Promoting Industrial Energy Efficiency in Developing Countries: An Overview of the Global Environment Facility and its Project Portfolio

Zhihong Zhang, The Global Environment Facility

ABSTRACT

This paper presents an overview of the Global Environment Facility (GEF) and its project portfolio in industrial energy efficiency. The GEF is an independent financial institution dedicated to the protection of the global environment. Since its creation in 1991, the GEF has allocated over $5 billion to projects in over 140 countries, including $1.8 billion in the climate change focal area. The bulk of GEF funding in the climate change focal area has gone to mitigation activities. The GEF energy efficiency portfolio includes about 30 industrial energy efficiency projects with a total GEF allocation of approximately $255 million and more than $1.8 billion co-financing. About two-thirds of the projects (in terms of size) are implemented by the World Bank and one-third by UNDP. Most of the energy efficiency projects are located in East Asia, especially China. About half of the projects explicitly target one or multiple energy-intensive sectors, such as building materials, steel, chemicals, and paper, and are implemented by UNDP. UNDP projects also tend to focus on small and medium-sized enterprises. The thrust of the GEF operational program on energy efficiency is to remove barriers, including policy, market, financial, as well as technical barriers. As such, most of these projects promote the development of energy service companies or the creation of financial instruments to finance energy efficiency investments, along with technical assistance in capacity building, information dissemination, and policy reforms. This paper summarizes the preliminary lessons learned and provides an example of the implementation experience of a UNDP-GEF industrial energy efficiency project in China.

The Global Environment Facility and Energy Efficiency

The Global Environment Facility (GEF) is the single largest source of financing dedicated to the protection of the global environment. It provides grants and concessional funding to developing countries and economies in transition for projects relating to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants (POPs). As the financial mechanism of the United Nations Framework Convention on Climate Change (UNFCCC) and other multilateral environmental conventions, the GEF finances agreed enabling, mitigation, and adaptation activities in eligible recipient countries.[1] Since its creation in 1991, the GEF has allocated over $5 billion to projects in over 140 countries, including $1.8 billion in the climate change focal area. The bulk of GEF funding in the climate change focal area has gone to mitigation activities.

GEF-funded projects are implemented by three agencies: the United Nations Development Program (UNDP), the United Nations Environment Program (UNEP), and the

[1] Enabling activities are those that help non-Annex I Parties to the UNFCCC to participate in the convention process, including preparation of national communications to the UNFCCC.

World Bank.[2] The GEF funds projects through operational programs. At present, there are 15 operational programs under the six focal areas. Within the climate change focal area, there are four main operational programs (OPs) on mitigation activities: energy efficiency (OP5), renewable energy (OP6), emerging energy technologies (OP7), and sustainable transport (OP11). The energy efficiency operational program deals with the removal of barriers to energy efficiency and energy conservation. It was one of the ten original GEF operational programs set out in the GEF Operational Strategy adopted by the Council in October 1995 and one of the three initial climate change operational programs that address long-term program priorities of the UNFCCC to mitigate climate change. The thrust for the barrier-removal approach for energy efficiency has stemmed from the findings of many studies that suggest institutional, economic, and social barriers often inhibit or delay the realization of the large energy-saving potential in many sectors and regions. According to the GEF Operational Strategy, this operational program has three purposes (GEF 1996):

(a) To remove barriers to the large-scale application, implementation, and dissemination of least-economic-cost, commercially established, or newly developed, energy-efficient technologies that would result in the reduction of greenhouse gas emissions;
(b) To help ensure the sustainability of the resulting "win-win" projects by demonstrating cost recovery and facilitating mainstream financial support, including from the multilateral development banks; and
(c) To facilitate the learning process required for widespread application of energy conservation and energy efficiency projects in developing countries.

Major market applications identified under the energy efficiency operational program include the following (with specific examples of measures in parentheses) (GEF 1997):

- Electricity production and distribution (load analysis, better maintenance and instrumentation, boiler and turbine improvements)
- Industrial energy consumption (efficient drives, motors, and improved systems configuration)
- Manufacturing processes in energy-intensive industries (basic materials processing)
- Effective use of energy intensive materials
- Combined heat and power technologies
- Coal production, transport, storage, and use (best practice applications)
- Manufacturing of more energy-efficient equipment (refrigerators, industrial motors, and lighting systems)
- Energy for rural and agro-processing industries
- Passive heating and cooling (building regulations and designs)
- Commercial buildings (more efficient lighting and space conditioning)
- District heating and cooling (insulation, weatherization, boiler tuning, and controls)

[2] In addition to the three GEF implementing agencies, there are seven executing agencies under expanded opportunities with limited access to GEF resources, including the four regional development banks (African, Asian, European, and Inter-American), the UN Industrial Development Organization, the Food and Agricultural Organization, and the International Fund for Agricultural Development.

These market applications range from energy supply-side efficiency of coal and electricity to end-use efficiency in industry, commercial and residential appliances and buildings, as well as combined heat and power, district heating, efficient use of energy-intensive products, and rural and agro-processing industries. Implementation of GEF projects during the past decade suggests that not all these market applications have found their way equally into the GEF project portfolio and that half of the projects do not necessarily focus on a particular market application. Some projects deal with one or several sectors, sub-sectors, or products, while others focus on one or several program models for barrier removal. All in all, in terms of the market applications listed above, a considerable number of projects deal with manufacturing of more energy-efficient appliances, passive heating and cooling, commercial buildings, district heating, industrial energy consumption, manufacturing processes in energy-intensive industries, and combined heat and power technologies. The portfolio includes only a handful projects targeting loss reduction of electricity transmission and distribution or rural and agro-processing industries. Supply-side efficiency products tend to be considered exceptional rather than the norm to be eligible for GEF support, as it has been argued that such activities as better maintenance and instrumentation or boiler and turbine improvements for the electric utilities should be considered baseline activities that do not qualify for GEF support (which is intended to finance the incremental cost of activities that lead to global environmental benefits). Furthermore, aside from a number of oil and gas transmission projects funded through the "short-term measures" window in the early years, the GEF has not been keen on supporting coal or other fossil fuel-related supply-side efficiency projects.

According to the Climate Change Program Study (GEFME 2004), energy efficiency projects (OP5) account for about 40 percent of the GEF portfolio in the climate change focal area. Within the energy efficiency operational program, about 20 percent of the closed and active projects focus on energy efficiency in industrial production, 30 percent on energy-efficiency products, about one-third on financial instruments and mechanisms, and 17 percent on energy efficiency in the public sector. Since many of the projects that fall within the cluster of financial instruments (e.g., funds and guarantees) and mechanisms (e.g., Energy Service Companies) also deal with the industrial sector, the total amount of industrial energy efficiency activities is likely to account for about one-third of the total energy efficiency project portfolio. The following section examines the trends of the GEF portfolio related to industrial energy efficiency, a number of typical program models, and emerging implementation experiences and lessons learned.

The Industrial Energy Efficiency Portfolio

As of March 2005, the GEF climate change portfolio includes approximately 30 industrial energy efficiency projects at various stages of development and implementation. Since GEF projects typically take one to two years to prepare and approve and an additional four to five years to implement, the majority of these projects are still under implementation. Only three projects have been closed, and another four projects are under preparation. Among these 30 projects, 24 are full-sized projects and six are medium-sized projects with a GEF grant under $1 million. Seventeen of these projects are implemented by the World Bank, including two by the International Finance Corporation (IFC) – the private sector arm of the World Bank Group – and one jointly with UNDP. UNDP is the implementing agency of 11 of these projects, and UNEP of only two projects (one regional and one global) (see Table 1).

Table 1: Summary of GEF Industrial Energy Efficiency Project Portfolio

	Number of Projects	GEF Allocations (Million USD)	Co-financing (Million USD)
World Bank WB/IFC WB/UNDP	17 2 1	196	1,672
UNDP	11	56	148
UNEP	2	3	9
Total	30	255	1,829

The GEF has allocated approximately $255 million for the 30 industrial energy efficiency projects, with more than $1.8 billion co-financing from the implementing agencies, bilateral donors, governments, financial institutions, and the private sector. Among the three GEF implementing agencies, the World Bank accounts for roughly 75 percent of the portfolio, UNDP nearly 24 percent, and UNEP just over 1 percent.

In terms of regional and national distribution, East Asia (China, Malaysia, Thailand, and Vietnam) accounts for most of the projects. China alone has received by far the most GEF support for industrial energy efficiency (as well as overall climate change funding), with nearly a quarter of the GEF allocations ($68 million) and more than half of the total co-financing ($1 billion). This should not come as a surprise, as China is the largest emitter of greenhouse gases among the GEF recipient countries and has the greatest potential for emissions reduction, especially in the industrial sector.

Industrial Sub-Sectors

About half of the projects in the industrial energy efficiency portfolio identify one or multiple sub-sectors which the project focuses on; the other half either do not specify a sub-sector or deal with industrial energy efficiency along with commercial or building sectors. Among those sub-sector-specific projects, the industries covered include construction materials (brick, cement, and glass), steel, coking, metal casting, paper, ceramics, textile, food and beverage, tea, rubber, and wood. A number of projects also aim at promoting industrial energy-efficient equipment, such as boilers, motors, pumps, as well as cogeneration. It is interesting to note that the majority of the UNDP-implemented projects have a specific focus on one or several industrial sub-sectors, while most of the World Bank-implemented projects do not limit themselves to a list of pre-determined industries (see Table 2).

Another interesting feature to note is that the UNDP-GEF projects typically focus on small and medium-sized enterprises (SMEs), while the World Bank-GEF projects tend to give more attention to large enterprises. The World Bank Algeria project (under preparation), for example, proposes to concentrate on large and medium-sized industries initially and then expand to the entire industrial sector at a later stage. In contrast, virtually all UNDP projects listed in Table 2 target SMEs.

Table 2: GEF-Supported Industrial Energy Efficiency Projects with Specific Sub-Sectors

Country	Project Title	Implementing Agency	Sub-Sectors
Algeria	Development of an Energy Efficiency Market in the Industrial Sector	World Bank	Construction materials, cements, steel, petrochemicals, and energy industry
Bangladesh	Improving Kiln Efficiency in the Brick Making Industry	UNDP	Brick
China	Energy Conservation and GHG Emissions Reduction in Chinese Township and Village Enterprises	UNDP	Brick, cement, coking, and metal casting
India	Removal of Barriers to Energy Efficiency Improvement in the Steel Rerolling Mill Industry	UNDP	Steel rolling
India	Energy Conservation in Small Sector Tea Processing Units in South India	UNDP	Tea processing
Kenya	Removal of Barriers to Energy Conservation and Energy Efficiency in Small and Medium Scale Enterprises	UNDP	Food and beverage, textile, paper products, and tea
Malaysia	Industrial Energy Efficiency Project	UNDP	Cement, ceramics, food, glass, iron and steel, paper and pulp, rubber, and wood
Vietnam	Promoting Energy Conservation in Small and Medium Scale Enterprises	UNDP	Brick, ceramics, textile, paper, and food processing

Program Models

The World Bank-GEF (including IFC) energy efficiency projects, especially those approved in recent years, generally promote the development of the ESCO market and the creation of dedicated financing instruments to stimulate investments in energy efficiency. Lack of access to financing and high transaction costs associated with energy efficiency projects have often been cited as a critical barrier to the wide-spread adoption of energy-efficient technologies. Fostering the market for ESCO development and creating financial instruments thus become two of the most typical components of World Bank-GEF energy efficiency projects. In addition, most projects have a technical assistance component for project management, capacity building of project stakeholders, dissemination of project results, as well as project monitoring and evaluation.

ESCO development. Since the mid-1990s, ESCOs have been widely accepted by the World Bank as a viable business model and an attractive mechanism for removing many of the barriers to energy efficiency. The reason for the attractiveness of the ESCO business model is that it relies on market forces to bridge the gap between end-users and financing, it involves private sector participation, it mobilizes local sources of financing, and it transfers the technical risks from the end-users to financiers and project developers. Most of the World Bank energy efficiency projects that have entered into the GEF pipeline have included components aimed at developing the ESCO market in such a diverse group of countries as Algeria, Bulgaria, China, Cote d'Ivoire, Romania, and Tunisia. Since most of the projects are either ongoing or under preparation, implementation experiences and lessons learned are only beginning to emerge.

Although a growing number of ESCOs have been established with the support of GEF funds and some energy efficiency investments have been made, the projects under implementation have experienced a number of challenges, including lack of equity sources for new ESCOs, legal and taxation issues associated with the ESCO business, inadequate business, marketing, and risk management skills among ESCOs staff, and lack of access to ESCO project financing, overly complex energy performance contracts, creditworthy risks associated with end-users, and unfamiliarity of customers and banks to ESCOs (World Bank 2004). Because of the many constraints for the development of the ESCO markets in developing countries, it is critical to identify the most promising business models suitable for the local conditions and integrate appropriate project financing into project design. A GEF ESCO Thematic Review also includes the following lessons learned (AEA Technology 2001):

- Projects should consider a complete and phased plan for market development.
- Energy pricing policies are critical to ESCO development.
- Large-scale, multi-donor, long-term funding may be required to develop ESCO markets.
- ESCOs require key technical and entrepreneurial skills.
- Active supply of energy-efficient equipment is essential to ESCO development.
- ESCO markets require educated end-users and financiers.
- Managerial and cultural factors should be understood and accounted for.
- Local banking sector should be closely involved.
- Legal and taxation issues should be addressed.
- Projects should develop sustainable institutions and companies.
- ESCO programs should seek to offer viable business models for all markets and projects.
- Specific target markets can provide a strong base for ESCOs.

Financial instruments. In addition to the development of the ESCO market, GEF funds have been used by the World Bank and IFC to create a variety of innovative financial instruments to finance energy efficiency activities. The most common financial instruments considered by the World Bank-GEF projects are: partial loan guarantees, loan loss reserve funds, special purpose funds, equity funds, and investment grants (World Bank 2004). Table 3 provides a summary of these instruments.

Some of these financial instruments have also been used by UNDP-GEF energy efficiency projects. For example, the China Township and Village Enterprise Energy Conservation Project sets up a revolving fund with GEF seed money and leverages local commercial banks to co-finance energy efficiency projects. The UNDP-GEF Vietnam SME Project intends to create a guarantee facility to finance energy efficiency in SME industries. As financing is not UNDP's comparative advantage, UNDP-GEF projects tend to give more emphasis to development of policies and institutions, information dissemination, and capacity building of stakeholders. The following section discusses the implementation experience of a UNDP-GEF industrial energy efficiency project in China.

Table 3: Financial Instruments of World Bank-GEF Energy Efficiency Projects

Financial Instrument	Description	Conditions	Sample Projects
Partial loan guarantees	GEF funds are placed into a reserve account used to under write partial credit guarantees for loans to energy-users, ESCOs, or equipment suppliers.	Appropriate in well-developed banking sectors where banks are liquid and willing to accept some risks	Algeria, Bulgaria, China (Energy Conservation Phase II), Hungary, and Tunisia
Loan Loss Reserve Funds	GEF funds are deposited into an account with participating banks to provide full or partial coverage for a portfolio of small loans, where individual loan guarantees are not appropriate.	Well suited for developed and liquid banking sectors; better suited for a portfolio of small, standard loans	Hungary (residential loans)
Special Purpose Funds	GEF funds are used as dedicated credit lines or revolving funds.	Appropriate where there is insufficient liquidity in the banking sector or there is major risk aversion among lenders	Algeria, Romania, and Thailand
Equity Funds	GEF funds are used as equity to ESCOs.	ESCO and project equity constraints are major barriers.	China (Energy Conservation Phase I)
Investment Grants	GEF funds are used to provide subsidies to end-users to reduce risks and stimulate the market.	Appropriate where credit barriers are too high to support commercial financing or the banking sector is underdeveloped.	Tunisia and Vietnam

Implementation Experience of the China TVE Project

The UNDP-GEF project entitled "Energy Conservation and Greenhouse Gas Emissions Reduction in Chinese Township and Village Enterprises (TVEs) – Phase II" was approved by the GEF Council in 2000. The project deals with four industrial sub-sectors of brick making, cement, coke making, and metal casting, and targets the so-called TVEs, which until the late 1990s were owned by the local governments at the township and village level but have since been privatized or become shareholding companies. These enterprises represent more than 90 percent of China's brick output as well as a significant share of cement, coke, and metal casting outputs.

Consistent with the thrust of GEF OP5, the China TVE energy conservation project aims to remove policy, market, technical, and financial barriers that impede the widespread adoption of energy-efficient technologies in the four industries. The institutional framework for barrier removal includes establishment of a policy implementation committee (PIC) at the national level, local PICs at the pilot counties, a consortium (which has been registered as a consultancy) to broker business development services between TVEs and service providers, and a revolving capital fund (RCF) to catalyze commercial loan financing for energy efficiency investments (UNDP 2000).

Implementation of the project started in 2001. By late 2003, the institutional framework had been set up, including creation of the national PIC, registration of the consortium as a commercial entity, and design of the RCF hosted by the Agricultural Bank of China (ABC). In the meantime, eight companies from the four sub-sectors were selected for technology

demonstration, and local PICs were established by the local governments of the counties or cities where the pilot companies are located. A range of training activities were carried out for the national PIC and local PIC members and enterprise managers. In particular, specific barriers to energy efficiency have been identified, and action plans by the local governments have been developed and are being implemented. Voluntary agreements between the eight pilot companies and the local governments have been drafted, whereby the pilot companies pledge to undertake technical renovation to improve their energy efficiency and reach specific energy-saving targets. The local governments in turn will provide conducive policies and measures and other forms of support. The GEF project provides technical assistance to the pilot companies, including contracting design institutes and equipment suppliers to provide relevant services to the pilot companies for the renovation projects (UNDP 2004). The demonstration projects are financed by the pilot companies, using equity or a combination of equity and debt. Because of the small capitalization of the RCF ($ 1 million from GEF) and the requirements that ABC places on its loans, the RCF thus far has played a limited role in financing the demonstration projects.

Table 4 below gives a brief description of the technical renovation activities of the eight pilot plants supported by the GEF project. For the two brick plants, the renovation efforts focus on raw material preparation, upgrading the extruding process, and retrofitting or replacing the kiln. Through these measures, unit energy consumption at these plants is expected to decrease by 15-20 percent, while product quality will be improved. Both demonstration projects are scheduled to be completed in May 2005.

The cement sub-sector has two distinct demonstration projects. As described in Table 4, the demonstration project of the first cement plant recovers low-grade waste heat from cement production to generate electricity. This demonstration project is among the first of its kind in China and represents a major technological breakthrough. The 3 MW waste heat power plant was commissioned in March 2004, and has attracted a great deal of attention from the Chinese cement industry. The other cement demonstration project targets renovation of the vertical shaft kiln. Although the past few years have seen a significant growth of rotary kilns in China, the vertical shaft kiln still represents the dominant albeit declining technology in China, and will likely be around for many years to come especially in the inland regions. By retrofitting the shaft kiln and the raw meal system, the project aims to reduce energy consumption of the cement plant by about 15 percent.

The two coking demonstration projects are very similar in scope and technology: both plants make coke using a non-recovery process (i.e., no chemical by-products are recovered), and both demonstration projects will use the waste heat from the coke ovens for power generation. These demonstration projects are also the first of their kind in China. The two projects are designed by two different electric power design institutes in China, and they also use different equipment suppliers. It would be interesting to compare the results of the two plants after their commissioning and trial operation.

Because of the diversity of products and processes in the metal casting industry, it is difficult to pinpoint the typical energy-saving technologies. The thrust of the demonstration projects is to upgrade the melting process, improve product quality, and reduce scrap, thereby reducing energy use per unit of salable product. Another measure proposed for the first pilot foundries is to construct a coke storage room to prevent the loss and deterioration of coke from exposure to adverse weather conditions. For the second foundry, the proposed energy efficiency project is also linked to the company's plan for capacity expansion and introduction of new product lines.

Table 4: Energy Efficiency Demonstration Activities of the China TVE Project

Sub-sector/pilot plant	Technical Measures	Projected Energy Savings
Brick Plant #1 Output: 70 million bricks/year Raw material: shale	• Renovate extruding process • Increase perforation rate • Retrofit kiln to improve heat insulation • Improve aging process	• Coal use decreases from 1.27 to 1.00 tce/10,000 bricks • Power use increases from 0.13 to 0.19 tce/10,000 bricks • Total energy use decreases from 1.4 to 1.2 tce/10,000 bricks
Brick Plant #2 Output: 32 million bricks/year Raw material: clay	• Prolong clay weatherization • Improve clay pugging process • Use fine roll mill to improve milling process • Renovate extruding process • Build energy-efficient kiln	• Coal use increases from 1.25 to 1.00 tce/10,000 bricks • Power use increases from 0.17 to 0.21 tce/10,000 bricks • Total energy use decreases from 1.42 to 1.21 tce/10,000 bricks
Cement Plant #1 Process: dry-process cement/clinker production	• Recover waste heat from cement plant to generate electricity	• Install capacity: 3 MW • Power generation: 21.2 GWh/year
Cement Plant #2 Process: shaft kiln Output: 500,000 tons/year	• Retrofit raw meal system • Retrofit shaft kilns	• Energy use decreases from 0.146 to 0.125 tce/ton cement
Coking Plant #1 Capacity: 450,000 tons/year	• Recover waste heat from coke ovens to generate electricity	• Install capacity: 3x6 MW • Power generation: 108 GWh/year
Coking Plant #2 Capacity: 500,000 tons/year	• Recover waste heat from coke ovens to generate electricity	• Install capacity: 2x15 MW • Power generation: 120 GWh/year
Foundry #1 Products: ductile iron pipe fittings and valves	• Renovate patterning process by using fiberglass • Renovate melting process by replacing the sole cupolas with duplex melting system • Build coke storage room • Develop sand recovery system	• Energy use decreases from 0.125 to 0.09 tce/ton casting
Foundry #2 Products: engine bodies, ductile iron castings for automobiles	• Build automatic static pressure molding line to produce new models of diesel engines	• Energy use decreases from 0.606 to 0.485 tce/ton casting

Note: tce = ton of coal equivalent

In addition to the eight pilot demonstrations, the TVE energy conservation project has embarked on an ambitious replication effort. Formulation of local action plans and voluntary agreements will be expanded to another 8-10 counties/cities, and at least 100 additional TVEs in the four sub-sectors will participate in the technical renovation activities supported by the project.

Conclusions

The GEF approach to energy efficiency, as stated in the Operational and Strategy and Operational Programs, is to remove barriers to the large-scale application, implementation, and dissemination of cost-effective, energy-efficient technologies and practices that will result in the reduction of greenhouse gas emissions. Such barriers may range from lack of an enabling policy environment to lack of information and human capacity, lack of access to financing and markets, and lack of information and technical know-how. Between the two GEF implementing agencies that have been actively involved in industrial energy efficiency projects, the World Bank (and IFC) project portfolio is dominated by various energy efficiency financing programs and

promotion of ESCOs and market-based mechanisms, while UNDP projects typically cover a wide range of barrier removal activities, including institutional development, capacity building, as well as financing. In general, UNDP projects tend to focus on specific, energy-intensive industries, especially the small and medium-sized enterprises. While some results and good practices have emerged, project implementation on the ground still faces many challenges. There is no "one-size-fits-all" program model that works for all projects in all countries.

Energy efficiency is the most robust operational program in the GEF climate change focal area. Results of the energy efficiency projects, including the industrial energy efficiency project portfolio, have been encouraging, and were favorably reviewed by the Climate Change Program Study (GEFME 2004). Nonetheless, there is an urgent need to monitor closely the implementation experiences of the growing industrial energy efficiency project portfolio, draw lessons learned, and incorporate them in the design of new projects. Interaction and knowledge sharing among projects and agencies also need to be stepped up.

References

AEA Technology. 2001. *GEF ESCO Thematic Review – Final Report*.

Global Environment Facility (GEF). 1996. *Operational Strategy of the Global Environment Facility*. Washington, DC: The Global Environment Facility.

-----. 1997. *GEF Operational Programs*. Washington, DC: The Global Environment Facility.

-----. 2000. *Promoting Energy Efficiency and Renewable Energy: GEF Climate Change Projects and Impacts*. Washington, DC: The Global Environment Facility.

-----. 2002. *The GEF Energy-Efficient Product Portfolio: Emerging Experience and Lessons*. GEF M&E Working Paper 9. Washington, DC: The Global Environment Facility.

GEF Office of Monitoring and Evaluation (GEFME). 2004. *Climate Change Program Study 2004*. Washington, DC: The Global Environment Facility.

UNDP. 2000. *Project Document: Energy Conservation and GHG Emissions Reduction in Chinese TVEs – Phase II*.

-----. 2004. *Annual Project Implementation Review: Energy Conservation and GHG Emissions Reduction in Chinese TVEs – Phase II*.

World Bank. 2004. *World Bank GEF Energy Efficiency Portfolio Review and Practitioners' Handbook*. Washington, DC: World Bank Environment Department.