

Data facilitation to the country teams is carried out in collaboration with UNDP on Climate Tech-wiki, Regional Centres to provide technical support on technologies and on methodologies, and the International Energy Agency (IEA) to create a developing country policy database through the project.

An additional 21 countries are to be selected as second-round countries by the end of 2010. The project and its progress will be presented at a side event at COP16 in Cancun, Mexico. The first draft guidebook on coastal zones is also scheduled for release during COP16.

This project approach is complementary to individual country-level TNA projects outside the Poznan Program.

FIGURE 3: TNA HANDBOOK AND ASSESSMENT PROCESS (UNDP 2010)



Source: http://unfccc.int/ttclear/jsp/TNAHandbook.jsp

Countries that wish to develop more in-depth and extensive analysis to facilitate technology transfer have been invited to do so under their GEF national resource allocation. For example, the GEF is providing support to China to carry out a detailed assessment of current technology developments and needs, key barriers, and ways to promote EST transfer. Going beyond technology identification, the project will pursue pilot activities to operationalize key assessment findings. Specifically, programs that target and reduce barriers to diffusion of priority technologies will be designed and potentially launched on a pilot basis. The China TNA project is implemented by the World Bank in order to promote coordination with its investment strategy.

Technology Transfer Pilot Projects

A GEF funding window was created to finance pilot projects that support the deployment, diffusion, and transfer of technologies that have been identified as national priorities through TNAs, National Communications, or other means.

The GEF organized a call for proposals for technology transfer pilot projects, which opened on March 25, 2009 with background information, procedure for proposal submission, and selection criteria. In addition to the standard criteria for reviewing GEF climate change projects, the call for proposals placed emphasis on, among others, consistency of targeted technology with national priorities, innovative technologies and mechanisms for technology transfer, highly leveraged projects, including investments from both the public and the private sector, as well as South-South technology transfer and international collaborative projects. The deadline for submission was August 14, 2009, which was subsequently extended to September 30, 2009.

Fourteen proposals were selected out of 39 submissions, covering 16 countries supported by six GEF Agencies. These selected projects are summarized in Table 1. Total GEF funding to support these pilot projects amounts to $58 million. Cofinancing for these projects totals more than $195 million.

The innovative and diverse technologies piloted in these projects are in the following fields:

- **Renewable energy:** solar, biomass, wind, wave, and hydrogen production and storage
- **Energy efficiency:** construction and insulation materials such as bamboo and typha, efficient and hydrofluorocarbon-free appliances

- **Transport:** green trucks
- **Waste management:** solid waste composting for energy recovery
- **Carbon capture and storage:** renewable carbon capture and storage from sugar fermentation
- **Water management:** membrane drip irrigation.

Countries and Agencies continued to develop projects in 2010 so that they could be submitted to the GEF for endorsement by the planned target dates. As of October 2010, GEF Agencies charged with implementing the technology transfer pilots have reported considerable progress in project development and implementation. Short descriptions of each pilot project are provided in this publication.

In addition to the benefits to be gained within each country, these pilot projects enable the GEF to explore ways and means to strengthen the linkages among project development, technology needs, and priority identification exercises. Practical experiences gained may also help all the partners move toward a more comprehensive strategy and focused technology programming in the future.

BRAZIL — RENEWABLE CO_2 CAPTURE AND STORAGE (CCS)

Project Title:	Renewable CO_2 Capture and Storage (CCS) from Sugar Fermentation Industry in Sao Paulo State
GEF Agency	UNDP
GEF Financing:	$2,970,000
Cofinancing:	$7,715,000 total
Public Sector:	$4,215,000
Private Sector:	$3,500,000
Dates of Implementation:	2009–2014

Project Overview

Carbon dioxide capture and storage (CCS) is considered as a very promising option to mitigate climate change, involving the separation of CO_2 from industrial and energy-related sources and long-term isolation from the atmosphere. Most efforts carried out to date deal with CCS related to fossil fuel use. This project addresses renewable CCS from biomass in an ethanol production plant. The application of this technology in renewable energy has the additional advantage of a net removal CO_2 from the atmosphere: for each liter of renewable fuel used, the approach not only reduces CO_2 emissions but also removes CO_2 from the atmosphere. Combining the use of ethanol from sugar cane with renewable CCS is one of the few existing ways to reduce CO_2 concentrations from the atmosphere (IPCC 2005).

Brazil has been a leading nation in the promotion of biofuels as a sustainable energy alternative, with a clear policy framework to support their use. As of 2009, the volume of domestic ethanol sales had surpassed that of gasoline, confirming Brazil as one of the large producers, users, and exporters of ethanol in the world. The project thus will transfer a technology that could significantly reduce CO_2 emissions with global environmental benefits in a key sector of the Brazilian economy.

This project aims to remove barriers to the deployment, diffusion, and transfer of renewable CCS technology for application to sugar fermentation in the production of ethanol. The project includes the following activities:

1. Establishment of enabling environment for renewable CCS technology transfer
2. Renewable CCS technology demonstration
3. Capacity building on renewable CCS technology application

The success of this demonstration project also has the potential to enhance the sustainability of biofuels. The technology can make a significant improvement to the already positive GHG balance of ethanol-based fuels and has the potential to capture and sequester 23 million tons of CO_2 per year in Brazil. Since sugar cane is produced mainly in developing countries, this project could contribute to South-South technology transfer.

CAMBODIA — UTILIZING AGRICULTURAL RESIDUES FOR POWER GENERATION

Project Title:	Climate Change Related Technology Transfer for Cambodia: Using Agricultural Residue Biomass for Sustainable Energy Solutions
GEF Agency	UNIDO
GEF Financing:	$1,947,000
Cofinancing:	$3,965,000 total
Public Sector:	$565,000
Private Sector:	$3,400,000
Dates of Implementation:	2009–2015

Project Overview

Cambodia has significant potential biomass energy resources from agricultural residues, including rice husk, rice straw, palm oil extraction waste, and cashew nut shells, in addition to standing biomass resources. The estimated potential energy generation from waste biomass is substantial, at nearly 19,000 GWhr per year. As Cambodia is dependent on imported fossil fuel, a strategy that combines energy efficiency with low carbon alternative technologies offers a comprehensive solution for the country to achieve the twin goals of energy security and sustainable energy solutions. The importance of using locally available renewable sources of energy has been recognized in Cambodia's TNA, National Communication, and national policy.

The objective of this project is to bring about transfer of sustainable, efficient, cost effective and environmentally friendly (low carbon) agro waste biomass-based energy systems to replace fossil fuel powered generators and boilers for power generation and thermal energy applications. The project uses an integrated approach that combines interventions at the policy level, in the market place, and on the shop floor. Specific activities include operations of two pilot plants, capacity building and tool development for technology adaptation and transfer, institutional framework strengthening, upscaling of biomass-fueled

technologies in Cambodia through market creation, and establishment of policies and regulatory frameworks for economic sustainability of technology transfer. The following two technology options will be explored:

1. Replacement of small fossil fuel generators in an industrial estate/provincial town with biomass-based high efficiency electricity generators of 3–5 MW
2. Replacement of diesel oil with available biomass in existing industrial captive power generation systems based on combined heat and power cycle.

Significant improvements in the biomass-based power generation technologies have taken place in the Asian region, particularly in India, China, Malaysia, and Thailand. Cambodia can benefit from such improvements through South-South technology transfer.

CHILE — LOCAL SOLAR TECHNOLOGY DEVELOPMENT FOR HEATING AND POWER GENERATION

Project Title:	Promotion and Development of Local Solar Technologies in Chile
GEF Agency	Inter-American Development Bank (IDB)
GEF Financing:	$3,000,000
Cofinancing:	$32,400,000 total
Public Sector:	$32,400,000
Private Sector:	pending
Dates of Implementation:	2009–2014

Project Overview

Northern Chile receives one of the highest concentrations of solar radiation in the world, with great potential for solar energy generation. Yet this potential has not been utilized sufficiently, primarily due to limited availability of suitable technologies and low levels of investments. Chile has been dependent on nearby countries for natural gas and oil to meet the increasing energy demand and to maintain economic growth. With this background, Chile has recently taken steps to promote the use of renewable energy to reduce reliance on imported fossil fuel-based energy and to improve electrical coverage in rural areas.

The general objective of this project is support the Government of Chile and the National Energy Commission in the development of a solar technology industry, for both solar water heating and power generation in Chile. This will be the first project in Chile to promote distributed generation with solar power applications installed in households, with the benefit of reducing the amount of energy losses in transmission.

The specific objectives include the following: (i) to promote transfer of technology, institutional strengthening and capacity building in solar technology; (ii) to encourage the development of demonstration projects using solar technologies for both solar water heating and power generation; and (iii) to support the design of incentives, financial mechanisms and public awareness campaign to promote solar technology projects for both solar water heating and power generation.

The project will enhance the capabilities for domestic solar water heater manufacturing, and will support the installation of approximately 8,000 solar water units with 2.5m^3 capacity and 2,000 units with 4.0m^3 capacity. Up to 500kWh of solar PV systems will also be installed.

This project has the potential to reduce to 7,318 tonnes of direct CO_2 equivalent emissions over the next 20 years. The estimated total indirect emissions are 0.497 million tonnes over 20 years.

CHINA — GREEN TRUCKS FOR CLEANER AND MORE EFFICIENT FREIGHT TRANSPORT

Project Title:	Green Truck Demonstration Project
GEF Agency	World Bank
GEF Financing:	$4,868,000
Cofinancing:	$17,400,000
Public Sector:	$17,400,000
Private Sector:	pending
Dates of Implementation:	2009–2014

Installing aerodynamic technology
Photo credit: World Bank

Local truck equipped with energy efficient technologies
Photo credit: World Bank

Project Overview

The transport sector is a major consumer of energy in China, accounting for 30% of total crude oil consumption. It is also a rapidly growing source of GHG emissions: transport-based GHG emissions are expected to increase by almost 400% from 2004 to 2030 in China. The number of trucks on the road is expected to increase six-fold by 2035 as the demand for road freight transport is rapidly increasing. Fuel efficiency of freight transport is 30% lower than in advanced industrialized countries. These figures indicate that the freight transport sector has significant potential to improve fuel efficiency and reduce GHG emissions.

However, many cost-effective technologies available internationally are not yet widely utilized in China for a number of reasons. First, existing policies do little to create incentives for the development of markets for innovative technologies designed to reduce energy consumption in the existing freight transport fleet. Second, few if any efficiency improvement are made in the new truck fleet due to limited incentives for the adopt of these newer technologies. Finally, the clients of freight service providers remain unaware about the merits, cost savings, and potential for fuel efficiency improvement.

This project will support green truck demonstrations in Guandong Province to accelerate the transfer and deployment of clean transport technologies in the road freight sector, thereby reducing GHG emissions and improving air quality. Guangdong Province serves as the focus for project activities because freight transport in this province demonstrates a very high share of fuel consumption, accounting for almost 80% of the transport sector fuel usage. The green truck technologies and practices for this project include improved aerodynamics, improved tire systems, enhanced truck maintenance, driver training on fuel efficiency, and improved logistics management. More than 150 old trucks are to be retrofitted with different types of green truck technologies verified under the United States Environmental Protection Agency Smartway Program, which has showcased environmentally cleaner, more fuel efficient transportation options. Innovative financing mechanisms are made available to participating carriers to enable them to purchase at least 150 new green trucks. Through licensing or intellectual property rights transfer, local technology vendors or truck producers are expected to make available an additional 1,000 new trucks. These technologies are expected to lead to an average 20% reduction in fuel usage in existing and new trucks.

The project will result in an estimated reduction of 2.5 million tonnes of CO_2 emissions over the next eight years.

COLOMBIA AND KENYA—HARNESSING SOLAR POWER FOR VACCINES AND HOUSEHOLDS THROUGH SOLARCHILL REFRIGERATORS

Project Title:	SolarChill: Commercialization and Transfer
GEF Agency	World Bank
GEF Financing:	$2,995,000
Cofinancing:	$5,050,000 total
Public Sector:	$450,000
Private Sector:	$3,000,000
Other:	$1,600,000
Dates of Implementation:	2009–2014

SolarChill refrigerators
Photo credit: SolarChill Partnership

Project Overview

SolarChill is an initiative that began in 2000 by a consortium of bi- and multi-lateral agencies, NGOs, and others that started to stimulate the development of vaccine refrigerators that are environmentally sound, battery free, technologically reliable, affordable, and multi-source powered. SolarChill refrigerators address a number of problems posed by vaccine refrigerators fueled by kerosene and liquefied petroleum gas (LPG) in terms of cost, reliability, and environmental impacts. A third generation of SolarChill refrigerators is ready for large-scale testing, presenting a unique opportunity for health ministries and clinics to benefit from the latest in solar-powered refrigeration technology.

This project aims to commercialize and transfer the SolarChill vaccine refrigerator (SolarChill A) and to begin the process of commercializing and transferring the SolarChill household and light commercial refrigerator (SolarChill B). The goal is to provide product tests of meaningful scale to allow the technology to proceed to the final stages of commercialization in two developing countries with potential for technology transfer to private-sector producers. The market potential for SolarChill A, which has recently been certified by the World Health Organization, has been estimated at between 3,000 to 5,000 units annually. The demand for household and light commercial refrigerators is more significant for populations not living near the electrical grid, and may be considered as a more profitable product for companies considering the technology for production.

The project will focus on three sets of activities. First, the project will undertake procurement and distribution of 100 SolarChill A models for each partner country to be placed in clinics and monitored to generate adequate data to verify the product reliability. Scientific credibility of the monitoring data will be ensured by UNEP in consultation with partners. The data will be critical to supporting awareness campaigns. Second, the project will carry out procurement of a small number of SolarChill B model to be demonstrated in industry shows and placed in businesses and other places for reliability modeling and marketing. Finally, marketing and awareness raising campaigns will be conducted with UNEP to raise awareness of the products, to stimulate market demand, and pave the way for accelerated commercialization, production and technology transfer in the program countries.

COTE D'IVOIRE — REDUCING GHG EMISSIONS WITH INTEGRATED MUNICIPAL WASTE MANAGEMENT

Project Title:	Construction of 1,000 Ton per Day Municipal Solid Waste Composting Unit in Akouédo Abidjan
GEF Agency:	African Development Bank (AfDB)
GEF Financing:	$2,888,000
Cofinancing:	$36,898,500 total
Public Sector:	$1,888,500
Private Sector:	$35,010,000
Dates of Implementation:	2009–2013

Project Overview

Akouédo is the only landfill for the urban agglomeration of Abidjan. Since 1965, solid wastes have been dumped here without any treatment or environmental safeguards. Once the wastes get to the site, they are simply spread mechanically with a stampede of informal sorters. This uncontrolled open site poses serious health concerns to the nearby population. Five million m^3 of contaminated water from the site presents risks to the water table and the nearby lagoon. Biodegradable wastes are also a source of GHG emissions.

The objective of this project is to transfer technologies for sustainable integrated management of the municipal solid wastes by the construction of a municipal solid waste treatment plant, including an industrial composting unit, thus reducing local pollution and contributing to GHG emission reduction and the fight against climate change. The project is expected to help the country develop its capacity in waste treatment and build consensus on climate change mitigation technologies. Industrial treatment of municipal solid wastes could help address concerns of GHG emissions through composting, and recovery of recyclable materials could create job opportunities. The project should also enable farmers to improve soils and crop productivity with compost and reduce use of chemical fertilizers. The main expected outputs include the following:

1. Diagnosis of the current waste management system to serve as a basis for the formulation and adoption of integrated waste management and awareness raising plan;
2. Establishment of a sustainable waste collection system and the capacity reinforcement of all actors involved in waste collection system; and
3. Installation of a 3,000 tons/day municipal solid waste treatment plant including a 1,000 tons/day industrial composting unit, a waste fermentation storage pit, a leachate treatment unit and a sanitary filling zone.

The project is based on South-South industrial cooperation with China to introduce waste treatment and composting technology systems designed and applied in China with proven efficiency for decades. The proposed integrated and sustainable waste management is a first of its kind in Cote d'Ivoire and in West Africa, and will serve as a basis for replication in the country and in the region.

JAMAICA — HARNESSING WAVE ENERGY FOR ELECTRICITY IN SMALL ISLAND COMMUNITIES

Project Title:	Introduction of Renewable Wave Energy Technologies for the Generation of Electric Power in Small Coastal Communities in Jamaica
GEF Agency:	UNDP
GEF Financing:	$816,000
Cofinancing:	$1,420,000 total
Public Sector:	$920,000
Private Sector:	$500,000
Dates of Implementation:	2009–2012

Project Overview

Marine renewable resources, especially wave, tidal, and current, have great potential for wider adoption due to the concentrated power and stable availability compared to other renewable resources. Industrialized countries with high energy intensity seas, such as the United Kingdom, the United States, Canada, Ireland and Australia, have been developing wave energy conversion technologies to harness this potential. Countries in tropical regions are starting to take note of the progress of wave energy in developed countries, and are including marine-based renewable energy in their development polices and regulatory frameworks to promote their introduction. Renewable energy applications have the potential to reduce the dependency on and expenditures on imported fossil fuel. For Jamaica, such fossil fuel import amounts to 65% of foreign exchange earned and about 15% of Gross Domestic Product.

Marine renewable technology development in industrialized countries tends to focus on larger scale, capital intensive, high intensity applications with central grid connections. In order to promote wide applications in developing countries, especially small island developing states (SIDS), these technologies would need to work in distributed generation, for low energy intensity seas, be oriented to benefit small communities, and with lower capital and operation and maintenance costs.

The main objective of this project is to introduce renewable wave energy in SIDS like Jamaica for the electrification of coastal rural communities (both on and off-grid) and to contribute to lowering the risks of these communities' exposure to high energy storm waves. The project supports wave energy conversion technology assessment, demonstration wave energy pilot projects, along with capacity building and policy and regulatory support.

The technology piloted through the project is the first of its kind to be introduced to Jamaica. One or two small coastal communities stand to benefit from renewable wave energy conversion technologies through this project. In the mid-term (2–5 years), up to 50 of small coastal communities, especially isolated ones that have no power or depend on diesel power generation through mini-grids, will benefit from wave energy conversion technologies through replication of similar projects. Approximately 10,000 people could potentially benefit from renewable wave energy in 5 years.

JORDAN — WATER AND ENERGY EFFICIENT IRRIGATION THAT ACCOMMODATES SALINE WATER

Project Title:	dHRS Irrigation Technology Pilot Project to Face Climate Change Impacts
GEF Agency:	International Fund for Agricultural Development (IFAD)
GEF Financing:	$2,200,000
Cofinancing:	$6,000,000 total
Public Sector:	$3,000,000
Private Sector:	$3,000,000
Dates of Implementation:	2009–2016

Machine set-up from earlier dHRS trial applications. Photo credit: duPont

Example of dHRS applications from Abu Dhabi (2009). Photo credit: dti-r

Project Overview

Jordan is one of the world's most water-scarce countries. Water scarcity is a leading constraint in the agriculture sector, which is the main consumer of water in the country. The climate in the region is predicted to become hotter and drier, in turn increasing the occurrence of droughts (IPCC 2007). The ability of the Jordanian agricultural sector to adapt to increased water scarcity induced by climate change is crucial for the country's human development and growth. The approach of this project is centered on the link among technology transfer for agricultural water efficiency, climate change response, and rural development.

The objective of this project is to reduce vulnerability to climate change in Jordan's agricultural system, particularly in the area of water resources, by testing an efficient water-use technology called Dutyion Root Hydration System (dRHS), held by DuPont. This innovative technology can remove contaminants such as salinity, and offers higher energy efficiency than conventional desalination and irrigation methods due to its use of gravity. The technology allows water to pass through its membrane by a process of Phase Change Permeation. Water is delivered as water vapor when plant demand exceeds free moisture in the soil. The project focuses on promoting a pro-poor and community-based approach to technology transfer by directly engaging farmers and local stakeholders in the installation, use, and maintenance of the new technology.

This project pilots this technology by installing it on 200 hectares, with approximately 5,000 meters of pipes per hectare. The technology is expected to improve water use efficiency by at least 30%. The project also provides targeted training on the installation and use of the system, by providing training sessions to 200 farmers and 20 irrigation technicians. National and local government officials will be trained on the potential of this technology as an adaptation measure to climate change in the country.

Climate change adaptation measures in the agricultural sector, including conservation agriculture, improvement of water use efficiency and implementation of water harvesting techniques have been identified in the Jordan Second National Communication. The government has shown strong commitment to this project, providing cofinancing through the Agricultural Credit Corporation (ACC). The ACC will assess the feasibility of a public-private partnership to produce the technology within Jordan to make it more accessible to farmers in Jordan and the region.

MEXICO — DEVELOPING A VALUE CHAIN FOR DOMESTIC WIND TURBINE PRODUCTION

Project Title:	Promotion and Development of Local Wind Technologies in Mexico
GEF Agency:	IDB
GEF Financing:	$5,500,000
Cofinancing:	$18,600,000 total
Public Sector:	$14,600,000
Private Sector:	$4,000,000
Dates of Implementation:	2009–2015

Project Overview

Mexico is an oil-exporting country rich in fossil fuel resources. However, its future national energy demands may not be met with fossil fuel-based energy sources due to scarcity of investment resources and other factors. The expected rise of natural gas imports, the volatility of fossil fuel prices, as well as climate change concerns have prompted growing interest by the Mexican government to develop domestic sources of renewable energy to complement fossil fuels in power production and supply.

There are many areas in the country with moderate to very favorable wind resources that could be tapped for wind energy generation. Mexico's strongest wind energy resource is found in a 3,000km^2 region known as La Ventosa, located in the State of Oaxaca. Initial data from an ongoing pilot plant in this region indicate that the average capacity factor for wind power plants in the region could exceed 30%, higher than average capacity factors of the majority of wind resource areas around the world.

In order to tap this potential for wind energy, Mexico seeks to promote a local manufacturing base for wind turbines. This will address the needs of smaller developments, such as one or two wind turbines for distributed generation, and also address the limited availability of turbines on the international market for strong wind regions such as La Ventosa. Mexico already possesses

most of the capacity required for turbine manufacturing, albeit with varying degrees of competitiveness.

This project will support Mexico's drive to become a key player in the global wind energy market, expanding its wind generation capacity by facilitating local development and implementation of wind power installations. The project provides support to develop a value chain for the domestic production of wind turbines adapted to local conditions. The project has the following activity components:

1. Design and specification of wind turbine components, including blueprints for manufacturing and assembly of wind turbine components, and operational manuals for installation, operation and maintenance;
2. Procurement, manufacturing and assembly of wind turbine components for a Class 1A wind turbine prototype suitable for Mexican conditions and verification of the blueprint parameters;
3. Erection, start-up and operational testing of the wind turbine; and
4. Capacity building and institutional strengthening to promote a wind power market for distributed generation by small power producers.

This project has the potential to reduce to 47,903 tonnes of direct CO_2 equivalent emissions over the next 20 years. The estimated total indirect emissions are 3.74 million tonnes over 20 years.

RUSSIAN FEDERATION — ENERGY EFFICIENCY IMPROVEMENT AND PHASE-OUT OF OZONE DEPLETING SUBSTANCES IN REFRIGERATION AND AIR CONDITIONING

Project Title:	Phase out of HCFCs and Promotion of HFC-Free Energy Efficient Refrigeration and Air-Conditioning Systems in the Russian Federation through Technology Transfer
GEF Agency:	UNIDO
GEF Financing:	$19,800,000
Cofinancing:	$40,000,000 total
Public Sector:	$2,500,000
Private Sector:	$37,500,000
Dates of Implementation:	2009–2015

Project Overview

Under article 2 of the Montreal Protocol, the Russian Federation is reducing consumption and production of hydrochlorofluorocarbons (HCFCs) by 75% relative to its baseline consumption of 3,996.9 ozone depleting potential (ODP) tonnes by 2010. A further reduction of 90% relative to the baseline is required by 2015. At present, there are three main barriers to achieving the phase-out and delivering long-term solutions to enhance use of alternative technologies in the foam and refrigeration and air conditioning sectors. They are: insufficient institutional capacity, lack of suitable alternative technologies, and insufficient market drivers for environmentally friendly equipment and products. This project represents the first comprehensive international effort to address the full scope of work for HCFC phase-out and to fully integrate related environmental issues.

The primary objective of this project is the direct phase out of 600 ODP tonnes of HCFCs in the foam and refrigeration manufacturing sectors in the Russian Federation to help meet the 2015 Montreal Protocol target. The secondary objective of the project is to introduce more energy efficient designs and practices, through technology transfer, during the conversion of refrigeration and air conditioning manufacturing facilities.

The principal technology transfer activity will be undertaken through the provision of thermodynamic and engineering design as well as code of practice for the service of high efficiency non-HCFC and hydrofluorocarbon (HFC) free refrigeration equipment and air conditioners. The technology transfer component is specifically aimed at stimulating the market for use of refrigerants with low global warming potential (GWP) in energy efficient refrigeration and air conditioning equipment. In the course of the replacement of HCFCs in refrigeration and air conditioning systems by ODP-free and low GWP alternatives, the system designs will be analyzed and improved to reduce energy consumption by approximately 25 to 30%.

A centre of excellence will be created to stimulate the roll-out and replication of technology transfer—both in terms of ongoing support for design/service activities and energy efficiency technology adoption through a financial incentive scheme—which will increase access to a broader range of consumers and operators of refrigeration and air conditioning systems.

The direct GHG emissions reduction resulting from the phase out of HCFCs will be approximately 15.6 million tonnes of CO_2 equivalent. The indirect GHG emissions reduction through reduced electricity consumption in the commercial and industrial refrigeration sectors is approximately 10 million tonnes of CO_2 equivalent in 5 years.

SENEGAL— BUILDING AND INSULATING WITH TYPHA TO ADDRESS ENERGY EFFICIENCY, CLIMATE CHANGE, AND BIODIVERSITY CONCERNS

Project Title:	Technology Transfer: Typha-Based Thermal Insulation Material Production in Senegal
GEF Agency:	UNIDO
GEF Financing:	$2,310,000
Cofinancing:	$3,400,000 total
Public Sector:	$1,500,000
Private Sector:	$1,600,000
Others:	$300,000
Dates of Implementation:	2009–2014

Typha vegetation and construction material made with typha
Photo credit: UNDP, Naporo Gmbh cited by UNDP

Project Overview

Bulrush, or typha australis, is an invasive species causing serious problems in Senegal's ecosystem and economy. The proliferation of this plant in the Senegal River is in part due to ecosystem changes from an upstream hydropower dam and a salt-wedge dam built in the 1980s. Today, typha has invaded approximately 140,000 hectares, spreading at 10% per year, with negative health and livelihood impacts.

In parallel, the country has faced weakened industrial and economic development due to power production shortfalls and poor quality of electricity supply. In order to reduce energy consumption in the building sector, Senegal is in need of effective, thermally efficient and affordable building materials. While cement is domestically produced, suitable aggregates and complementary materials are rather limited. Buildings are also rarely insulated, due to lack of availability of insulation materials. This results in suboptimal standards of comfort and energy efficiency of concrete buildings. There is a critical need to supply appropriate thermal insulation materials to the building sector. Typha can be harvested and used as a raw material for insulation to reduce energy consumption of both new construction and retrofitting of existing buildings to reduce electricity consumption and related GHG emissions.

The objective of this project is to facilitate the transfer of technology for producing innovative thermal insulation materials using typha. The project is interdisciplinary with positive effects on energy efficiency, climate change, and biodiversity.

The combination of typha and cement offers a wide range of promising construction products, ranging from additive and formwork to strong panels, columns and beams. The use of typha as insulation materials has been validated in European-based research institutions. This collaborative project aims to refine the technology in order to transfer it to Senegal.

In particular, the project includes research and development, certification and patenting, establishing the local production chain through investment in a production facility for the innovative insulation materials, and adapting the materials to local condition. Demonstration and monitoring will be conducted in a government building retrofitted with typha-based insulation materials.

SRI LANKA—IMPROVING ENERGY ACCESS AND HALTING LAND DEGRADATION WITH BAMBOO

Project Title:	Bamboo Processing for Sri Lanka
GEF Agency:	UNIDO
GEF Financing:	$2,700,000
Cofinancing:	$10,700,000 total
Public Sector:	$2,100,000
Private Sector:	$8,600,000
Dates of Implementation:	2009–2015

Project Overview

Sri Lanka faces degradation of forest resources due to increased demand for timber and fuel wood from population pressure and economic growth. A sizeable part of the agricultural lands in different parts of the country, including at least 30% of the tea land, has also become marginal or uneconomic. Many areas are in urgent need of land cover to prevent further degradation. Bamboo cultivation on the degraded lands offers an ideal alternative to halt land degradation and provide sustainable energy source. To support this on a long-term basis, there is a need to create an industry whose continued existence (and profitability) depends on a sustainable feedstock resource. Experiences in other Asian countries, such as China and India, have shown that a bamboo industry can be a sustainable industry. While bamboo is already a key product of forestry and agriculture on a world scale, only a limited area of bamboo plantation exists in Sri Lanka, mainly used locally for fuel and in low quality construction.

This project has the objective to develop a bamboo supply chain and product industry in Sri Lanka, leading to reduced global environmental impact from GHG emissions and a sustainable industry base. The project seeks to develop new bamboo plantations covering 10,000 hectares on degraded land to serve as an industry cluster. The industry would have engineered bamboo materials for structural applications, bamboo pellets for local energy use and for export markets, and bamboo sprouts for food. As Sri Lanka already has a wood processing industry, focusing the industry on processed and engineered bamboo products could increase the quality and value of bamboo production in the country, which in turn could increase the value added and the profitability of the industry sector.

This project involves the South-South transfer of technologies in key steps in the bamboo processing chain. For instance, the technology for bamboo tissue reproduction could be transferred from India, while the technology for bamboo processing could be transferred from India and possibility China. Bamboo pelletizing technology can be transferred and also utilized for other residues, such as those from rubber wood plantations.

The project also features capacity building, demonstration, and financing components. The project will also support the development of a policy framework to support dedicated or mixed bamboo plantations and to develop a market for the products.

A successful project will validate profit potential and will promote continued operation and replication beyond the project time horizon. The availability of degraded land is sufficient to allow a hundred-fold replication.

THAILAND — ETHANOL PRODUCTION FROM CASSAVA

Project Title:	Overcoming Policy, Market and Technological Barriers to Support Technological Innovation and South-South Technology Transfer: the Pilot Case of Ethanol Production from Cassava
GEF Agency:	UNIDO
GEF Financing:	$2,970,000
Cofinancing:	$8,340,000 total
Public Sector:	$4,550,000
Private Sector:	$3,790,000
Dates of Implementation:	2009–2015

Project Overview

Thailand has set a high target for renewable energy sources in its National Renewable Energy Master Plan. Of the 8% target for the renewable portion of total projected energy demand by 2011, 1.9% will be contributed by biofuels such as ethanol and biodiesel. For ethanol, the target is to increase its consumption in transportation by mandating a phase-out program for regular fuels and an introduction of gasohol. The country has sufficient raw materials, especially molasses and cassava to produce ethanol. Contract farming in neighboring countries has been encouraged to ensure raw material supply and to create wider commercial opportunities and technology transfer opportunities to farmers.

The project will remove barriers and promote technology transfer in the production of ethanol and enhance South-South cooperation. The targeted technology is simultaneous saccharification and fermentation, which includes improved culturing techniques, raw material preparation, fermentation technology and shortcuts to the fermentation processes, and options for net energy reduction throughout the project cycle.

The project also aims to further increase fermentation efficiency in ethanol production, to promote private sector engagement, and to transfer the technologies to other countries in Southeast Asia. The project includes technology demonstrations to enhance and motivate full-scale technology investments. The project will offer to set up a demonstration plant in collaboration with an interested partner. To remove policy and financial barriers, the project will also provide training to banks, policy makers and entrepreneurs. The technology will be transferred to Viet Nam, reflecting the lessons learned from demonstration in Thailand. The project will also support activities in Cambodia to lay the foundation for technology transfer. The project responds to findings from TNAs of both Thailand and Viet Nam.

TURKEY AND COOK ISLANDS — HARNESSING HYDROGEN ENERGY IN SMALL ISLAND COMMUNITIES

Project Title:	Realizing Hydrogen Energy Installations on Small Islands through Technology Cooperation
GEF Agency:	UNIDO
GEF Financing:	$3,000,000
Cofinancing:	$3,500,000 total
Public Sector:	$3,450,000
Private Sector:	$50,000
Dates of Implementation:	2009–2012

Aitutaki Power Station (Cook Islands)
Photo credit: UNIDO

Project Overview

Renewable energy technologies offer many benefits for replacing fossil fuels in power generation, including low operating cost and climate change mitigation. However, because some types of renewable energy production are intermittent (e.g., wind, solar) and maximum production does not always occur at times of maximum demand, renewable energy has not been treated as a dispatchable source of power. In many cases, this limits renewable energy penetration to below 30% in order to protect the stability of the electricity grid.

Hydrogen energy technologies can be used to address these issues by storing energy from renewable energy in the form of compressed hydrogen, which can be later used in fuel cells in stationary applications. Small islands, despite their technical and economic hurdles for technology transfer associated with their size and isolation, offer ideal demonstration sites for this "renewable-to-hydrogen" energy system, as they tend to have under-developed energy infrastructure and thus present an opportunity to leap frog to the cleanest technologies.

This demonstration project supports the establishment and operation of two renewable-to-hydrogen energy installations on Aitutaki Island of Cook Islands and on Bozcaada Island in Turkey. The project addresses the specific challenges in the grid integration of renewable energy using energy storage. This collaborative project plans to test innovative technologies—to be transferred from wind-hydrogen installations in Norway and Greece—and disseminate the results.

The installation in Aitutaki Island involves the installation and operations of a solar-to-hydrogen system at the airport. A 200kW PV array with the capacity to produce approximately 280MWh/year will be connected to an electrolyzer to produce 1 to 2 kg per hour of hydrogen. The produced hydrogen is compressed and stored in cylinders to supply the airport and at the island's hospital. The produced hydrogen can feed the grid during peak demand period, typically during the evening, when solar energy production is lower, and also power the fuel cell back-up units at the airport and the hospital. The installation is projected to generate 10% of the electricity produced on Aitukaki Island. The Bozcaada installation in Turkey features both wind and solar energy.

The main expected outputs are:

- Installation of two plants to provide the small islands communities with a productive asset, enabling them to attract external funding to expand their portfolio of clean, cost-effective and environmentally sound energy solutions;
- Establishment of a framework for public private partnership investments; and
- Expanded local capacity and trained staff in renewable and hydrogen technologies.

TABLE 1: TECHNOLOGY TRANSFER PILOT PROJECTS SUPPORTED BY THE POZNAN STRATEGIC PROGRAM ON TECHNOLOGY TRANSFER

COUNTRY	PROJECT TITLE	GEF AGENCY	GEF POZNAN PROGRAM FUNDING ($)	TOTAL GEF FUNDING ($)	COFINANCING ($)
Brazil	Renewable CO_2 Capture and Storage from Sugar Fermentation Industry in Sao Paulo State	UNDP	2,970,000	2,970,000	7,715,000
Cambodia	CC related TT for Cambodia: Using Agricultural Residue Biomass for Sustainable Energy Solutions	UNIDO	1,947,000	1,947,000	3,965,000
Chile	Promotion and Development of Local Solar Technologies in Chile	IDB	3,000,000	3,000,000	32,400,000
China	Green Truck Demonstration Project	World Bank	2,998,000	4,868,000	17,400,000
Colombia, Kenya	SolarChill: Commercialization and Transfer	World Bank	2,995,000	2,995,000	5,050,000
Cote d'Ivoire	Construction of 1,000-Ton per day Municipal Solid Wastes Composting Unit in Akouédo Abidjan	AfDB	2,888,000	2,888,000	36,898,500
Jamaica	Introduction of Renewable Wave Energy Technologies for the Generation of Electric Power in Small Coastal Communities	UNDP	816,000	816,000	1,420,000
Jordan	dHRS Irrigation Technology Pilot Project to Face Climate Change Impact	IFAD	2,200,000	2,200,000	6,000,000
Mexico	Promotion and Development of Local Wind Technologies in Mexico	IDB	3,000,000	5,500,000	18,600,000
Russian Federation	Phase out of HCFCs and Promotion of HFC-free Energy-Efficient Refrigeration and Air-Conditioning Systems in the Russian Federation through Technology Transfer	UNIDO	2,970,000	19,800,000	40,000,000
Senegal	Typha-based Thermal Insulation Material Production in Senegal	UNDP	2,310,000	2,310,000	3,400,000
Sri Lanka	Bamboo Processing for Sri Lanka	UNIDO	2,700,000	2,700,000	10,700,000
Thailand	Overcoming Policy, Market, and Technological Barriers to Support Technological Innovation and South-South Technology Transfer: The Pilot Case of Ethanol Production from Cassava	UNIDO	2,970,000	2,970,000	8,340,000
Turkey, Cook Islands	Realizing Hydrogen Energy Installations on Small Islands through Technology Cooperation	UNIDO	3,000,000	3,000,000	3,500,000
TOTAL			**36,763,000**	**57,963,000**	**195,388,500**

Dissemination of GEF experience and successfully demonstrated environmentally sound technologies

The GEF has recently launched an initiative to support the dissemination of GEF experiences and successfully demonstrated ESTs to achieve two main objectives. The first objective is to provide a better, more in-depth understanding of the technology transfer process and the role of the GEF by developing case studies for specific technologies. The second objective is to disseminate to a wider range of countries and audiences the technologies that have already been successfully demonstrated with GEF support—with a view to facilitating wider adoption of those technologies.

The dissemination initiative is managed by the GEF Secretariat in collaboration with relevant GEF Agencies and other interested parties. The initiative targets five to ten ESTs that have been successfully demonstrated by GEF projects. These technologies, covering both mitigation and adaptation, have potential for wide applications in many developing countries that will lead to significant GHG emissions reductions while contributing to the development objectives of the countries. The experience and lessons learned are being drawn for dissemination so as to benefit the design of the new projects in the future. A booklet that describes such ESTs as well as lessons learned from project implementation is being developed. The GEF also plans to hold a dissemination event on ESTs at COP16. Through this initiative, the GEF Secretariat plans to establish collaboration linked to the ongoing and emerging initiatives of the UNFCCC and other partners.

GEF-5 and Technology Transfer

The GEF-5 climate change mitigation strategy charts a course to promote a broad portfolio of environmentally sound, climate-friendly technologies that will achieve large GHG reductions in GEF-recipient countries in accordance with national circumstances. The entire climate change mitigation portfolio for GEF-5 supports technology transfer, as defined by the IPCC and the technology transfer framework outlined by the COP. This support is reflected in the strategy's six climate change mitigation objectives:

Objective 1: Promote the demonstration, deployment, and transfer of innovative, low-carbon technologies
Objective 2: Promote market transformation for energy efficiency in the industrial and buildings sectors
Objective 3: Promote investment in renewable energy technologies
Objective 4: Promote energy-efficient, low-carbon transport and urban systems
Objective 5: Promote conservation and enhancement of carbon stocks through sustainable management of Land Use, Land-Use Change, and Forestry
Objective 6: Support enabling activities and capacity building

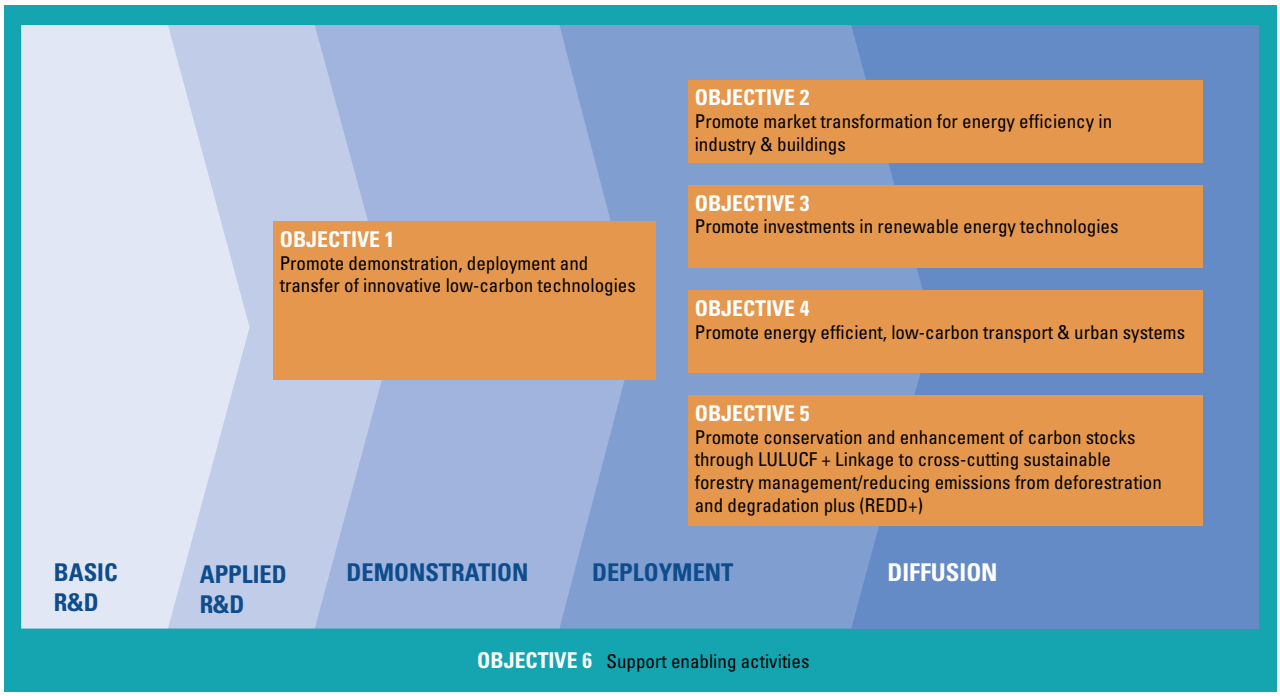
The strategy promotes technology transfer at various stages of technology development in the innovation chain, from demonstration of innovative, emerging, low-carbon technologies to diffusion of commercially proven, ESTs and practices. The GEF support involves a combination of technology push and market pull interventions.

Objective 1: Promote the demonstration, deployment, and transfer of innovative, low-carbon technologies. This objective is geared toward promoting the demonstration, deployment, and transfer of innovative, low-carbon technologies. Projects supported under this objective targets innovative technologies with potentially significant long-term impacts on carbon emissions. GEF support may involve the demonstration, deployment, and transfer of commercially available technologies that were identified as priorities by the recipient countries but have not been widely adopted in their particular markets. GEF support includes technical assistance for creating an enabling policy environment for technology transfer, North-South, and South-South technology cooperation, purchase of technology licenses, and investment in pilot projects. The GEF is also prepared to support technology centers and networks at the global, regional, and national levels, in accordance with UNFCCC guidance and the priorities of the GEF recipient countries. The target for this objective is the demonstration of three to four innovative technologies in 10 to 15 countries. Technologies at the diffusion stage or those in wide-scale dissemination are considered under other objectives.

Objective 2: Promote market transformation for energy efficiency in the industrial and buildings sectors. This objective aims to expand investment in energy efficiency in the industrial and buildings sectors. Projects supported under this objective aims to step up policy interventions and scale up energy efficient investments. For industry, emphasis is placed on energy-efficient industrial production and manufacturing, particularly in SMEs. For buildings, the GEF support covers the building envelope; energy-consuming systems; appliances; and equipment used for heating, cooling, lighting, and building operations. Emphasis is also placed on integrated and systemic approaches. Promotion of energy-efficient cook stoves will also be covered. Projects under this objective may extend to supporting the phase-out of HCFCs used in industry and buildings prior to the phase-out dates under the Montreal Protocol.

Objective 3: Promote investment in renewable energy technologies. This objective aims to further boost investment in renewable energy technologies by moving beyond the creation of enabling policy and regulatory environments. Projects supported under this objective lead to a step change in the deployment and diffusion of

FIGURE 4: GEF-5 CLIMATE CHANGE MITIGATION STRATEGY OBJECTIVES AND TECHNOLOGY INNOVATION CURVE



reliable, least-cost renewable energy technologies. GEF support may cover on-grid renewable energy, decentralized production of electric power, as well as heating with indigenous energy sources, including biomass, solar, wind, hydro, and geothermal. GEF support could also cover sustainable production of biomass for biofuels, as a substitute for fossil fuels where appropriate conditions exist, and methane recovery from biomass wastes for power and heat generation. GEF projects can promote local SMEs to enhance their technical capacities to provide installation, operation, and management support.

Objective 4: Promote energy-efficient, low-carbon transport and urban systems. This objective supports interventions for land use and transport planning, public transit systems, energy efficiency improvement of the fleet, efficient traffic control and management, transport demand management, and non-motorized transport. Technological options in the transport sector, such as clean, low-carbon vehicles, may be considered in countries where such options can be expected to achieve significant reductions in GHG emissions as well local development environmental benefits. GEF support under this objective may involve technical assistance, innovative financing mechanisms, awareness campaigns, and investments in demonstration and deployment of high-performance technologies.

Objective 5: Promote conservation and enhancement of carbon stocks through sustainable management of Land Use, Land-Use Change, and Forestry. This objective aims to conserve, restore, enhance, and manage carbon stocks in forest and non-forest lands, and to prevent emissions of the carbon stocks by reducing the pressure on these lands in the wider landscape. Deploying low carbon technologies may reduce demands from resources produced by land management, and simultaneously adopting and deploying new land management responses can synergistically enhance and sustain carbon sequestration and conserve stocks. GEF support could include development of national systems to measure and monitor carbon stocks and fluxes from forest and non-forest lands, policy and institutional strengthening, local community good practices, and establishment of financing mechanisms or investment programs.

Objective 6: Support enabling activities and capacity building. This objective aims to provide support for non-Annex I parties to prepare their National Communications to the UNFCCC and meet their obligations under the Convention. The GEF will also continue to fund the preparation and updating of TNAs in accordance with Convention guidance. Furthermore, the GEF can support carbon markets.

The GEF-5 strategy for climate change draws on past experiences and is guided by three principles of responsiveness to Convention guidance, consideration of the national circumstances of recipient countries, and cost-effectiveness in achieving global environmental benefits. GEF-5 endeavors to exert a transformative impact in helping GEF-recipient countries to move along a low-carbon development path through investment in, and market transformation of, environmentally sound, climate-friendly technologies.

Toward a Long-Term Strategic Program on Technology Transfer

Progress achieved under the *Poznan Strategic Program on Technology Transfer*, particularly in the development of pilot projects and TNAs, has highlighted the need to go beyond current practices to catalyze investments in technology transfer.

Decision 2/CP.14 of the COP to the UNFCCC requested that GEF report to the COP at its 16th session to consider long-term implementation of the strategic program. The GEF Secretariat stands ready to establish and implement a Long-Term Strategic Program on Technology Transfer. Such a plan, if agreed upon by the COP, may entail the following elements to further scale up investment in ESTs in developing countries, and to enhance technology transfer activities under the Convention.

1. Support for Climate Technology Centers and a Climate Technology Network
2. Piloting Priority Technology Projects to Foster Innovation and Investments
3. Public-Private Partnership for Technology Transfer
4. Technology Needs Assessments (TNAs)
5. GEF as a Catalytic Supporting Institution for Technology Transfer.

Each element is briefly summarized below.

1. Support for Climate Technology Centers and a Climate Technology Network

The GEF could provide financial and technical support toward the establishment and operation of technology centers and networks at the global, regional, and national levels, as appropriate, to support and accelerate cooperative actions on technology and the diffusion of ESTs for

mitigation and adaptation in developing countries. The types of activities to be funded by the GEF may involve technical assistance, training, information sharing, and knowledge management, taking into account the specific functions of technology centers and networks as reflected in the UNFCCC discussions.

The GEF could establish a technology transfer coordination function as part of its knowledge management function, and link it with regional technology transfer centers to be established in regional development banks.

Resources could be provided from the global and regional set-aside (GRS) in the GEF climate change focal area for global and regional activities, or if the needs to be covered are more important than what the GEF Secretariat is foreseeing, complemented by new voluntary contributions to the GEF. Countries that wish to establish national centers are invited to do so utilizing their respective national allocations under the System for Transparent Allocation of Resources (STAR).

2. Piloting Priority Technology Projects to Foster Innovation and Investments

Under the Poznan Program, 14 pilot projects in 16 countries have received assistance for technology transfer.

The GEF will step up its efforts in promoting the demonstration, deployment, and transfer of innovative low-carbon technologies. Projects supported under this window will fall under two categories. The first category targets the demonstration and deployment of innovative technologies with significant impact in the long-run reduction of carbon emissions. Demonstration of 3 to 4 innovative technologies are envisaged in 10 to 15 countries. Such support is consistent with Objective 1 of the GEF-5 climate change mitigation strategy.

The second category targets the deployment and diffusion of priority technologies as identified in TNAs, National Communications, and other national policy documents, addressing the need to go beyond assessments toward catalyzing investments. Priority sectors are: energy efficiency in industry and buildings; renewable energy; transport and urban systems; and sustainable management of land use, land-use change, and forestry. Such support is consistent with Objectives 2, 3, 4, and 5 of the GEF-5 climate change mitigation strategy.

Funding for both pilot project categories will come from country allocations under the STAR. Similarly, a Technology Transfer Program for Climate Adaptation is going to be developed by the GEF, drawing resources from the SCCF. Eligible activities will be informed by COP guidance.

3. Public-Private Partnership for Technology Transfer

Drawing on the GEF's past experience and lessons learned, an initiative to promote Public-Private Partnerships (PPP) for Technology Transfer could be established to support private sector engagement in technology transfer in order to leverage innovative financial instruments or business models for technology deployment and diffusion in developing countries. The GEF Earth Fund is currently undergoing a review, providing an opportunity to incorporate technology transfer-related initiatives. The GEF could aim at further developing the platform concept, under which a portfolio of technology transfer projects could be managed. Eligible activities will be informed by COP guidance.

GEF funding will be drawn from the GEF PPP window, which falls outside of the country allocations under the STAR. The new partnership could be launched at COP17.

4. Technology Needs Assessments

The Poznan Strategic Program allocated resources for 35 to 45 countries to receive targeted financial and technical support to develop or update their TNAs within the framework of Article 4.5 of the UNFCCC. This round of TNAs is expected to lead to the development of national technology action plans for prioritized technologies, and facilitate identification of technology transfer projects to be linked to relevant financing sources.

Similar support will be provided to another set of 35 to 45 countries, targeting low- and medium-income countries, to carry out and/or update their TNAs as a global initiative. GEF resources for the global initiative will be drawn from the GRS in the climate change focal area. Larger countries that need more in-depth and extensive analysis have the option to request TNAs as a national initiative, to be drawn from the STAR.

5. GEF as a Leading Supporting Institution for Technology Transfer

The longer-term implementation plan will utilize the strengthened institutional capacity of the GEF to implement and enhance technology transfer programming. With a cadre of professionals with extensive programming and policy sectoral experiences, the GEF is well-positioned to be a catalytic global supporter for innovative approaches and address guidance on technology transfer from the UNFCCC COP. The GEF-5 programmatic enhancements, such as support for technology transfer across the six strategy objectives, addressing technology transfer elements in project reviews and incorporation of technology-related indicators in portfolio management, underscore the GEF's commitment to innovative approaches. Furthermore, the GEF can also play a useful and growing

role in promoting technology transfer through the carbon markets, with its expensive network of partner institutions and its rich experience in financing projects (GEF 2010a).

The long-term impact of the GEF work will be to slow the growth of GHGs emitted to the atmosphere from the GEF-recipient countries. GEF's work will contribute to the ultimate objective of the UNFCCC, which is to achieve stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The GEF stands ready to catalyze real progress on the ground, and to achieve its overall goal to support developing countries and economies as they transition toward a low-carbon development path.

ABBREVIATIONS AND ACRONYMS

ACC	Agricultural Credit Corporation
AfDB	African Development Bank
CCS	Carbon Capture and Storage
COP	Conference of the Parties
EGTT	Expert Group on Technology Transfer
EST	Environmentally Sound Technology
GEF	Global Environment Facility
GHG	Greenhouse Gas
GRS	Global and Regional Set-Aside
GWP	Global Warming Potential
IDB	Inter-American Development Bank
IFAD	International Fund for Agricultural Development
IPCC	Intergovernmental Panel on Climate Change
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
LDCF	Least Developed Countries Fund
NGO	Non-Governmental Organization
ODP	Ozone Depleting Potential
PPP	Public-Private Partnership
PV	Photovoltaic
RFP	Request for Proposals
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCCF	Special Climate Change Fund
SME	Small and Medium Enterprise
STAR	System for a Transparent Allocation of Resources
TAP	Technology Action Plan
TNA	Technology Needs Assessment
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization

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ABOUT THE GEF

The Global Environmental Facility unites 182 member governments—in partnership with international institutions, nongovernmental organizations, and the private sector—to address global environmental issues. An independent financial organization, the GEF provides grants to developing countries and countries with economies in transition for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. These projects benefit the global environment, linking local, national, and global environmental challenges and promoting sustainable livelihoods.

Established in 1991, the GEF is today the largest funder of projects to improve the global environment. The GEF has allocated US$9.2 billion, supplemented by more than US$40 billion in co-financing, for more than 2,700 projects in more than 165 developing countries and countries with economies in transition. Through its Small Grants Programme, the GEF has also made more than 12,000 small grants directly to nongovernmental and community organizations.

The GEF partnership includes 10 Agencies: the UN Development Programme, the UN Environment Programme, the World Bank, the UN Food and Agriculture Organization, the UN Industrial Development Organization, the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, the Inter-American Development Bank, and the International Fund for Agricultural Development. The Scientific and Technical Advisory Panel provides technical and scientific advice on the GEF's policies and projects.

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