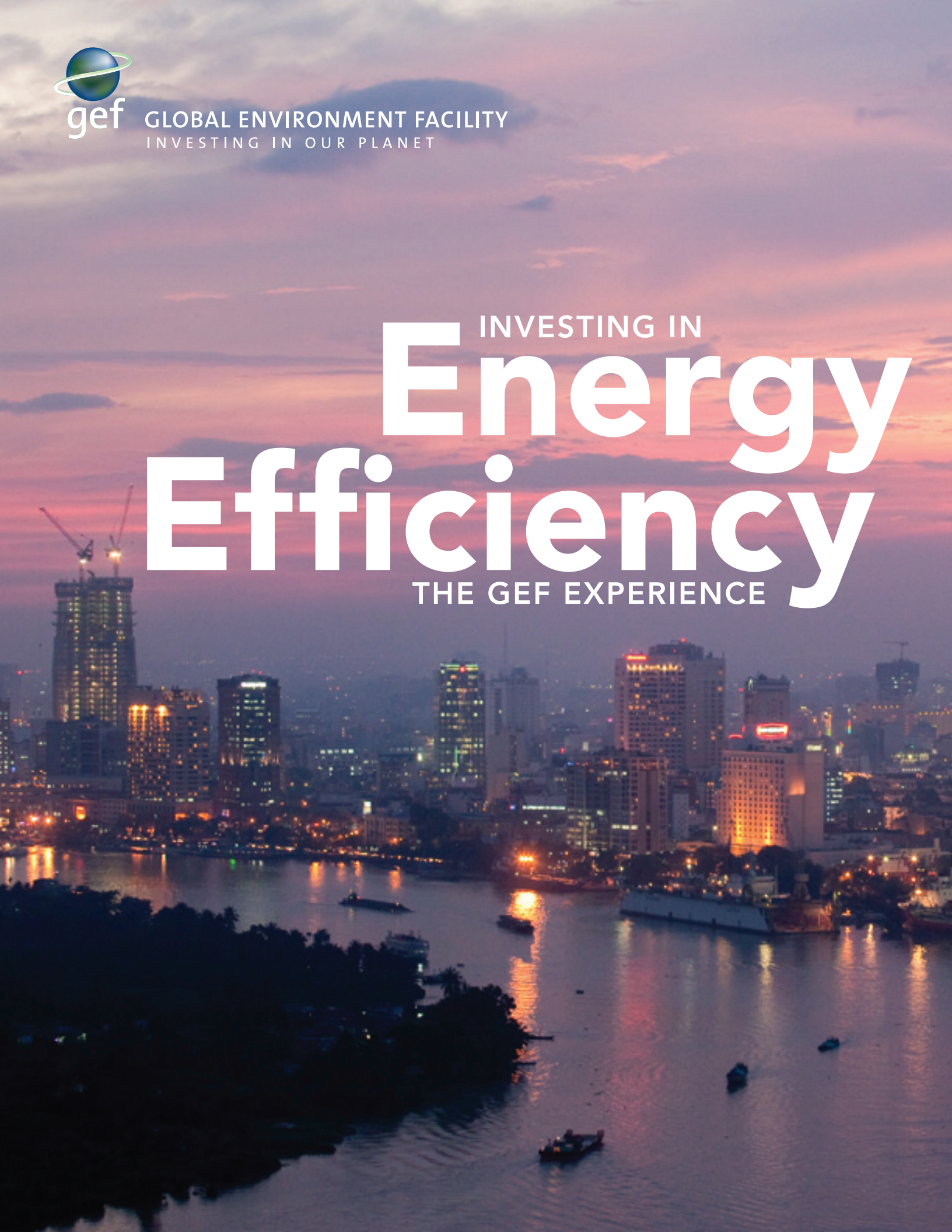

gef
GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET
INVESTING IN
Energy
Efficiency
THE GEF EXPERIENCE

Foreword

Cover Page: Modern buildings rise in Ho Chi Minh City, Vietnam

This Page: Technicians in a foundry, China. GEF has supported small and medium-size enterprises in China and other developing countries to improve their energy efficiency and reduce greenhouse gas emissions

Dr. Naoko Ishii
CEO and Chairperson
Global Environment Facility

Between now and 2035, world energy demand is projected to grow by 51 percent, according to the International Energy Agency (IEA)'s World Energy Outlook (IEA 2011). Energy demand in developing and transition countries is predicted to grow even faster over that time. This rapid growth in energy demand presents a particular challenge given that most of the world's population still relies on energy from fossil fuel sources and traditional biomass. The application of energy efficiency technologies and practices can directly reduce pressure on energy supplies, reduce harmful pollution, save consumers money, and promote economic development.

The Global Environment Facility (GEF) is a significant public sector investor in energy efficiency, with direct investments of US$1.25 billion in 115 developing and transition countries, leveraging an additional $11.4 billion in co-financing. These investments are expected to directly reduce greenhouse gas emissions by 1.7 billion tonnes of carbon dioxide equivalent (CO_2 eq) by 2020, which is equal to the amount of CO_2 eq put out by 375 million cars in a single year. These figures include GEF funding, co-financing, and estimated emissions reductions from 185 stand-alone energy efficiency projects and from the energy efficiency components of 58 technology transfer and mixed projects.

The GEF has invested a substantial share of its resources in projects that remove market and other barriers to achieving greater energy efficiency. With the GEF's support, developing and transition countries have introduced policies and regulatory frameworks as well as standards and labels for appliances, lighting, buildings, and industrial equipment. These countries have also established market-based approaches and pioneered innovative financial instruments. The GEF has also fostered technology transfer in many projects through the demonstration of energy-efficient technologies with the potential to deliver both immediate and long-term benefits.

The GEF remains committed to improving energy efficiency as a pivotal way to meet the climate change challenge. Investments in energy efficiency reflect my vision of the GEF as a partner of choice and a champion of the global commons, while the challenges posed by rising energy demand underscore my determination to scale up our activities to deliver benefits on a global scale. We look forward to further partnerships with the public and private sectors to serve as a premier source of funding for global environmental projects including energy efficiency projects.

Compact fluorescent lamps (CFLs) improve commerce and quality of life in rural Sri Lanka

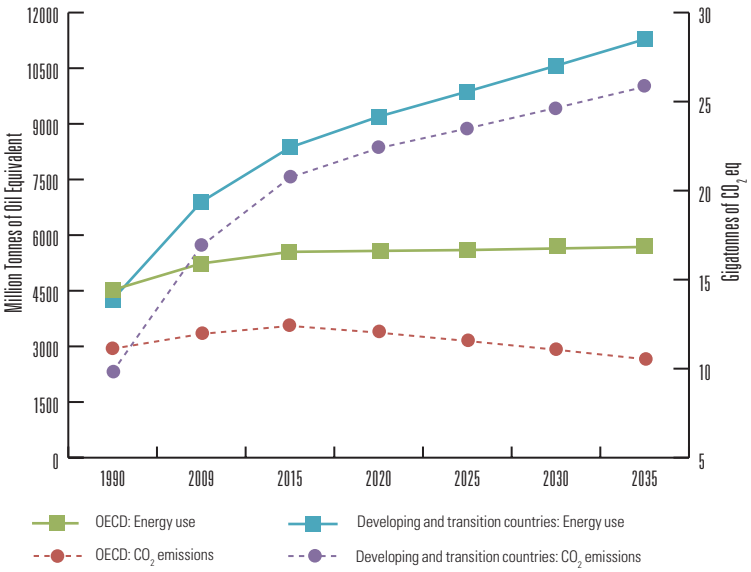
Energy Efficiency: Largest Source of Emissions Reductions and Compelling Opportunity for Developing Countries

Demand worldwide for energy is increasing. Between 2009 and 2035, global energy demand is expected to grow 1.6 percent per year, leading to an overall increase of 51 percent according to the International Energy Agency (IEA) (2011). As a result, energy-related greenhouse gas (GHG) emissions will increase by 1.7 percent per year, reaching 43.3 billion tonnes (t) of carbon dioxide equivalent (CO_2 eq) in 2035—a 49 percent increase over 2009 (IEA 2011). If not curtailed, rising energy demand and the accompanying increase in GHG emissions could undermine international efforts to address human-induced climate change.

Growing energy demand poses a particular challenge—and a unique opportunity—for developing and transition countries. Through 2035, these countries are expected to provide 70 percent of the world's economic growth and 90 percent of its increase in energy demand (Figure 1). Most developing and transition countries are net energy importers, so any rise in future energy costs could jeopardize their economic growth. Commercial use by developing countries of their own energy resources, renewable or otherwise, involves long-term infrastructure development requiring significant investment with hard-to-obtain financial resources. Under these circumstances, the Intergovernmental Panel on Climate Change (IPCC) estimated that energy efficiency gains will not only reduce pressure on limited domestic energy supplies and thereby improve national security, they will enhance economic competitiveness, generate employment, and reduce local, regional, and global air pollution (IPCC 2007).

In addition to conferring economic benefits, energy efficiency measures have great potential to reduce GHG emissions. According to IEA projections, end-use efficiency could account for 31 percent of global GHG emissions reductions

FIGURE 1 WORLD PRIMARY ENERGY DEMAND AND ENERGY-RELATED GHG EMISSIONS, BY COUNTRIES

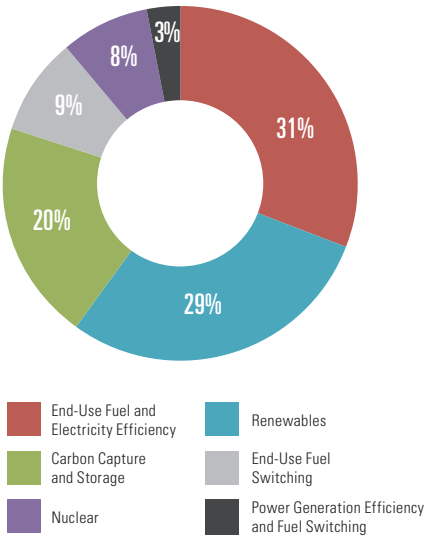


Data Source: New Policies Scenario, World Energy Outlook (IEA 2011)

by 2050 as shown in Figure 2 (IEA 2012). In order to implement aggregate emission pathways consistent with having a likely chance of holding the increase in global average temperature below 2 °C or 1.5 °C above pre-industrial levels, energy efficiency technologies must successfully contribute to a two-thirds reduction in global energy intensity by 2050. Energy intensity is a measure of how efficiently countries use energy to create economic output; it is expressed as energy input per unit of gross domestic product (GDP). To reach this

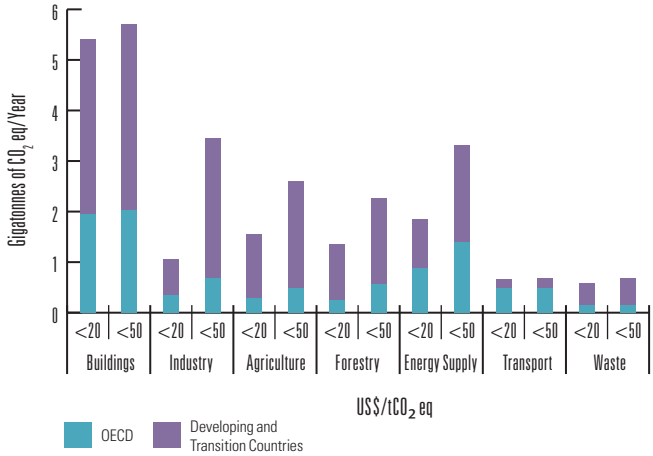
FIGURE 2 REDUCTION IN GHG EMISSIONS IN THE IEA MAP SCENARIO BY TECHNOLOGY AREA

(SHARE OF REDUCTION BELOW BASELINE SCENARIO IN 2050)



Data Source: MAP Scenario, Energy Technology Perspectives (IEA 2012)

FIGURE 3 ECONOMIC MITIGATION POTENTIAL BY SECTOR IN 2030 ESTIMATED FROM BOTTOM-UP STUDIES



Data Source: Special Report-Renewable Energy Resources and Climate Change Mitigation (IPCC 2012).
Note: Estimated economic potential ranges for GHG mitigation costs in the energy supply and end-use sectors, above the assumed baseline for different regions, as a function of the carbon price in 2030, and based on end-use allocations of GHG emissions including from electricity generation.

goal, annual improvements in energy intensity must double from 1.2 percent achieved over the last 40 years to 2.4 percent in the next four decades (IEA 2012).

Efficiency measures also save money for consumers and are cost-effective in other ways. First, energy savings lower monthly or recurring costs for households. Second, investments in energy efficiency frequently require short payback times while providing benefits over their entire lifetime, meaning that carbon abatement costs are often negative or that they generate a net financial return (in terms of cost per avoided t CO_2 eq emissions) (Enkvist et al. 2007).

Buildings and industry present significant opportunities for small- and large-scale energy efficiency improvements. The *Synthesis* of the Fourth Assessment Report of the IPCC estimates that these sectors represent more than 41 percent of total potential emissions reductions (IPCC 2007) as shown in Figure 3. This is especially true in developing countries, where rapid urbanization and industrialization drive most of the growth in energy demand and resulting GHG emissions. Investments in new buildings and industry in developing countries can be much more energy-efficient than the current baseline, achieving even greater efficiency than developed countries by jumping over outdated technologies. As a consequence, developing and transition countries are estimated to account for 67 percent of the GHG emissions reduction potential in buildings and 75 percent of that in industry (Figure 3).

There is widespread agreement in recent studies that energy efficiency plays the most important role in providing early and continued energy savings that yield GHG emissions reductions [Box A].

The purpose of this brochure is to further illustrate GEF strategies, best practices and lessons learned from its energy efficiency investments in industry and the building sector.

GEF Strategy on Energy Efficiency

Recognizing the importance of energy for economic development, as well as the negative effects of inefficient energy use, the GEF has made it a strategic objective to support projects that not only promote the transfer of energy-efficient technologies but also work with regulatory institutions on reforming policies and regulations to foster energy efficiency.

As an operating entity of the financial mechanism of the United Nations Framework Convention on Climate Change (UNFCCC), the GEF has supported climate change mitigation efforts in developing countries since 1991 in close cooperation with recipient countries and the GEF implementing Agencies. The GEF's work on climate change has maintained a strong focus on the transfer of environmentally sound technologies (ESTs), closely aligned with the UNFCCC's technology transfer framework.

In 1995, the GEF's operational strategy laid the foundation for its efforts in energy efficiency to mitigate climate

BOX A ENERGY EFFICIENCY IS AN IMMEDIATE AND EFFECTIVE OPTION

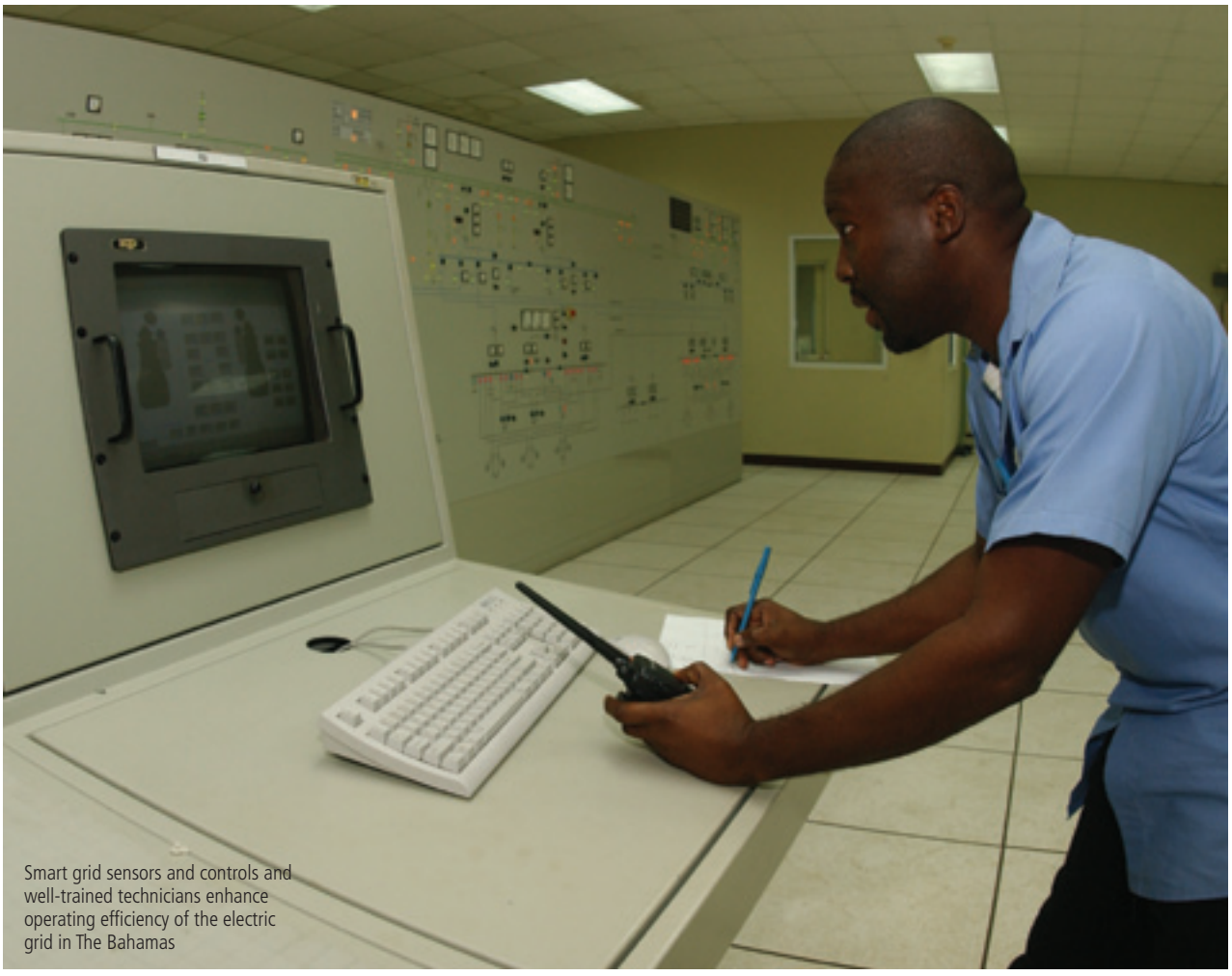
"Efficiency improvement is proving to be the most cost-effective, near-term option with multiple benefits, such as reducing adverse environmental and health impacts, alleviating poverty, enhancing energy security and flexibility in selecting energy supply options, and creating employment and economic opportunities. Research shows that required improvements in energy efficiency particularly in end-use can be achieved quickly.

For example:

- retrofitting buildings can reduce heating and cooling energy requirements by 50–90 percent
- new buildings can be designed and built to very high energy performance levels, often using close to zero energy for heating and cooling
- electrically-powered transportation reduces final energy use by more than a factor of three, as compared to gasoline powered vehicles
- a greater integration between spatial planning and travel that emphasizes shorter destinations and enhances opportunities for flexible and diverse choices of travel consolidating a system of collective, motorized, and non-motorized travel options offer major opportunities
- through a combination of increased energy efficiency and increased use of renewable energy in the industry supply mix, it is possible to produce the increased industrial output needed in 2030 (95 percent increase over 2005) while maintaining the 2005 level of GHG emissions

A portfolio of strong, carefully targeted policies is needed to promote energy efficient technologies and address, inter alia, direct and indirect costs, benefits, and any rebound effects."

Global Energy Assessment, key findings, page xvi (Johansson et al. 2012)



Smart grid sensors and controls and well-trained technicians enhance operating efficiency of the electric grid in The Bahamas

change. Under this strategy, also known as Operational Program 5, *Removal of barriers to energy conservation and energy efficiency* focused on market transformation by removing barriers to the wide adoption of energy-efficient technologies.

The barriers targeted included price distortions (e.g., subsidized energy tariffs); regulatory barriers and biases (e.g., inability of governments to formulate and implement policies); lack of information; insufficient management capacity; inability to analyze nontraditional projects; higher perceived risk of alternative technologies; high transaction costs; high initial costs (e.g., inability to amortize, poor access to credit); and appropriation effects (e.g., the agent that bears the costs cannot recover investment benefits). Through its barrier-removal strategy, the GEF has invested in projects using the following approaches:

- Policy and regulatory frameworks: energy efficiency and conservation policies, energy tariff regulations, demand-side and supply-side measures.
- Standards and labeling: building codes, minimum energy performance standards and energy labels for appliances and equipment, efficient lighting.
- Market-based approaches: establishment and operation of energy service companies (ESCOs).
- Financial instruments: investment grants, partial loan guarantees, risk-sharing facilities and loan loss reserve funds, special purpose and revolving funds, equity funds.
- Technology demonstration and diffusion: demonstration, deployment, and transfer of energy-efficient technologies.

Each of these approaches is described below and supplemented with case studies illustrating successful projects.

By implementing this strategy, the GEF promotes replication that encourages market transformation. To sustain such transformation, all GEF projects strive to develop local capacity, disseminate best practices, and build public awareness.

The GEF has continually refined its approach to energy efficiency to reflect emerging scientific, technological, and policy developments. From the third replenishment of the GEF Trust Fund (GEF-3) (2002–2006), the strategy focused on energy efficiency in buildings, appliances, and industry. This choice was consistent with the analysis of GHG emissions reduction potential in these three sectors. In GEF-4 (2006–2010), the GEF Council reaffirmed these main features and retained the focus on energy efficiency in buildings, appliances, and industry.

The GEF-4 strategic objectives covered the entire spectrum of building performance, including the building envelope; systems for heating, cooling, and lighting; and household appliances and office equipment. In the industrial sector (which includes energy firms and utilities), the strategic objectives covered a wide range of the energy systems used for power production, manufacturing, and processing.

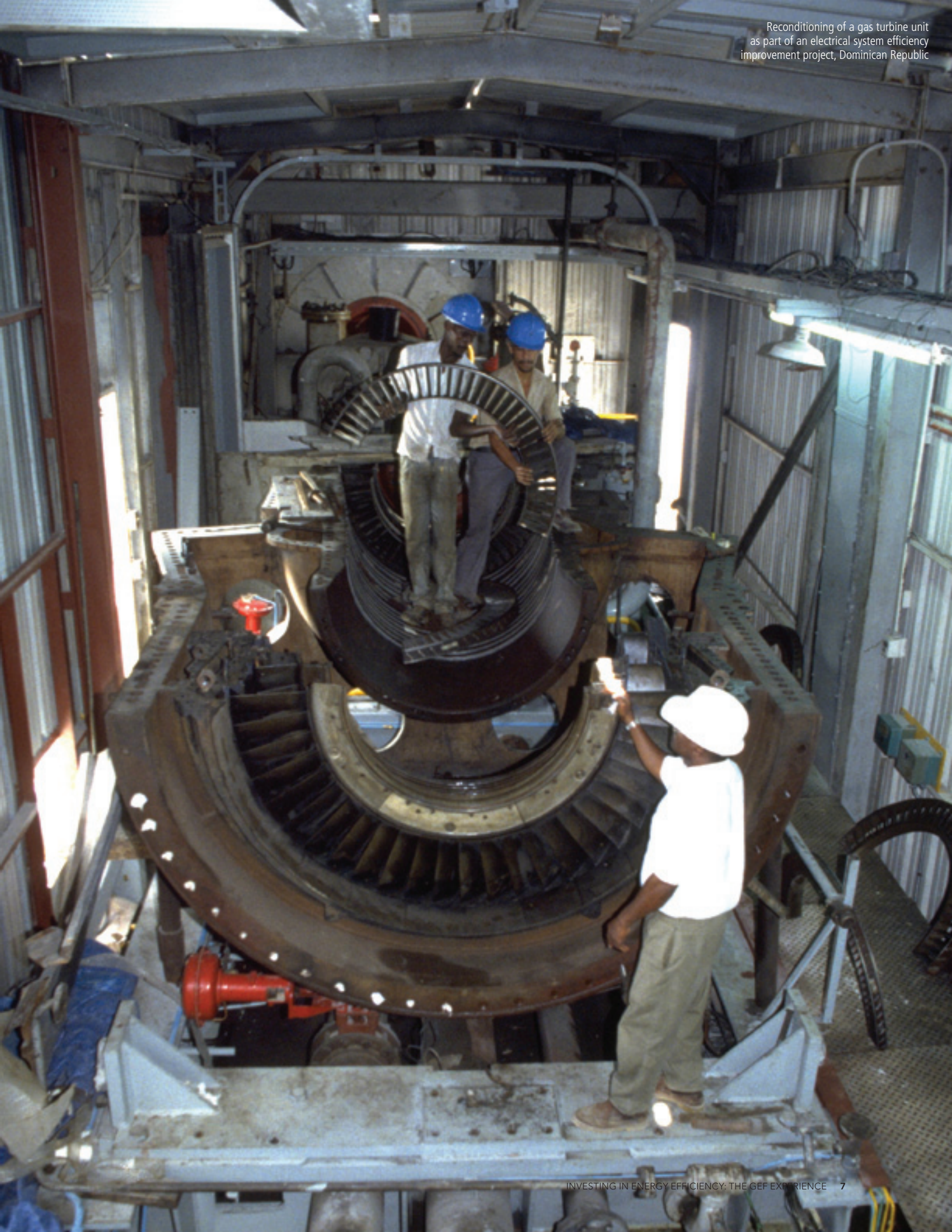
In GEF-5 (2010–2014), the GEF continues to build on its strong track record to enhance and expand investments in energy efficiency in industry and the building sector[1,2]. Energy efficiency projects contribute to the GEF-5 goal to make a transformative impact in helping GEF-recipient countries move to a low-carbon development path through market transformation for, and investment in, environmentally-sound and climate-friendly technologies.

The GEF-5 energy efficiency investments are directed to developing and enforcing strong policies, norms, and regulations in order to achieve large-scale energy savings and GHG emissions reductions. During GEF-5, energy efficiency projects aim at stepping up policy interventions as well as at scaling up investments.

In the building sector, GEF support covers residential, commercial, and public buildings, and includes both new buildings and the retrofitting of existing buildings. It extends to all aspects of buildings, including the building envelope, energy-consuming systems, appliances, and equipment used for heating, cooling, lighting, and building operations. Project activities often incorporate the use of solar energy and the thermal capacity of shallow ground for heating and cooling. Emphasis is placed on integrated and systemic approaches and on high-performance buildings, appliances, and equipment. Energy-efficient cook stoves are also promoted.

In the industrial sector, emphasis is placed on promoting energy-efficient technologies and practices in industrial production and manufacturing processes (including agro-processing) especially in small and medium-sized enterprises (SMEs) while supporting industrialization and sustainable development. GEF-5 has seen strong expansion of projects focused on energy management systems based on the International Standards Organization (ISO) energy management standards, ISO 50001, which provides businesses with strong tools for continuous energy improvement and measurement, reporting, and verification (MRV).

Consistent with GEF aims to address chemicals that degrade the environment, and in order to build synergy across Conventions, energy efficiency projects may include support for the phase out of hydrochlorofluorocarbons (HCFCs) used in industry and buildings in chillers, air-conditioners, and refrigerators, even before the required phase-out dates under the Montreal Protocol.



Reconditioning of a gas turbine unit as part of an electrical system efficiency improvement project, Dominican Republic

Electric power transmission lines improve energy security and economic development in Cyprus

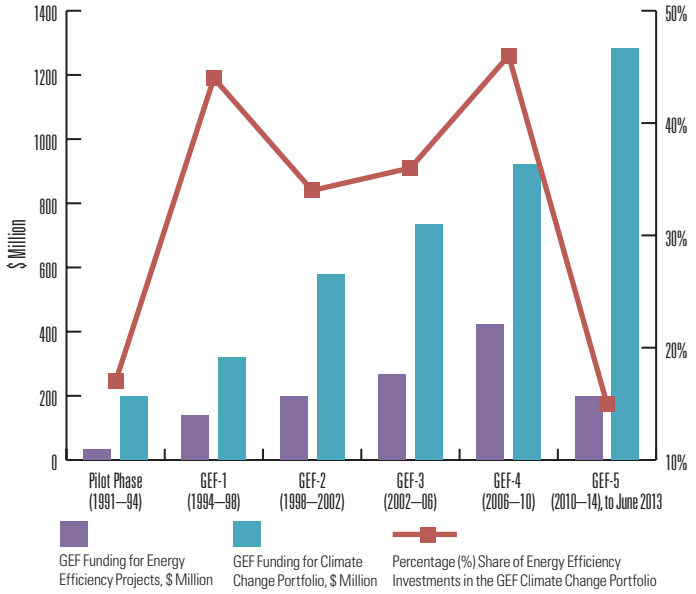
The GEF's Investment in Energy Efficiency

Portfolio Overview

From 1991 to June 30, 2012, the energy efficiency portion of the GEF climate change portfolio amounted to US$1.25 billion from investments in 115 countries and in 243 projects that included energy efficiency components. This GEF funding has been supplemented with $11.4 billion in co-financing (Table 1). The co-financing ratio of 9:1 represents the strong catalytic effect of GEF investments in leveraging other public and private resources[3].

Since the inception of the GEF, 38 percent of GEF funding and 42 percent of co-financing, respectively, have been directed at energy efficiency (see Table 1). Thirty-eight (38) percent of GEF projects included energy efficiency components. Funding for the energy efficiency portfolio increased from GEF-2 (1998–2002) to GEF-4 to almost 50 percent of all climate change mitigation funding as shown in Figure 4. In GEF-5, energy efficiency funding accounted for over

FIGURE 4 GEF ENERGY EFFICIENCY INVESMENT SHARE OF CLIMATE CHANGE PORTFOLIO



Source: GEF Project Tracking and Management Information System, 2013.

Note: The sharp decline in share of energy efficiency projects reflects a change in methodology for reporting total climate change spending. As noted in Table 1, the comparable percentage of energy efficiency under the old methodology is 27.5%

TABLE 1 LEVEL OF FINANCING IN ENERGY EFFICIENCY

(IN $ MILLION)

GEF Replenishment Phase		Projects Solely on Energy Efficiency	Projects with an Energy Efficiency Component	Total Energy Efficiency Projects	All Climate Change Mitigation Projects	Percentages of Projects with Energy Efficiency Components
Pilot Phase (1991–94)	*Number of Projects*	7	0	7	30	23.3
	GEF Amount	33.3	0	33.3	199.4	16.7
	Co-financing	341.2	0	341.2	2,337.2	14.6
GEF-1 (1994–98)	*Number of Projects*	16	2	18	38	47.4
	GEF Amount	133.7	6.1	139.8	319.2	43.8
	Co-financing	575.7	64.6	640.3	1,569.2	40.8
GEF-2 (1998–2002)	*Number of Projects*	32	4	36	95	37.9
	GEF Amount	189.9	6.8	196.7	578.4	34.0
	Co-financing	1,321.6	151.5	1,473.1	2,846.9	51.7
GEF-3 (2002–06)	*Number of Projects*	29	13	42	113	37.2
	GEF Amount	228.2	36.9	265.1	732.5	36.2
	Co-financing	1,258.9	486.5	1,745.4	4,215.8	41.4
GEF-4 (2006–10)	*Number of Projects*	83	16	99	208	47.6
	GEF Amount	384.9	37.1	421.9	779.7	54.1
	Co-financing	2,894.9	316.4	3,211.3	6,839.3	47.0
GEF-5 (2010–14), to June 2013	*Number of Projects*	18	23	41	155	26.5
	GEF Amount	131.0	66.5	197.5	1,282.2	15.4
	Co-financing	2,376.1	1,587.2	3,963.3	9,382.7	42.2
Total	*Number of Projects*	185	58	243	639	38.0
	GEF Amount	1,101.0	153.4	1,254.4	4,033.6	31.1
	Co-financing	8,768.3	2,606.2	11,374.5	27,191.0	41.8

Source: GEF Project Tracking and Management Information System, 2013.

Note: The total GEF amount for GEF-5 of $1,282.2 includes funding for Sustainable Forestry Management and Multi-focal area. The Climate Change Mitigation portion is $717.2. The energy efficiency share of this amount is 27.5%.

15 percent of the total GEF spending on climate change mitigation to, including Sustainable Forestry Management and Multi-focal area funding, and over 27% without those. This significant level of investment is directly attributable to the increased importance that GEF-recipient countries place on energy efficiency.

Analysis of project documents indicates an expected direct GHG emissions reduction of 1.8 billion t CO_2 eq by 2020[4] from GEF investments in energy efficiency. As the GEF continues to increase its investments in energy efficiency projects, they will have an expanding global impact. GEF's energy efficiency investments are making substantial contributions to closing the gap between historic levels of investment in energy efficiency and the documented need for expanded investment (Yang 2013).

The average cost-effectiveness of GEF funding for energy efficiency projects is estimated to be approximately $0.75 per t CO_2 eq (direct emissions reductions only). This demonstrates the economic benefits of adopting energy efficiency technologies and measures for reducing GHG emissions.

Types of Interventions

GEF energy efficiency projects offer innovative technologies in critical economic sectors. They are carried out on the municipal, residential, and industrial levels and address the market, regulatory, financial, and technological barriers mentioned earlier. In addition to building local capacity and raising awareness, which are within the scope of all the projects, the GEF relies on five general project models to remove existing barriers [Box B].

During the GEF Pilot Phase (1991–1994) and GEF-1 (1994–1998), the energy efficiency portfolio focused on technology demonstration and policy and regulatory transformation. Under GEF-2 (1998–2002), the distribution was tipped toward technology transfer, standards and labeling, and financial instrument interventions. GEF-3 (2002–2006) was marked by a prevalence of market-based solutions and policy and regulatory transformations.

In GEF-4 (2006–2010) and GEF-5 (2010–2014), the energy efficiency portfolio has focused on establishing comprehensive standards and labeling programs and regulatory frameworks, and demonstrating and deploying energy-efficient technologies. In addition, the GEF is expanding the scope of its assistance to encompass more integrated approaches linked to financing mechanisms, such as standards and labeling programs linked with consumer incentives in the residential sector; energy management systems linked with sector-specific technology scale-up; and risk-sharing facilities linked with national efficiency targets (Figure 5).

BOX B GEF-5 STRATEGIC OBJECTIVE: ENERGY EFFICIENCY

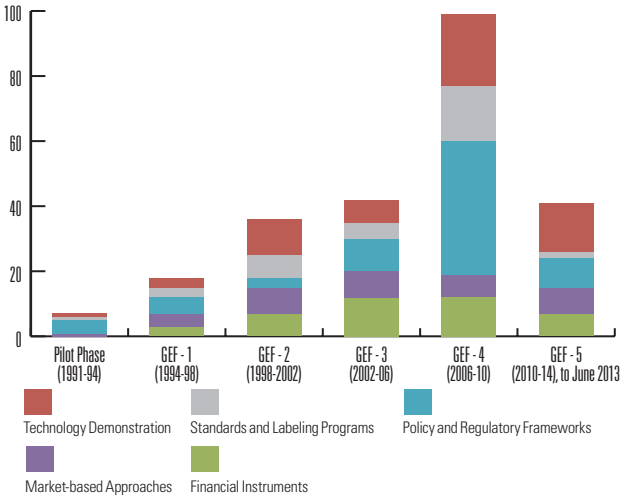
Promote market transformation for energy efficiency in industry and the building sector:

- Projects that focus on policy and regulatory frameworks
- Projects that develop standards and labeling programs
- Projects that rely on market-based approaches
- Projects that establish financial instruments
- Projects that focus on specific sectors and technologies

Key Expected Outcomes

- Appropriate policy, legal and regulatory frameworks adopted and enforced
- Sustainable financing and delivery mechanisms established and operational
- GHG emissions avoided

FIGURE 5 NUMBER OF GEF ENERGY EFFICIENCY PROJECTS BY INTERVENTION TYPE



Source: GEF Project Tracking and Management Information System, 2012.

TABLE 2 GEF INVESTMENTS IN ENERGY EFFICIENCY BY TECHNOLOGY

(IN $ MILLION)

GEF Replenishment Phase	Appliances and Equipment	Lighting	Buildings and Heating	Energy Supply/ Energy Services Companies	Industrial Processes	Mixed and Others	Total
Pilot Phase (1991-1994)		10.0	7.4		1.7	14.2	33.3
GEF-1 (1994-1998)	10.6	5.0	41.1	63.7	13.4	6.1	139.8
GEF-2 (1998-2002)	9.2	24.6	52.0	89.3	9.1	12.5	196.7
GEF-3 (2002-2006)	5.5	8.4	37.0	122.0	18.6	73.6	265.1
GEF-4 (2006-2010)	44.9	37.7	159.2	40.5	92.0	47.6	421.9
GEF-5 (2010-2014), to June 2013	16.3	1.8		38.8	46.3	94.4	197.5
Total GEF Funding	**86.4**	**87.5**	**296.7**	**354.3**	**181.1**	**248.5**	**1,254.4**

Source: GEF Project Tracking and Management Information System, 2013.

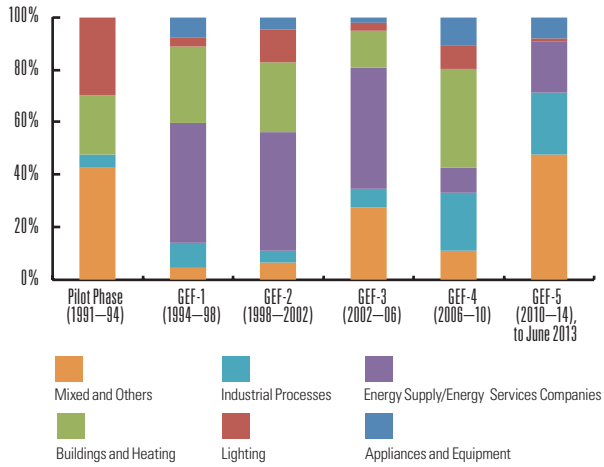
Note: Includes funding amounts for the energy efficiency components of all projects, including those classified as "Mixed and Others." Does not include multi-focal area funding.

When viewed by technology, the GEF has invested in a wide range of energy efficiency technologies and processes. The largest contribution has been made in Energy Supply/Energy Services Companies, Buildings and Heating, and Industrial Processes, with significant investments also in Lighting and Appliances and Equipment (Table 2 and Figure 6).

The GEF has supported energy efficiency projects in 115 countries in all regions of the world, with the biggest investments in Asia and in Eastern Europe and Central Asia (ECA). These regions accessed GEF funding in the early GEF phases (1994–2006) for projects using market-based and/or financial mechanisms. Asia (particularly China) also began to receive GEF funding very early, directing it toward projects dealing with regulatory frameworks, market transformation, and technology transfer. While Asia has continued to attract the largest share of GEF funding throughout all GEF replenishment phases, the funding share of transition countries in ECA has not kept pace. Instead, financing in recent GEF phases has increased in least developed countries (LDCs) in Africa and Latin America and the Caribbean. Recent projects in the latter regions focus on regulatory frameworks and market-based approaches, as was the case in the Asian countries in the early phases of the GEF. In the Latin America and Caribbean region, more efficiency projects were supported during GEF-4 than in the three prior phases, with more than a dozen projects on appliances, lighting, building efficiency, and industrial processes.

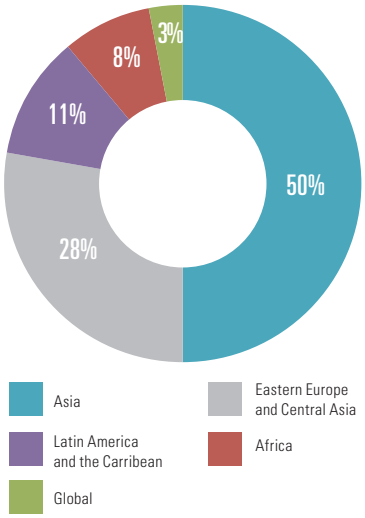
Eighty-six (86) percent ($1,080 million of $1,254.4 million) of the GEF's total climate change energy efficiency investments have been in Africa, Asia, and ECA—reflecting these regions' increased needs for energy, fueled by their high economic growth rates and/or their significant populations (Figure 7).

FIGURE 6 PERCENTAGE SHARE OF THE GEF INVESTMENT BY ENERGY EFFICIENCY TECHNOLOGY, BY PHASE



Source: GEF Project Tracking and Management Information System, 2013.

FIGURE 7 GLOBAL DISTRIBUTION OF TOTAL GEF FUNDING FOR ENERGY EFFICIENCY, BY FUNDING LEVEL



Source: GEF Project Tracking and Management Information System, 2013.

Aluminum smelting is an energy intensive process and efficiency improvements yield economic growth and energy security benefits, Tajikistan

Energy Efficiency Highlights during GEF-5 (2010–2014)

During GEF-5 Fiscal Year (FY) 2011, two energy efficiency projects focused on financial mechanisms were approved. These projects illustrate a successful GEF and agency strategy to use GEF funds to catalyze additional investment through local financial institutions to support sustainable investments even after the GEF project is completed.

During FY 2012, nine energy efficiency projects were approved with GEF grant funding of $68 million, attracting co-financing of over $1.3 billion. In addition, fifteen mixed projects included energy efficiency components using GEF grant funding of $53 million and co-financing of $991 million.

Included in this FY 2012 cohort were several large-scale efficiency projects that leverage GEF funding to attract private sector investment through the use of energy efficiency financing and risk-sharing facilities. Even though this reporting period showed a trend towards large-scale efficiency projects with strong emphasis on financing, projects were not limited to large emerging markets. Indeed, several projects promote efficiency in lighting and buildings in small countries. Further, several efficiency projects in FY 2012 focus on energy management systems in the industrial sector, targeting SMEs that will enable continuous energy efficiency improvement and promote the development of MRV tools. These energy management systems are vital to promoting "Green Industry" and sustainable development in the industrial sector.

In FY 2013, seven energy efficiency projects were approved with GEF grant funding of $29 million, attracting co-financing of $227 million. Six additional projects included energy efficiency components with GEF grant funding of $8.5 million and co-financing of $62 millon for the energy efficiency components. Just under half of all the projects focused on financial instruments and market based approaches, delivering a co-financing ratio of 9:1.

Policy and Regulatory Frameworks

Since the GEF's Pilot Phase, the World Bank and the United Nations Development Programme (UNDP) have been the primary implementers of projects addressing policy and regulatory frameworks, with important contributions by the United Nations Environment Programme (UNEP), the United Nations Industrial Development Organization (UNIDO), and other agencies. This approach targets overall energy policy; demand-side and supply-side measures; energy tariff regulations; power sector reform; energy efficiency policies, laws, targets, and plans; establishment of energy efficiency agencies; and promotion of energy efficiency audits.

Safe maintenance of hydrofluorocarbon (HFC)-free energy efficient cooling system in the Russian Federation as part of the Poznan Strategic Program on Technology Transfer pilot project, implemented by the United Nations Industrial Development Organization (UNIDO).

National authorities are actively involved in these projects—leading policy drafting, implementing project components, and participating in and facilitating capacity-building initiatives among public administrators. Examples of projects include a UNDP project in Bulgaria shown as a Case Study that developed an energy efficiency strategy to mitigate GHG emissions and supported the development of the Bulgarian Energy Efficiency Act and the National Energy Efficiency Program). In India, the Energy Efficiency project of the World Bank helped the government to decentralize procedures in the power sector and to promote energy efficiency. Additional projects include GEF-3 projects in China on heat reform and building energy efficiency (World Bank) and end-use energy efficiency (UNDP) as well as a GEF-4 project on thermal power efficiency in China (World Bank).

In terms of Demand-Side Management (DSM), GEF projects rely on the financial, organizational, and technical strengths of local utility companies to deliver energy efficiency investments in the utility, building, and municipal sectors. The World Bank has supported projects promoting energy efficiency in Mexico, Thailand, Vietnam, and Jamaica through utility-based DSM demonstrations.

During GEF-4, UNIDO also began to implement projects emphasizing the development of regulatory frameworks. Two examples are a project promoting energy efficiency in selected SME clusters in India and a joint UNIDO-UNDP project on improving industrial energy efficiency in Turkey. Projects in Thailand, the Philippines, Lao PDR, Vietnam, Peru, Ecuador, Argentina, the Russian Federation, Belarus, Kazakhstan, Mongolia, and Mauritius also address policy and regulatory frameworks to promote energy efficiency.

CASE STUDY

BULGARIA–ENERGY EFFICIENCY STRATEGY TO MITIGATE GREENHOUSE GAS EMISSIONS

GEF Agency:	UNDP
GEF Funding:	$2.5 million
Co-financing:	$3.9 million
Dates of Implementation:	1996–2004

Background

Bulgaria introduced significant national economic reforms during the project implementation period. By the end of the project, the economic and investment climate allowed private investors to enter the market to finance energy efficiency retrofits and projects in both the public and private sectors.

Project Overview

The project aimed to introduce practices into municipalities to improve energy efficiency and to reduce emissions of GHGs and other environmental pollutants. The project was organized around two elements:

- National capacity building—to establish sustainable energy policies and programs and to enhance public awareness in municipalities.
- Demonstration projects—to accelerate sustainable energy practices in municipalities (e.g., in street lighting, district heating, and energy efficiency in buildings) by showing the potential of new practices to save energy and money while reducing GHG emissions.

Capacity-building activities focused on municipalities as the critical political and socioeconomic unit to bring about change in Bulgaria. They included municipal energy management, training, and financing. The project developed local capacity to prepare energy efficiency projects based on experience from successful demonstrations.

Project Outcomes

- The project contributed to the development of the Energy Act (2003) and the Energy Efficiency Act (2004), which established provisions recognizing housing associations as legal entities entitled to both preferential energy prices and the financing of energy efficiency projects by the Energy Efficiency Fund;

Technician in a heat and hot water boiler manufacturing facility that utilizes energy-efficient metal working techniques, Russia

- In response to successful demonstrations, 37 municipalities established their own energy efficiency programs—a noteworthy achievement; and
- On the basis of these municipal programs, numerous energy efficiency projects related to municipal buildings, district heating systems, and street lighting were developed and implemented.

The project will contribute an estimated emissions reduction of 15.7 $KtCO_2$ eq annually from the demonstration projects.

Standards and labeling programs

The UNDP has implemented the majority of GEF projects establishing standards and labeling for end-use equipment, while other GEF Agencies have implemented a smaller number of such projects. The GEF-supported interventions typically focus on instituting: building codes; minimum energy performance standards and energy labels for appliances and efficient lighting fixtures; consumer education; and testing and certification of appliances. In countries with substantial manufacturing capacity, the GEF has also supported enterprises in developing new energy-efficient appliances and in acquiring technical information and knowledge from more advanced countries.

For example, in Tunisia (See Case Study on page 17) 10 out of 12 local appliance manufacturers now offer locally certified energy-efficient models. Similarly, through its project to promote commercialization of energy-efficient refrigerators in China, the GEF and UNDP provided technical assistance to refrigerator and compressor manufacturers, improving their average efficiency by 29 percent between 1999 and 2005. Under this project, sales of top-rated energy-efficient refrigerators increased from 360,000 units in 1999 to 46 million units in 2008, helping to drive increased production capacity. Under GEF-4, the GEF supported a significant program on energy efficiency in buildings, including more than 20 national projects implemented by the UNDP. For appliances and equipment, UNDP supports a large regional program to remove barriers to the cost-effective development and implementation of energy standards and labeling. This program aims to transform the markets of: household and office appliances (e.g., refrigerators and air conditioners); equipment (e.g., electric motors and fans); and lighting products (e.g., compact fluorescent lamps and ballasts) in Asian countries including Bangladesh, China, Indonesia, Thailand, Vietnam, and Pakistan.

Energy efficient wood stove and hot water heater demonstrated by UNDP project

Today, a large number of projects implemented by the UNIDO involve standards and labeling, particularly through a regional program in Southeast Asian countries including Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. The program is focused on reducing industry's carbon footprint through compliance with energy management systems based on the ISO 50001 standard.

CASE STUDY

TUNISIA–BARRIER REMOVAL TO BRING ABOUT MARKET TRANSFORMATION AND LABELING OF REFRIGERATORS

GEF Agency:	UNDP
GEF Funding:	$0.7 million
Co-financing:	$1.2 million
Dates of Implementation:	1998–2004

Background

A study of the Tunisian refrigerator market conducted before the start of the project showed that to lower its energy consumption, the government needed to focus on energy efficiency within the refrigeration sector. The study demonstrated that major energy savings could be achieved through widespread adoption of more efficient refrigerator models. The study also identified critical barriers (institutional, technical, informational, capacity, and market) that had to be addressed for market transformation to occur. At the time, Tunisian standard-setting sought to follow European and international practices. The National Institute for Standardization and Industrial Property was the lead agency responsible for the design and approval of the proposed new labeling format and testing procedures. During the project's preparation, six standards were applicable to household refrigeration in Tunisia, yet aspects of energy consumption and efficiency had not been considered.

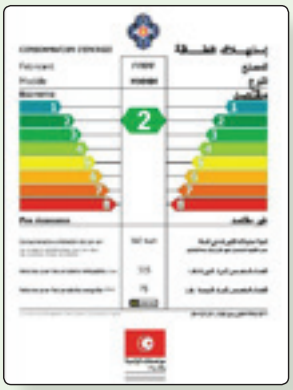
Project Overview

In addressing a variety of barriers, the project ensured that all local refrigerator manufacturers developed and adopted energy efficiency and energy-consumption labels, thereby guaranteeing consumer awareness of the positive economic impact of purchasing a more efficient model. In addition, effective testing, monitoring, and enforcement capacities were developed to comply with labeling standards and requirements. The economic, technological, and environmental benefits of labeling contributed to achievement of Tunisian sustainable development policy. Furthermore, barrier removal activated market forces, promoting diffusion of more efficient appliances. Finally, the project allowed local manufacturers to join in market development and to comply with labeling criteria and future binding standards, limiting energy consumption.

Project Outcomes

- Passage of three laws on energy efficiency, equipment, and appliance labeling;
- Capacity building of public institutions, refrigerator manufacturers, and local professionals;
- Awareness raised in decision-makers about energy efficiency of refrigeration technologies;
- Establishment of inter-institutional links in energy efficiency field associated with refrigerator market; and
- Dialogue between public and private sectors.

The project will contribute an estimated emissions reduction of 3.4 $MtCO_2$ eq over 2005–2030.



Energy efficiency labels for refrigerators raise consumer awareness about energy use, Tunisia

Market-Based Approaches

The GEF promotes market-based approaches for energy efficiency through projects that support establishment and operation of ESCOs. The GEF has supported ESCOs that include energy performance contracting in energy efficiency investments to serve the SME, residential, services, and industrial sectors. In this context, ESCOs are viewed as a specialized financing mechanism for energy efficiency investment.

Alternatively, some projects support the development of utility-based ESCOs as an element of a DSM or financing program (Singh 2005). The establishment of ESCOs allows such firms to profit from advising and supporting consumers to implement energy efficiency measures as well as from engagement in energy performance contracting. The World Bank, International Finance Corporation (IFC), UNDP and the European Bank for Reconstruction and Development (EBRD) have been the most active GEF agencies in this area, initiating projects leading to ESCO creation, development of an ESCO industry, and establishment of utility-based ESCOs.

In China, a two-phased energy conservation project shown as a Case Study and a utility-based energy efficiency finance program exemplify this approach. Similarly, a World Bank project in Brazil directed resources toward creation and demonstration of pilot ESCOs. Once established, the Brazilian ESCOs implemented performance contracts and created credit facilities from commercial or development banks to encourage third-party financing of subsequent ESCO projects. A UNDP project in Chile, meanwhile, demonstrated the commercial viability of industrial energy efficiency improvements through creation of two ESCOs. Another approach finances and promotes already-existing ESCOs. This model was followed in the Indian Renewable Energy Development Agency (IREDA) project, which provided financing to private-sector ESCOs to implement performance contracts with large industrial and commercial users such as steel and chemical plants and distilleries.

Other GEF project examples include co-financing technical assistance to the Centre for Energy Conservation in Peru, and an industrial energy efficiency program in Tunisia. The Inter-American Development Bank (IDB) is implementing an innovative project in Chile that uses a risk-sharing facility, funded by the GEF, to promote local investment in the growing ESCO sector there.

Energy Efficiency Inspection

CASE STUDY

CHINA–ENERGY CONSERVATION PROJECT PHASE II

GEF Agency:	World Bank
GEF Funding:	$26 million
Co-financing:	$255 million
Dates of Implementation:	2003–2010

Background

Modeled on successful ESCOs in other countries, three large ESCOs were successfully developed in China during the first phase of the China Energy Conservation Project. The project led to the development of 173 energy performance contracting projects by three ESCOs by May 2001, with an aggregate investment of about $34 million, and they continue to grow profitably. The second phase of the project built on this success to expand China's ESCO industry into a major energy efficiency investment modality, operating under purely market conditions with loan financing from domestic banks.

Project Overview

The project's objective was to develop a self-sustaining and growing ESCO industry in China. The project involved domestic banks as financiers of the industry, thus completing the full necessary market framework, and developed a service-oriented ESCO association for mutual ESCO assistance. The second phase of the China Energy Conservation Project aimed to expand domestic investment in energy efficiency projects through the aggressive development of China's nascent ESCO industry, thereby achieving large-scale energy efficiency improvements and associated reduction in growth of GHG emissions.

The project included two components:

- An ESCO service component to provide in-depth technical assistance to new and emerging ESCOs on the establishment and development of their business.
- An ESCO loan guarantee program to enhance opportunities for new and emerging ESCOs to obtain loans from domestic banks and to engage banks in the development of a sustainable ESCO industry.

As a result, the GEF projects supported the launch of the now highly prosperous ESCO industry in China, providing funds to back commercial banks to promote ESCOs' work on energy performance contracting.

Production line in an energy-efficient auto parts manufacturing facility, China

Project Outcomes

- Today, the ESCO industry is one of the government's principal means of promoting energy conservation in China. More than 140 energy efficiency measures have been implemented through the GEF program. In 2007 alone, China's ESCOs invested $1 billion in energy performance contracting projects, saving about 53 Mt of coal equivalent over the life of the project assets created during that year;
- ESCOs' total national investments surpassed the performance target for the fourth year of the project by more than 15 times, while energy conservation and carbon emissions reduction results surpassed performance targets by more than 8 and 9 times, respectively, over the same period; and
- The independent GEF Evaluation Office in its terminal evaluation report graded this project with high ratings. It also affirmed that the project was exceptionally successful in meeting its development objective of scaling up domestic investment in energy efficiency projects through aggressive development of China's nascent ESCO industry.

The project will contribute an estimated emissions reductions of 192.8 Mt CO_2 eq.

Financial Instruments

The GEF is at the forefront of efforts to advance innovative financial instruments that promote energy efficiency, including investment grants, partial loan guarantees, and special-purpose funds such as loan loss reserve funds, revolving funds, and equity funds.

All GEF agencies have recognized the importance of financial instruments for scaling of energy efficiency investments and supported projects with innovative financial mechanisms. In countries such as Bulgaria, Hungary, Russia, China, and the Philippines—where the banking sector is relatively developed, commercial banks are liquid and willing to accept some risks, and market baseline activity is sufficient—projects have been implemented to underwrite partial-risk and credit guarantees to ESCOs, end users, SMEs, industries, and municipalities (Taylor et al. 2008).

In addition, the GEF has helped establish several revolving and loan loss reserve funds including:

- The IFC Hungary Energy Efficiency Co-financing Program (HEECP);
- The World Bank chiller replacement project in Thailand;
- The World Bank energy efficiency project in Bulgaria; and
- The UNDP project for reconstruction of a public lighting systems in Slovakia.

Furthermore, UNDP and IDB are collaborating to provide partial performance guarantee mechanisms to enable ESCO borrowing from commercial banks under the Brazil energy-efficient buildings project.

A notable success story is the partnership of the GEF and IFC on risk-sharing facilities—IFC has subsequently acquired more than 15 years of experience with risk-sharing facilities serving 11 countries. The facilities have proven very successful, leveraging more than $1.4 billion of private-sector lending and generating very small losses of less than 0.05 percent (IFC 2011). This type of successful public-private partnership is a model for future GEF projects focused on financing and investment.

Cogeneration equipment installed in Avan District under UNDP Project

CASE STUDY

IFC PHILIPPINES SUSTAINABLE ENERGY EFFICIENCY FINANCE RISK-SHARING FACILITY PHASE II

GEF Agency:	IFC
GEF Funding:	$2.6 million
Co-financing:	$67 million
Dates of Implementation:	2012-2015

Background

The GEF and IFC have worked together on risk-sharing facilities since 1996, starting with the HEECP project in Hungary. This pioneering risk-sharing facility has led to successful replication in more than ten countries. According to a 2011 IFC report *Sustainable Energy Finance*, IFC has launched 15 sustainable energy finance programs which have attracted $1.4 billion in co-financing. The GEF was a partner in 11 of the projects. This exemplary and successful replication of energy efficiency financing is the type of catalytic impact the GEF and its partner agencies strive to achieve.

Project Overview

In the Philippines, the GEF and IFC launched the Philippines Sustainable Energy Finance Program (PSEFP) in 2007. The PSEFP combines advisory services and investment product support (i.e., risk-sharing facilities) to local financial institutions to increase the amount of financing available for small-scale renewable energy and energy efficiency projects in the Philippines.

The first risk sharing facility under the PSEFP was signed in 2009 with a local financial intermediary to support a clean energy portfolio of up to Philippine peso (PHP) 2 billion ($46 million). Building on this experience, the risk-sharing facility was expanded in 2012 under Phase II by PHP 3 billion ($70 million) for a total facility size of PHP 5 billion ($116 million). The expansion under Phase II, will allow the local bank to expand lending to new areas, including green housing and GEF-eligible low carbon-intensive transportation projects (e.g., electric/hybrid vehicles). As of June 30, 2012, the risk-sharing facility (under Phase I and Phase II) has supported the local bank in disbursing over $160 million to eligible clean energy projects.

Project Outcomes

- Significantly expand local financial institution investment in energy efficiency projects;
- Increase demand for ESCO services and energy efficiency investments through increased awareness of the attractive rates of return;
- Increase responsibility and share of investment by local financial institutions; and
- Lower the risk faced by GEF and IFC compared to earlier risk-sharing facilities.

The project will contribute an estimated emissions reduction of 500 Mt CO_2 eq over the project's lifetime.

Liucun Hollow Brick Plant, China. The GEF supported construction of this energy-efficient tri-arch brick kiln, and also promoting diffusion of the technology in Bangladesh.

Technology Demonstration and Diffusion

In accordance with UNFCCC Conference of Parties (COP) guidance, the GEF has been at the forefront of financing the transfer of ESTs to developing countries. The GEF's energy efficiency projects, for instance, focus on technologies that are mature, available on the international market, and profitable but not previously adopted due to human, institutional, technological, policy, or financial barriers.

Priority technologies include energy-efficient lighting fixtures, appliances, stoves, industrial technologies, district heating systems, boilers, and chlorofluorocarbon (CFC)-free chillers. Industrial sectors addressed include construction materials (brick, cement, and glass), steel, coke making, foundry, paper, ceramics, textile, food and beverage, tea, rubber, and wood. Some technology transfer projects also include activities addressing power generation and cogeneration (combined heat and power), transmission, and distribution systems.

The UNDP has successfully implemented sector- and technology-specific projects such as: the China Energy Conservation in Township and Village Enterprises initiative, which spanned four sectors; the India Energy Efficiency Improvement in Steel Rerolling Sector project; the Vietnam Energy Conservation in SMEs project, spanning five sectors; and a project transferring energy-efficient brick kiln technology from China to Bangladesh ("south-to-south" technology transfer). Investments have evolved over time—a recent technology transfer project on non-fired bricks in Vietnam has been approved, offering even further energy efficiency benefits.

The World Bank is also active in this field, helping transfer building chiller technologies (e.g., chiller replacement programs in India, the Philippines, and Thailand); efficient industrial boiler systems (e.g., in China); and residential cooking stove technologies (e.g., improved household stoves in Mongolian urban centers). In addition, the World Bank and the IFC have supported numerous projects promoting the use of efficient lighting technologies, including a high-efficiency lighting pilot program in Mexico (See Case Study on page 23); an efficient lighting initiative in Argentina, Peru, and South Africa; and a GEF-4 funded project in Kenya and Ghana that helped launch the Lighting Africa initiative. UNIDO has launched numerous projects to promote technology transfer among SMEs, including energy efficiency in small-scale manufacturing and the integration of solar thermal heating for productive uses.

CASE STUDY

MEXICO–HIGH-EFFICIENCY LIGHTING PROJECT (ILUMEX)

GEF Agency:	World Bank
GEF Funding:	$10 million
Co-financing:	$13 million
Dates of Implementation:	1991–1997

Background

Compact fluorescent lamps (CFLs) offer an energy-efficient solution to help Mexican consumers save money and avoid the GHG emissions caused by electricity use. With support from the GEF and leveraged funding, this project set out to sell 2.6 million CFLs to demonstrate the technical and financial feasibility of switching to CFLs and, ultimately, to transform the Mexican residential lighting market by: modeling change; improving government capacity; changing consumer preferences; and improving the production capacity of manufacturers, distributors, and vendors.

Project Overview

To sell the CFLs, ILUMEX followed a simple model that relied on bulk purchases of high-quality CFLs, CFL sales in local utility service centers, low-interest financing, an installment payment system on electricity bills, and subsidized prices. Mexico's main public utility company, Comisión Federal, initially implemented the project in urban Guadalajara and Monterrey, then scaled up the project for implementation in the states of Jalisco, Nuevo León, and parts of Colima, Nayarit, Coahuila, and Tamaulipas.

Project Outcomes

- Completed sale of 2.6 million CFLs by project end in 1998;
- Replication of the project's model in a nationwide program by Mexico's Trust Fund for Electrical Energy and in a program run by Luz y Fuerza del Centro, a Mexico City utility; and
- Illustrated the importance and functionality of a DSM approach, confirmed the technical and financial viability of CFL use, and clarified the significance of subsidies in promoting new energy-efficient technologies. As a result, Mexico now has one of the most developed institutional models for energy efficiency initiatives.

The project will contribute an estimated emissions reduction of 764 Mt CO_2 eq over the lifetime of the lighting distribution.

In GEF-5, a new and expanded efficiency initiative was launched by the GEF, the World Bank, and the Government of Mexico, building on the successful earlier efforts. The new effort will support loans to consumers—for energy efficiency lighting, air conditioners, and refrigerators—that can be paid back through monthly payments on the utility bill[5].

Taking Efficient Lighting Global

The GEF/UNEP en.lighten initiative builds on successful national projects to create a global Public-Private Partnership (PPP) to accelerate the phase-out of inefficient lighting. With leadership and support from private sector partners, Philips and Osram, and the China Lighting Technology Center, en.lighten has produced a tool-kit of best practices for the transformation of lighting and helped establish strong quality control, certification, and MRV requirements that will aid the global transition to efficient lighting. This initiative is a model for advancing energy efficiency through a focus on quality, standards, and PPP. The initiative will also help promote advanced lighting technologies, including light-emitting diodes (LEDs).

http://www.enlighten-initiative.org

GEF-funded Heat Reform and Building Efficiency Project – Hua Xia Jin Dian, a demonstration pilot of residential buildings, Hexin District, Tianjin, China.

The GEF's Role in Promoting Energy Efficiency

The GEF financing of energy efficiency projects has produced valuable, even critical, results for developing countries and transition countries. The GEF support has promoted energy efficiency by:

- Helping to remove barriers to implementation and dissemination of energy-efficient technologies and practices.
- Supporting market transformation for energy-efficient appliances and the widespread adoption of energy-efficient technologies and sustainable financial mechanisms in the industry and building sectors.

Specifically, the GEF's support has been praised for its combination of investment funding with technical assistance and for its development and introduction of new financial mechanisms and pilot projects, which often have overcome high transaction costs and initial risks (Taylor et al. 2008). The GEF's experience in the energy efficiency field points to these lessons learned for future operations:

- Full assessment of the energy efficiency market should be conducted early during project preparation.
- Critical barriers to the implementation of energy efficiency projects within target markets should be identified, and customized interventions to address them sustainably should be determined in advance.
- Project design must be flexible enough to react to changes in the broader financial sector while remaining transparent at all times.
- Projects involving financial intermediation should develop robust mechanisms for financial and technical overview and appraisal.
- Risks should be shared among all program participants (Taylor et al. 2008; Singh 2005; UNDP 2005).

Notwithstanding the GEF's successes, the potential for energy efficiency remains vast and growing. As technologies evolve, new opportunities arise to further enhance energy efficiency among existing users. More importantly, as we strive to bring modern energy services and full energy access to all the people of the world, the need for efficient use of energy will only increase.

Going forward, the GEF anticipates continued strong focus on energy efficiency in the buildings and industrial sectors. The success of PPPs for energy efficiency points towards future projects that use these mechanisms to replicate and scale-up energy efficiency investments. There are also opportunities to address consumer behavior and promote energy-efficient choices, especially by taking advantage of information and communications technologies by, for example, enabling smart metering and smart grids. As in the past, future GEF projects on energy efficiency will help GEF countries promote development and economic competitiveness as they help protect and preserve the environment.

Lighting systems improvements are important in residential and commercial buildings, Morocco

Conclusion

Investments in energy efficiency have positive effects not only on reducing GHG emissions, but on competitiveness, employment generation, and health conditions. With rising energy demand, it is widely considered more cost-effective to invest in end-use energy efficiency improvements than to satisfy new demand through increases in energy supply (IPCC 2007). In addition, energy efficiency shows the highest potential to reduce GHG emissions among a variety of alternatives. According to the IEA's projections, end-use efficiency could account for 31 percent of the global GHG emissions reductions needed by 2050 for aggregate emission pathways consistent with having a likely chance of holding the increase in global average temperature below 2 °C or 1.5 °C above pre-industrial levels (IEA 2012).

Buildings alone account for approximately 32 percent of global energy use, and for nearly 30 percent of total GHG emissions, including energy end-use emissions, electricity generation emissions and district heat. Over the next four decades, an estimated $16.3 trillion will be required to deploy innovative energy-efficient technologies to achieve targeted emissions reductions in the buildings sector (IEA 2012). However, nearly all of these investments will have positive rates of return.

To address the global challenge of climate change, the GEF has invested substantial resources in energy efficiency programs in developing countries. Since its establishment in 1991, the GEF has committed over $1.25 billion in funding and leveraged an additional $11.4 billion in co-financing, a significant portion of which has come from the private sector.

In helping developing countries remove regulatory, policy, and market barriers, GEF investments facilitate the multiple benefits—energy, environmental, and economic—of energy efficiency solutions. The GEF also helps government agencies adopt energy efficiency standards, formulate policy and regulatory frameworks, pioneer innovative financial instruments, and promote market-based approaches.

The successes of the GEF projects have been made possible with the cooperation of its partners, particularly the local and national governments of developing countries, and with the project management expertise of GEF Agencies. Energy efficiency activities promote global environmental benefits, support sustainable local economic development, and will remain a major part of the GEF's response to the global pressures of increasing GHG levels.

Together with its partners, the GEF looks forward to expanded investments in energy efficiency. The GEF support for developing and enforcing strong policies, norms, and regulations has the potential to achieve large-scale energy savings and GHG emissions reductions. The GEF stands ready to be a partner of choice for scaling up energy efficiency investments in developing and transition countries leading to a truly transformative impact.

ABBREVIATIONS AND ACRONYMS

CCS	Carbon Capture and Storage
CFC	Chlorofluorocarbon
CFL	Compact Fluorescent Lamp
CO_2 eq	Carbon dioxide equivalent
COP	Conference of the Parties
DSM	Demand-Side Management
EBRD	European Bank for Reconstruction and Development
ECA	Eastern Europe and Central Asia
ESCO	Energy Service Company
EST	Environmentally Sound Technology
FY	Fiscal Year
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
HCFC	Hydrochlorofluorocarbons
HEECP	Hungary Energy Efficiency Co-financing Program
IDB	Inter-American Development Bank
IEA	International Energy Agency
IFC	International Finance Corporation
ILUMEX	High-Efficiency Lighting Project (Mexico)
IPCC	Intergovernmental Panel on Climate Change
IREDA	Indian Renewable Energy Development Agency
ISO	International Standards Organization
LDC	Least Developed country
LED	Light Emitting Diode
MRV	Measurement, Reporting and Verification
PPP	Public-Private Partnership
PSEFP	Philippines Sustainable Energy Finance Program
SME	Small and Medium Enterprise
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization

UNITS OF MEASURE

Gt	One Giga (10^9) tonne
Kt	Kilotonne
Mt	Million tonne/Megatonne
t	Metric tonne

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END NOTES

1 Transport efficiency is covered under the GEF-5 focal area objective CCM-4 to promote energy-efficient low-carbon transport and urban systems. Those efforts are documented in the GEF publication *Investing in Sustainable Transport and Urban Systems – The GEF Experience, 2012.*

2 The GEF-5 energy efficiency portfolio will continue to focus on end-use efficiency measures and co-generation. Supply-side measures related to electric power generation, transmission, and distribution will not be supported under the efficiency objective (CCM-2), as documented in GEF-5 Strategic Objectives Document, GEF.R.5.Inf_.21, page 25.

3 Energy efficiency components were included in 52 technology transfer and mixed projects (i.e., projects including more than one GEF program area, such as energy efficiency and renewable energy), often with renewable energy technology investments.

4 Differences in project design assumptions, time frames, project types, and intervention strategies make it difficult to precisely estimate the impact of energy efficiency projects on GHG emissions reduction. The estimate provided here includes reported benefits from completed projects and projected benefits from approved projects that are not yet completed.

5 GEF Project #4116, *Lighting and Appliances Efficiency Project*, World Bank. 2010.

PHOTOGRAPHY

Cover: Aidan Dockery
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ABOUT THE GEF

The GEF unites 183 countries in partnership with international institutions, civil society organizations (CSOs), and the private sector to address global environmental issues while supporting national sustainable development initiatives. Today the GEF is the largest public funder of projects to improve the global environment. An independently operating financial organization, the GEF provides grants for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants.

Since 1991, the GEF has achieved a strong track record with developing countries and countries with economies in transition, providing $11.5 billion in grants and leveraging $57 billion in co-financing for over 3,215 projects in over 165 countries. Through its Small Grants Programme (SGP), the GEF has also made more than 16,030 small grants directly to civil society and community based organizations, totaling $653.2 million.

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