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FINANCING ENERGY EFFICIENCY IN INDIA

November 2008

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ACRONYMS

ADB	Asian Development Bank
APP	Asia Pacific Partnership on Clean Development and Climate
BEE	Bureau of Energy Efficiency [India]
CDCP	Clean Development and Climate Program
CDM	Clean Development Mechanism
CFL	compact fluorescent lamp
DSM	demand-side management
EE	energy efficiency
ECO-Asia	Environmental Cooperation-Asia
ESCO	energy service company
INR	Indian rupee
IREDA	Indian Renewable Energy Development Agency
SME	small and medium enterprises
TWh	terawatt-hour
USAID	United States Agency for International Development
USD	United States dollar

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EXECUTIVE SUMMARY

This report reviews the current status of energy efficiency (EE) financing in India. Divided into four sections, the report begins with a review of India's energy consumption trends and prior estimates of the EE financing potential. The report then goes on to present an estimate of the EE financing potential in India based on more recent data. Section 2 examines the EE policy environment in India, with particular attention given to the national EE policy framework and the role of implementing agencies. Section 3 reviews programs and mechanisms for financing EE in India, alongside their perceived barriers. The report concludes with a set of recommendations to increase access to EE financing in India.

METHODOLOGY

The ECO-Asia Clean Development and Climate Program carried out the research for this report during the first half of 2008. The report draws from a number of secondary sources and builds upon the findings of recent reports, most notably a World Bank report that examined experience with EE financing in Brazil, China, and India (World Bank, 2008). In addition, the Program Team surveyed selected Indian stakeholders in the area of EE finance, including banks, donor institutions, and energy service companies (ESCOs).

FINDINGS

India's energy consumption and coal use are rising. A review of secondary sources indicates that India's robust annual economic growth (7-8 percent) is forecast to continue over the next five years, while energy consumption will grow at an annual rate of between 5.6 to 6.4 percent (India Planning Commission [IPC], August 2006). Presently, the majority of electricity in India is used by the industrial sector (44 percent) and the residential sector (22 percent) (IPC, August 2006). The largest share of India's primary energy supply (39 percent) is produced by burning coal, followed by renewable and waste energy (29 percent) and oil (24 percent). Gas, hydropower, and nuclear power supply about 8 percent. The use of coal is expected to triple in the next twenty-five years. By 2030, it is projected that 51 percent of India's primary energy supply will be produced by burning coal (USAID, 2007).

Inefficient use of energy and high electricity tariffs are driving up costs for industry. When examining indicators in key energy-consuming sectors relative to benchmarks, India's energy intensities are higher than those of most developed and some developing countries (WEC, 2008). In other words, India is using electricity less efficiently than most other countries, and this is driving up costs for industry. In addition, this review finds that the current tariff structure in India puts industry at a disadvantage. Broadly speaking, high electricity tariffs for the industrial and commercial sectors continue to cross-subsidize lower energy prices in the agricultural, residential, and public sectors.

The total investment potential for electricity efficiency is upwards of USD 6 billion. Two previous studies (using data from 1999 to 2004) concluded that the potential for investment in electricity efficiency measures in India was between USD 3 to 3.5 billion (ADB, 2004; World Bank, 2008). For this present study, 2005 state-level data from Tamil Nadu were analyzed and extrapolated to the national level. This analysis indicates the current investment potential for electricity efficiency in India may be as high as USD 5.7 to 6 billion.

Attractive returns on energy efficiency investments. The review conducted for this report indicates that investments in industrial energy efficiency represent a low-risk, near- to medium-term strategy with attractive rates of return (i.e., 15- 20 percent annually). These investments hold the potential to weather significant market fluctuations because they are provided to companies that have increased incentives to reduce energy costs during economic downturns to enhance competiveness.

A comprehensive EE policy framework is in place; however, these need to be translated into programs at the state level. India has had a comprehensive EE policy framework (Energy Conservation Act, 2001) in place for several years. The framework empowers the Indian Ministry of Power's Bureau of Energy Efficiency (BEE) to implement the provisions of the Act. However, it was only after the formation of the BEE that the policy measures were being translated into implementable programs at the state level. Measures such as accelerated depreciation benefits offered by the Government of India for a range of EE equipment and devices, as well as incentives and rebates for EE projects being offered by key financial intermediaries, and supported by the Government of India. Earlier this year, the BEE also launched the Energy Conservation Building Codes. It will be several years before these measures begin to show results. At the same time, this review found that India lacks a comprehensive system of tariff and non-tariff support to promote the uptake of EE equipment.

Regulatory directives for supporting EE investments are inadequate. The Electricity Act of 2003 provides state regulatory commissions with the authority to issue directives that promote EE and demand-side management (DSM). However, most states have yet to issue such directives. Two states in India have implemented small programs for utility-driven EE implementation on a pilot basis, namely: (1) the allowance of recovery on EE investments through a billing pass-through mechanism and (2) the creation of a pool of funds to implement EE projects. (Two brief case studies of these mechanisms are highlighted in Sections 2.1 and 2.2 of this report.) In addition, this report highlights an innovative program that is intended to facilitate the replacement of incandescent lamps with compact fluorescent lamps (CFLs) and to generate tradable Certified Emission Reductions (CERs) through the Clean Development Mechanism (CDM) of the UN Framework Convention on Climate Change (UNFCCC) (see Section 2.3). However, there is an urgent need to replicate and scale-up these efforts all across the country in order to tap the huge existing potential for energy savings.

Only a limited set of EE financing mechanisms and initiatives exist. This review identified and reviewed EE financing mechanisms, measures, and initiatives provided by the public and private sectors. These EE financing measures are being supported by the government of India, donor agencies, multilateral financial institutions, and commercial banks. In most cases, it appears that the demand for these programs was lower than estimated, and this is most likely because several of these programs failed to fully address the persistent barriers within the EE sector (see discussion in Section 3.2). Overall, there was insufficient data to determine the extent to which these measures are addressing the overall investment needs for energy efficiency in India. The bottom line is that the overall scale of existing mechanisms and initiatives is extremely small relative to the large potential for EE investments in India.

BARRIERS TO EE FINANCING

The surveys and interviews conducted for this report provided in-depth feedback about the barriers to the implementation of EE financing mechanisms. The key barriers include:

INFORMATION BARRIERS

Lack of reliable information. There is a lack of systematic and reliable information available on the EE potential in the Indian economy (by sector, subsector, consumer and project type) and on the details of EE projects financed in India, by banks, financial institutions, and other investors. This lack of information hinders the development of large-scale investment plans, public programs, and the evaluation of past programs and successes therein.

Lack of bank awareness. Most lenders are unfamiliar with EE technologies and approaches and require technical support to appraise and manage loans for EE projects. Some of the banks surveyed responded that lack of awareness on the part of the project proponents and the lack of trained personnel within the bank were the major barriers limiting lending for EE projects.

The necessary scale of information dissemination is huge. India's industrial structure results in a very large number of small and medium enterprises (3 million firms), which contribute 60 percent of the country's gross domestic product. Reaching the decision-makers in these firms to facilitate the implementation of EE projects poses significant hurdles and increases transaction costs.

FINANCIAL BARRIERS

Reluctance to make initial investments. Industrial managers are reluctant to make an initial investment in the costs of energy audits, preparation of detailed project reports, etc. Instead, industries have been seeking soft support for these up-front costs, which can be recouped from the energy savings after the project is implemented.

Limitations in bank appraisal methods. The financial feasibility of EE projects has to be assessed by analyzing how increased productivity and energy savings improve company cash flow. Lenders often do not have the capacity to apply suitable appraisal methodologies.

Barriers to lending to new clients. Lenders have procedural requirements for new clients and usually prefer to lend to existing customers. Enlisting and signing up new customers is a significant barrier and reduces the pool of potential EE project investments.

Ageing equipment stock in municipalities. The municipal sector in India typically has equipment that is more than twenty years old. Substantial energy savings can be realized if this equipment is replaced with the latest EE technologies. However, there is a severe constraint on capital availability in municipalities, and as a result the investments often do not materialize.

Concerns about the financial strength of ESCOs. ESCOs should expeditiously address concerns about their financial strength by developing strategic partnerships with banks that can provide financing and lines of credit for products on which they guarantee the technical performance.

Perceived risks of SME lending. The financial institutions surveyed for this report indicated that it is not a lack of capital that is hindering EE investments; rather, it is the perceived risks associated with lending to the SME sector. SMEs typically have insufficient systems for tracking and reporting financial accounting, production and output, and energy use and savings. In addition, SMEs are often reluctant to divulge information on their production and energy consumption.

OTHER BARRIERS

Businesses focus on security of electricity supply. In an environment of crippling energy shortages and brownouts, most entrepreneurs are focused on building new generation capacity (either grid-based or captive), and there is not enough capital or entrepreneurial talent pursuing EE investment opportunities. Similarly, when faced with 4-8 hours of non-availability of power, energy users would prefer to invest in captive generation rather than in energy-saving equipment.

Low priority of EE investments. With the rapid growth of the Indian economy, business managers do not consider EE investments as high priority, and instead they prefer to invest in production-oriented assets or in marketing and distribution channels in order to increase their market share.

Lack of confidence in ESCOs. Business managers tend to lack confidence in ESCOs. This may reflect a lack of experience with the ESCO business model. It may also reflect the fact that working with an ESCO requires sharing a large volume of data, and managers are reluctant to share these data. It is possible that if ESCOs could propose monitoring methods that are less data-intensive, business managers would be more willing to work with ESCOs. Another factor is the limited experience of ESCOs in India, and the lack of widely available success stories. This lack of familiarity with successful examples hinders the ability of ESCOs to develop and market their services.

RECOMMENDATIONS

The report concludes with a set of recommendations for improving the investment climate for EE. These recommendations are covered in Section 4 of this report and are summarized below.

Establish systematic data collection mechanisms. There is a lack of good data on EE potential, investments, energy savings, and details of loan performance parameters. This lack of data poses a significant hurdle to scaling up EE investments and designing new investment products. Data collection protocols and reporting frameworks need to be implemented at various levels, starting from the facility and utility level, up to the level of the state nodal agency, and finally at the national level through the BEE.

Train bank and financial officers. Multilateral organizations and bilateral donors could encourage banks and financial institutions to train bank and loan officers in order to increase awareness about EE investments, and emphasize the need to manage risks by accessing credit enhancement and payment security mechanisms, including credit guarantees and trusts such as the one implemented by the State Industrial Development Bank of India.

Fast-track effective approaches for financing demand-side management. Policymakers should implement and expand utility-based approaches for DSM financing. An example would be the load management charge being tested in the state of Maharashtra for utility-supported EE, which is similar in principle to the public benefits charges levied in many states of the United States (US).

Close the gap between audits and implementation. EE project developers need to understand the reasons that audit recommendations are rarely converted into actual EE projects. There may be a need for some "hand-holding" in order to convert EE audits into investment grade audits and bankable project proposals. This may require a greater degree of support to the project developers from energy audit companies and service providers. It may also be necessary for Indian ESCOs to shift from the traditional ESCO model, which is based on "shared savings", to a "guaranteed savings" model.

INTRODUCTION

Energy demand in India is expected to grow at an annual rate of nearly 6 percent over the next 10 years in tandem with projected economic growth rates of a similar scale (IPC, August 2006). Finding adequate supplies of energy to satisfy this increased demand is a significant challenge. The Indian energy sector continues to struggle to overcome chronic energy shortages caused by a combination of low levels of domestically available fossil fuels (except coal), a historically low level of investment in the energy sector, and increasing global competition for energy supplies. Further, much of the planned expansion in India's power sector is predicated on the use of coal, with related negative implications for emissions of both local air pollutants and greenhouse gases.

Available data suggests that investments in end-use energy efficiency (EE) could be a very cost-effective option for India to meet a significant portion of its increased demand for energy (USAID, 2007). This fact has been recognized by a number of Indian leaders in the public and private sectors over the past decade, and policy instruments have helped to establish the basic elements of an energy efficiency marketplace.[1] A number of Indian companies have also taken steps to reduce high energy costs in order to improve their economic competitiveness. In addition, there has also been a surge of interest in capturing added value for EE in the emerging global carbon markets. Moreover, donor-funded technical assistance programs are helping to address barriers to the scale-up of investments in EE, and have tested innovative approaches and pilot programs to stimulate investments.

Given the ongoing developments in India's energy sector and renewed interest among the public and private sectors in improving EE, the US State Department through the Asia Pacific Partnership on Clean Development and Climate (APP), commissioned a review of the status of energy-efficiency financing in India. This report reviews the following aspects of India's EE market:

- the overall market size for EE finance in India;
- key trends in overall availability and sources of EE financing;
- current EE investment funds and programs;[2]
- India's EE investment policy framework and its efficacy; and
- near-term advisory needs to improve the investment potential of Indian EE projects.

METHODOLOGY

The Program Team carried out the research for this report during the first half of 2008. This report draws from a number of secondary sources and builds upon the findings of recent reports, most notably a World Bank report, which gathered energy efficiency financing lessons from Brazil, China, and India (Taylor , R. P., Govindarajalu, C., Levin, J., Meyer, A. S., & Ward, W. A. (2008).).[3] In addition, the Program Team surveyed key stakeholders in the area of EE finance, including banks, donor institutions, and ESCOs **(Table 1)**.

1 These instruments include the Energy Conservation Act of 2001 as well as regulatory directives issued by independent state regulators under the Electricity Act of 2003.

2 For example, investment funds, loan guarantee instruments, commercial banks programs and public-sector programs at central, state and municipal levels.

3 This project was led by the World Bank and funded over multiple years by various organizations, including the United Nations Foundation and the United Nations Environment Program. The final report, published in 2008, covered end-use EE finance issues in Brazil, India and China, and provides a baseline for the status update provided in this report.

TABLE 1. LIST OF ORGANIZATIONS SURVEYED

Category	Organizations
Donors and multilateral development banks	Asian Development Bank KfW Bankengruppe World Bank
Private banks	ICICI Bank Limited Yes Bank Limited
Public sector banks	Indian Renewable Energy Development Agency State Bank of India Canara Bank
State-participated energy conservation funds/facilities	Tamil Nadu Urban Development Fund Karnataka Urban Development Finance Corporation
Energy services companies (ESCOs)	DSCL Services Co. Ltd.

LIMITATIONS OF STUDY

This study focuses primarily on EE investment opportunities related to electricity end uses.[4] Due to lack of available resources, certain EE financing activities were excluded from this review, namely:

- The concept of **financing EE through infrastructure funds** is at a nascent stage in India. This report does not analyze this mode of financing due to the lack of data and limited experience with EE infrastructure financing in India.
- Another potential mode of **financing EE investments in the real estate and building** sectors is the use of real estate investment trusts. Since real estate investment trusts have only recently been formed in India, the Program Team was unable to analyze the potential for the use of real estate investment trusts in scaling up EE investments.
- Most EE projects reduce greenhouse gas emissions, yielding carbon reductions that may have monetary value in the global carbon market. Consequently, there is growing interest among the international community in the use of **carbon finance for EE.** In most cases, while the additional value of the tradable emission reduction credits may enhance the project bankability and provide up-front capital, the business case for EE financing has to rest first on the merits of EE itself. This report provides a brief overview of India's involvement in the Clean Development Mechanism (CDM) markets for EE, but does not make a focused evaluation of the additional impact of carbon finance on EE investments.

4 While there are significant opportunities for EE gains in the supply chain of energy from generation to transmission and distribution, and also in non-electrical end uses (i.e. gas, oil), this report does not analyze those opportunities.

FUNDING FOR THIS STUDY

This study was implemented by USAID through its ECO-Asia Clean Development and Climate Program (ECO-Asia CDCP). Funding was provided by the US State Department under the umbrella of the Asia-Pacific Partnership on Clean Development and Climate (APP), which brings together governments and private sector partners from Australia, Canada, China, India, Japan, the Republic of Korea, and the United States. Together, these countries account for more than half of the world's economic activity, population, and energy use.

ECO-Asia CDCP is a regional technical assistance program funded by the US Agency for International Development (USAID) and managed by USAID's Regional Development Mission for Asia. The program is helping Asia's fastest growing economies meet their energy needs through initiatives that reduce greenhouse gas emissions and enhance energy security.

1. INDIA'S EE MARKET

As in most countries, the EE market in India is not easily isolated from other economic activities. As a consequence, it is difficult to precisely measure the size and market share of EE investments. Nevertheless, it is possible to arrive at a broad estimate of the value and potential for EE investments in India.

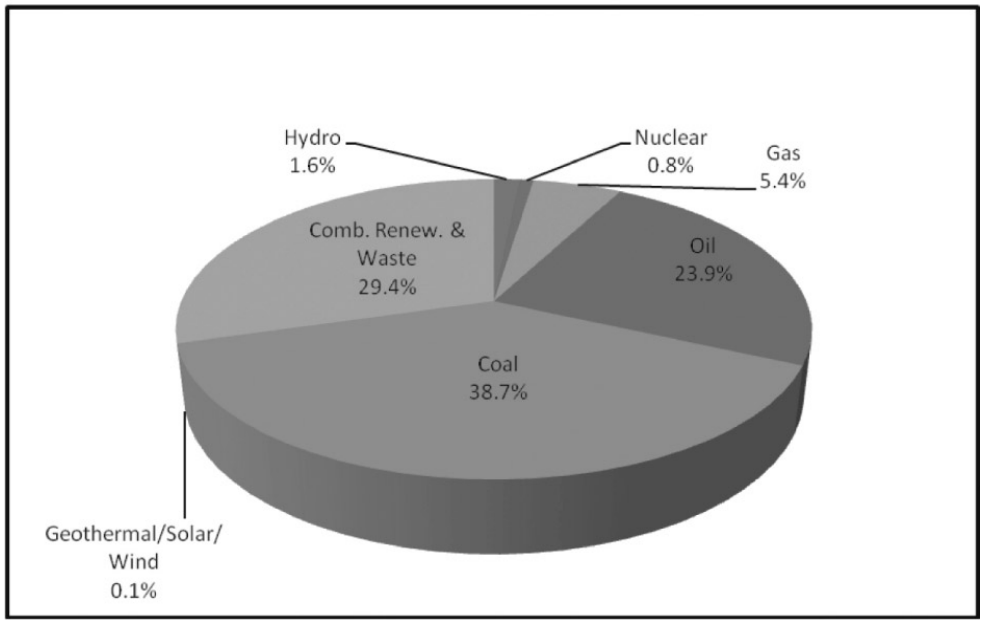
This section is divided into four parts: The first part highlights energy consumption trends in India. In the second part, the energy intensity of the Indian economy is compared with the energy intensity of other nations. The third part contains an overview of the key EE stakeholders in India and their roles. In the final part, published works are considered along with recent findings to estimate the overall value and potential for EE investments in India.

1.1 ENERGY CONSUMPTION AND THE INDIAN ECONOMY

The Indian economy has grown at a rapid rate over the last few years. In the financial year 2006-07, the gross domestic product grew at a rate of 9.5 percent, with most of the growth coming in the industrial (10.5 percent) and services (10.7 percent) sectors, while the agriculture sector recorded a growth of just 1.7 percent (IPC, August 2006). Gross domestic product is forecast to grow at 7-8 percent per annum over the next five years, and energy consumption is expected to show a slightly slower growth rate of between 5.6 to 6.4 percent per annum (IPC, August 2006).

As illustrated in **Figure 1**, the largest share of India's primary energy supply (38.7 percent) is produced by burning coal, followed by renewable and waste energy (29 percent) and oil (24 percent). Gas, hydropower, and nuclear power supply about 8 percent. The use of coal is expected to triple in the next twenty-five years. By 2030, it is projected that 51 percent of India's primary energy supply will be produced by burning coal (USAID, 2007).

FIGURE 1: SHARE OF TOTAL PRIMARY ENERGY SUPPLY BY SOURCE IN 2005



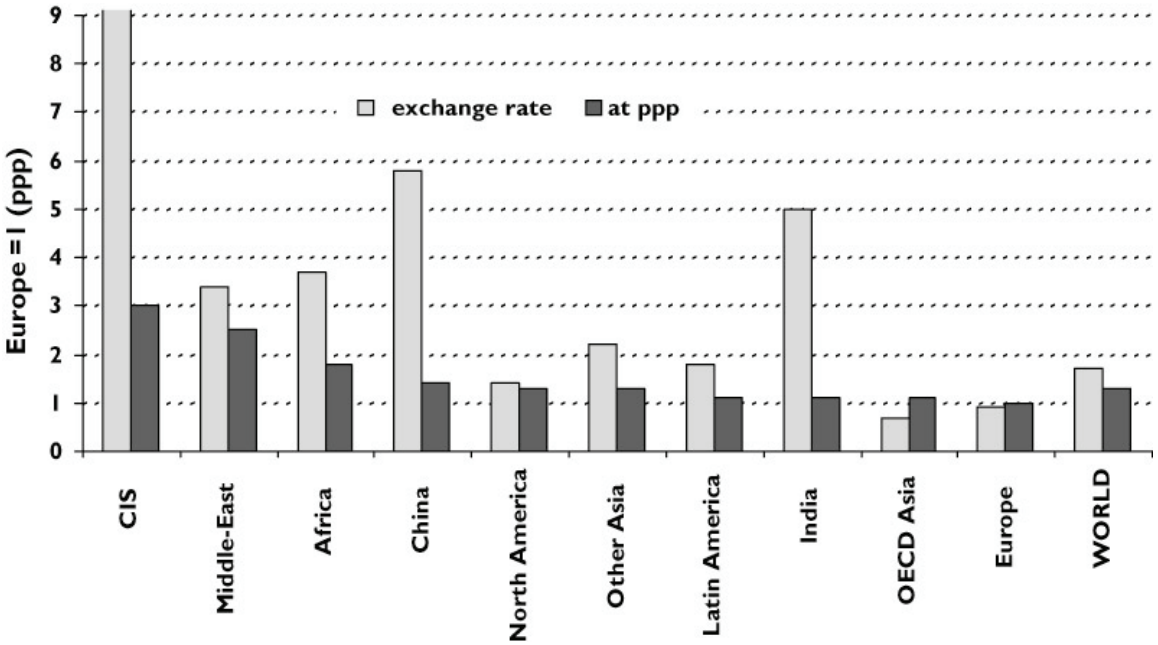
Source: International Energy Agency, 2005

1.2 ENERGY INTENSITY OF THE INDIAN ECONOMY

Energy intensity is one indicator of the relative efficiency of an economy. It is usually presented in terms of either energy input per unit of economic activity or of energy input per unit of finished product. It is possible to develop a picture of an economy's relative EE by comparing its energy intensity, or the energy intensity of an industrial subsector (e.g. cement, steel), to that of other countries.

At the national level, energy intensity is often expressed as metric tons of oil equivalent per unit of gross domestic product. However, in calculating this ratio, the use of exchange rate-based (nominal) gross domestic product, or purchasing power parity-based (PPP) gross domestic product, can lead to very different results **(Figure 2)**.[5] It is therefore more instructive to compare energy intensity at a more detailed level of the economy, such as within an industrial subsector, or a within a well-defined sector such as the power sector.

FIGURE 2. PRIMARY ENERGY INTENSITY AT PURCHASING POWER PARITIES AND EXCHANGE RATES

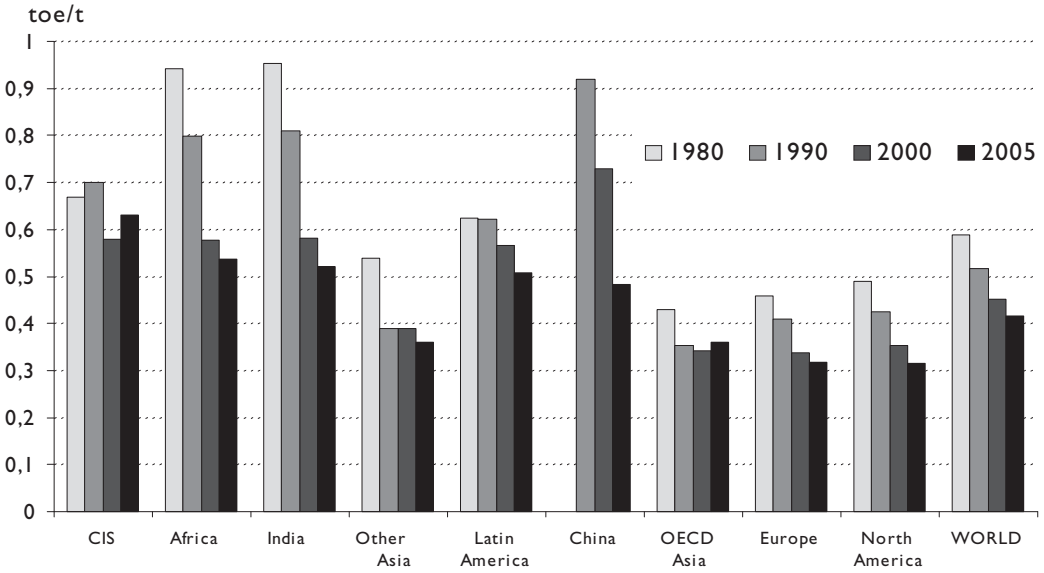


Source: ENERDATA as cited in World Energy Council, 2008

5 The use of PPP instead of exchange rates increases the value of gross domestic product in regions with a low cost of living (such as India) and therefore decreases their energy intensities. For example, recent data published by the World Energy Council (2007) suggests that when calculated using PPP-based GDP, India's energy intensity is lower than the world average and comparable to levels in North America, and Asian nations that are part of the OECD. On the other hand, using exchange rate-based GDP, India's energy intensity is much higher than that of most developed nations and is only lower than that of the Commonwealth of Independent States and China. Moreover, the use of ratios does not fully reflect impacts caused by differences in the size of the overall economy. Some of India's apparent low energy intensity can be attributed to its economic structure (i.e., India's overall lower level of industrial activity relative to developed economies, and its continuing reliance on large amount of traditional sources of energy which is not often accounted for fully in estimates of primary energy use.)

When examining indicators in key energy-consuming sectors relative to benchmarks, India's energy intensities are higher than those of most developed and some developing countries (WEC, 2008). For example, India's energy use per ton of steel output is high relative to many other countries **Figure 3**.

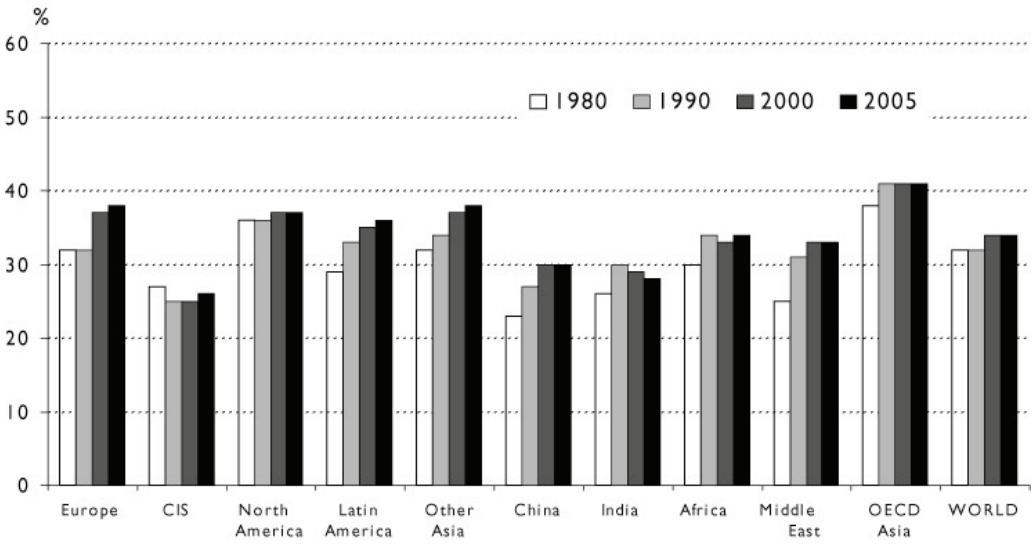
FIGURE 3. INTERNATIONAL COMPARISON OF ENERGY INTENSITY IN STEELMAKING (ENERGY CONSUMPTION PER TON OF STEEL)



Source: World Energy Council, 2008

Similarly, a comparison of the thermal efficiency of power generation in India, compared with several developed and developing countries, reveals that significant potential exists to improve energy efficiency within the Indian power sector (WEC, 2008). As India continues to develop and consume more energy in the various sectors of the economy, significant reductions in energy intensities will be required.

FIGURE 4. INTERNATIONAL COMPARISON OF TRENDS IN AVERAGE THERMAL EFFICIENCY OF POWER PRODUCTION



Source: World Energy Council, 2008

Data on total electricity consumption in India and the contribution by various end-use sectors is provided in **Table 2.** The industrial and residential sectors account for a majority of the demand.

TABLE 2. ELECTRICITY CONSUMPTION IN INDIA BY SECTOR (2005)

Sectors	Gigawatt-hour (GWh)	Percent
Industry	210,040	44
Residential	103,368	22
Agriculture	95,685	20
Commercial	34,761	7
Transport	10,424	2
Others	23,659	5
Total	**477,937**	**100**

Source: International Energy Agency, 2005

Indian industries continue to pay some of the highest energy costs in the world. Further, most enterprises and many residences use expensive backup diesel generators[6] because the supply of power from the grid is unreliable and of poor quality (Business Standard, June 2008). The current tariff structure also puts industry at a disadvantage. Broadly speaking, high electricity tariffs for the industrial and commercial sectors continue to cross-subsidize energy prices in the agricultural, residential, and public sectors.

6 There are no official statistics on the extent of diesel-based captive generation. Business Standard magazine recently reported that diesel-based captive generation is nearly 25,000 MW which is nearly 17 percent of the total generation in India.

1.3 STAKEHOLDERS IN THE INDIAN EE MARKETPLACE

Over the past few years, pressures related to environmental pollution, energy security, and climate change have led to increasing interest across Asia in strategies for improving EE, substituting fossil fuels with alternative energy sources, and mitigating greenhouse gas emissions. A number of stakeholders and participants have become involved with EE efforts in India **(Table 3)**.

TABLE 3. ORGANIZATION OF EE SERVICES AND PRODUCTS IN INDIA

Actors	Roles
EE technologies and providers	While governments, banks, and donor organizations have taken steps to create investment opportunities in EE, the private sector also has made substantial progress, especially in the provision of large-scale manufacturing of energy-efficient equipment and establishing energy service capabilities.[7]
Bureau of Energy Efficiency (BEE) Designated large industrial consumers	BEE, in support of the implementation of Energy Conservation Act of 2001, has classified several large industries as "Designated Consumers". These consumers are playing an important role in spurring EE markets as they create a demand for EE products and services. Key sectors in this category of large consumers include the fertilizer, cement, steel, and industries manufacturing heavy equipment.
Energy service companies (ESCOs)	A small but growing community of energy service companies (ESCOs) entrepreneurs has emerged in India over the past few years. The ESCO business in India began in 1994-95, with a USAID grant to the Industrial Development Bank of India to promote ESCOs. In 1995-96, a USAID-sponsored study tour and US mission visit to India resulted in the formation of a small number of ESCOs. Presently, there are 10 to 15 ESCOs operating in the Indian market, engaged in EE equipment related and consultancy services. Energy efficiency projects are mostly implemented using guaranteed savings schemes and are financed by the host company. Information on ESCO projects and performance is not publicly available; however, the total value or service earnings of all ESCOs is estimated to be in the range of INR 150 to 300 million/year (USD 3 to 6 million per year), which is insignificant compared to the ESCO market potential.
Energy auditors	As part of its implementation of the Energy Conservation Act 2001, the Bureau of Energy Efficiency (BEE) has initiated a process for certifying energy managers and energy auditors through a rigorous competitive examination. This process has resulted in increased interest among energy professionals in providing state-of-the art energy auditing and management services. However, several recent studies have identified performance-based contracts as a barrier, and have noted the lack of available capital (i.e., capital targeted by lenders or investors for EE projects).

7 An illustrative list of the technologies and their respective providers would include: lighting (Philips, OSRAM, Havells, Phoenix); electric motors (Siemens, Crompton Greaves); distribution transformers (EMCO Ltd., Bharat Bijlee); capacitors (ASIAN); boilers (Thermax, Bharat Heavy Electricals Ltd.); industrial cogeneration and waste heat recovery (Thermax); water pumping (Kirloskar); air conditioners and refrigerators (Voltas, Blue Star); and metering technologies (Conzerv, Secure Meters).

1.4 ENERGY EFFICIENCY INVESTMENT POTENTIAL IN INDIA

There is no single source of good quality data on the potential for investment in energy efficiency technologies and projects in India. While the literature on the topic does contain a few recent estimates of EE potential (based on data from 1999 to 2004), these studies use different sets of data, assumptions and indicators, which do not allow for a consistent comparison. This section reviews these estimates and presents an estimate of India's EE investment potential based upon an extrapolation of state level data from 2005.

Asian Development Bank (ADB) study. The ADB commissioned a study in 2004 to explore the feasibility of setting up a partial credit guarantee facility for financing EE projects. Drawing upon data mainly from 1999 to 2001, this review focused on EE potential of electricity use within four sectors: industrial, commercial, private hotels, and hospitals. The review concluded that the total investment potential for electricity efficiency measures in these sectors was approximately USD 3.5 billion, with most of this (USD 3 billion) in the industrial sector (ADB, 2004).

TABLE 4. ADB ESTIMATE OF ELECTRICITY EFFICIENCY POTENTIAL IN INDIA

Sector	Investment Potential Indian Rupee Billions (USD millions)	Energy Savings (TWh)	Capacity Savings (MW)
Industrial – Generic EE Measures	42.0 (1,050)	23.8	3,400
Industrial – Process EE Measures	79.0 (1,975)	25.2	3,600
Commercial	6.59 (165)	0.8	290
Municipal	13.0 (325)	3.7	1,688
Total	**141.0 (3,500)**	**53.5**	**8,978**

Source: ADB, 2004

World Bank review. The final report on the World Bank's study of EE financing in Brazil, China, and India provides a more comprehensive estimate of EE potential in the Indian economy. The report (which drew upon data from 2003 and 2004), concluded that the EE potential in all sectors of the Indian economy could be as high as 50 TWh annually, with an investment potential of approximately INR 140 billion (USD 3 billion) (Taylor, R. et al., 2008).

Extrapolation from state-level EE estimates. Given the lack of detailed, bottom-up estimates of EE potential, the Program Team decided to use another approach – by reviewing a detailed assessment of EE potential at the state level and then extrapolating to approximate EE potential at the national level. The Program Team reviewed a bottom-up analysis of state-level data on EE investment potential in the State of Tamil Nadu (Government of Tamil Nadu, 2007), which is a leading industrialized state in India. Tamil Nadu has annual electricity sales of 43 TWh, which is about one tenth of India's total sales. The sectoral breakdown of electricity use in Tamil Nadu is similar to the country as a whole **(Table 5)**, This review of the 2005 state-level data on the EE potential in Tamil Nadu found an economic savings potential of 8.4 TWh.

TABLE 5. COMPARISON BETWEEN SECTOR-WISE ELECTRICITY CONSUMPTION IN INDIA AND THE STATE OF TAMIL NADU

	Country-wide consumption (2005)		Tamil Nadu consumption (2005)	
Sectors	**TWh**	**%**	**TWh**	**%**
Industry	210.0	44	15.9	36
Residential	103.4	22	10.8	25
Agriculture	95.7	20	9.6	22
Commercial	34.8	7	3.0	9
Transport	10.4	2		
Others	23.7	5	3.4	8
Total	**478.0**	**100**	**43.6**	**100**

Source: Government of Tamil Nadu, *Handbook of Power Consumption for the State of Tamil Nadu* (2007).

Extrapolated to the national level, the EE potential for India could be upwards of 90 TWh **(Table 6)**. If we were to assume that the EE investments would cost approximately the same as that cited by the ADB and WB studies, this would indicate that the total EE potential in India has grown to approximately INR 240-250 billion (USD 5.7 to 6.0 billion) as of 2005. While the disparity between these estimates is likely due (in part) to differences in methodology and assumptions, it is probable that it also reflects the overall increase in electricity consumption between 2002 and 2005, and therefore, related savings potential.

TABLE 6. ENERGY SAVINGS POTENTIAL FOR INDIA COMPARED WITH TAMIL NADU STATE (TWh)

Sectors	India (TWh)	Tamil Nadu (TWh)
Industry	31.6	2.39
Residential	20.1	2.16
Commercial	8.7	0.97
Agriculture	28.7	2.87
Total	**89.6**	**8.39**

Lawrence Berkeley National Laboratory review of sector potential. Very little data exist on the EE potential in different economic sectors. Recently, a team of researchers from Lawrence Berkeley National Laboratory published a report on the electricity savings potential in the residential sector (Letschert and McNeil, 2007). The researchers developed estimates using statistical simulation techniques, state-level survey data from several years ago, and more recent data on appliance sales.

The report presents a *base-case* scenario and an *efficiency* scenario. The base-case scenario assumes a business-as-usual trend, while the efficiency scenario assumes that there will be a major shift to high-efficiency products by 2010.[8] In the efficiency scenario, the efficiency of the appliance stock gradually increases as modeled by appliance shipments (sales) in the forecast. The economically viable EE potential for individual products ranges from 15 percent for fans and air conditioners to as high as 41 percent for lighting equipment. By 2030, it is projected that most of the equipment stock will be comprised of energy-efficient appliances, and this will translate into an overall electricity savings of 26 percent for that year in the residential sector, compared to the base case. **Table 7** details the electricity savings by type of end use. The greatest savings are for lighting equipment, followed by refrigerators, air conditioners, and fans. According to the authors of this report, these four products represent 88 percent of the economically viable EE potential in the residential sector (Letschert and McNeil, 2007).

TABLE 7. ELECTRICITY SAVINGS POTENTIAL FROM SELECTED APPLIANCES, 2030

Appliance	Base case consumption (TWh)	High efficiency case consumption (TWh)	Savings (TWh)	Savings (%)
Lighting	338	241	97	41
Refrigerators	77	35	42	18
Air conditioners	208	173	35	15
Fans	116	81	35	15

1.5 RETURN ON ENERGY EFFICIENCY INVESTMENTS

The review conducted for this report indicates that investments in industrial energy efficiency represent a low-risk, near- to medium-term strategy with attractive rates of return (i.e. 15- 20 percent annually). These investments hold the potential to weather significant market fluctuations because they are provided to companies that have increased incentives to reduce energy costs during economic downturns in order to enhance their competiveness.[9]

8 In the base-case scenario, the unit electricity consumption (UEC) of appliances is assumed constant over time, with three exceptions: refrigerators, air conditioners, and water heaters. Refrigerator electricity consumption is expected to grow due to an increase in the market share for larger models, two-door refrigerator freezers, and frost-free units. Air conditioner electricity consumption is expected to grow based on the assumption of increased use of multiple units, increase in unit cooling capacity, and increase in hours of use. The forecast of air conditioning energy use in 2030 is based on current use patterns in Hong Kong (as a proxy). Water heater electricity consumption is supposed to fall slightly during the forecast period due to the projected decrease of the number of persons per household.

9 Industries have installed captive diesel generation sets to overcome the constraints in power supply. Captive diesel generation tends to be expensive relative to power from the grid. Energy efficiency provides an opportunity for these industries to reduce their demand for captive diesel generation.

For investors, there are three distinct opportunities to finance EE improvements: (1) low-cost investments for routine maintenance of equipment and production facilities (e.g., plugging air leakages, repairing faulty insulation, covering up steam leaks, etc.), which typically enjoy full returns in under one year; (2) medium-cost investments to finance the replacement of low efficiency and aging equipment, which generally return the amount invested within one to three years; and (3) high-cost investments to finance changes to production process, which can be expected to realize full payback after three or more years.

Box 1. Savings Achieved by Industrial Units in Kerala

A quick review of EE investments in the State of Kerala from 2004 to 2007, confirms that the payback period for all reported investments averaged less than two years. The survey of industries conducted for this report indicates that companies have generally used their own funds to finance and implement EE improvements. During the survey, many companies said they prefer to finance EE improvements through loans instead of using their own funds (for which the opportunity costs are high), provided some of the barriers for financing are removed.

Year	Number of Companies	Total Investment (USD millions)	Total Savings (USD millions)	Payback (Average in years)
2007	21	2.75	4.79	0.57
2006	27	10.2	5.86	1.7
2005	17	4.14	2.1	1.97
2004	12	2.72	2.18	1.25

Source: Presentation by Dr. K. M. Dharesan Unnithan, Director, EMC- Kerala, on 18 July 2008 at workshop on Establishing a State Energy Conservation Fund in Kerala, Thiruvananthapuram. This workshop was organized by the USAID ECO-Asia Clean Development and Climate Program.

2. POLICY ENVIRONMENT FOR EE PROMOTION

The policy environment in India for promoting EE investments is defined by regulations, implementing rules and directives, and government-supported market interventions and technical assistance programs.

This section is divided into four parts. Section 2.1 examines the government policy framework which is in place to promote EE financing, and Section 2.2 explores related directives to support this framework. Section 2.3 highlights an innovative program being developed by the Bureau of Energy Efficiency (BEE) to promote the wide-scale adoption of compact fluorescent lamps in India by using the UN Clean Development Mechanism (CDM). Section 2.4 highlights donor agencies that are presently funding technical assistance efforts to build capacity and experience in the design and implementation of EE financing schemes.

2.1 GOVERNMENT POLICY FRAMEWORK

The Indian government has established policy measures at the State and Central levels to mandate the efficient use of energy and to create requirements for EE performance standards and reporting. The section below summarizes key policy developments and progress to date.

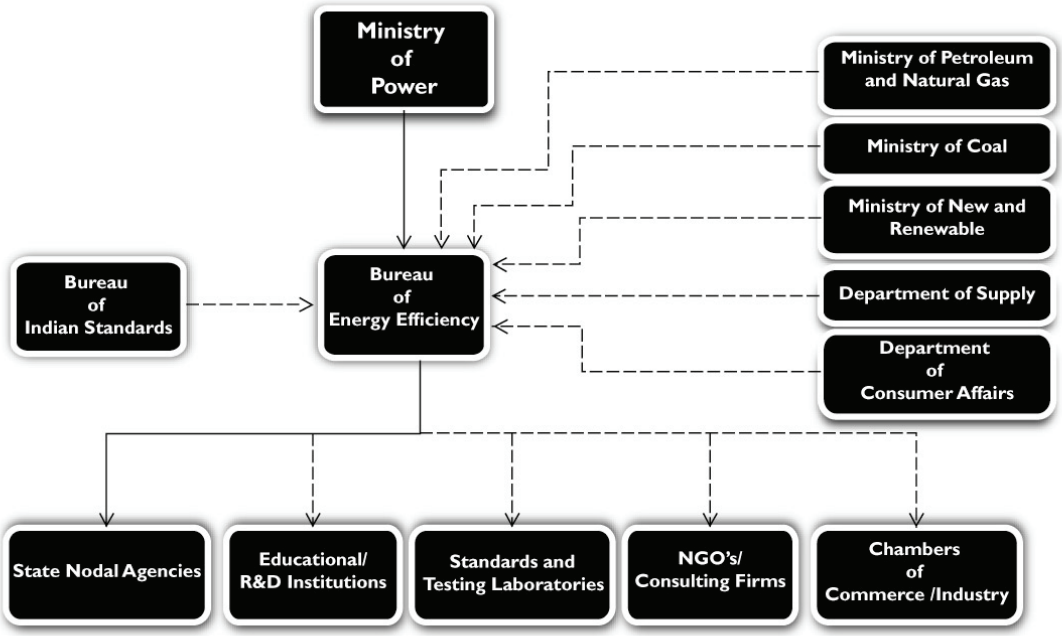
2.1.1 ENERGY CONSERVATION ACT, 2001

The Energy Conservation Act (2001) was passed by the Indian Parliament in September 2001. It requires that large energy consumers adhere to energy consumption norms, new buildings follow an Energy Conservation Building Code, and appliances meet energy performance standards and display energy consumption labels. Paragraph 16 in Section VI of the Energy Conservation Act (2001) mandates the establishment of EE funds:

1. The State Government shall constitute a Fund to be called the State Energy Conservation Fund for the purposes of promotion of efficient use of energy and its conservation within the State.
2. The Fund shall be credited all grants and loans that may be made by the State Government or Central Government or any other organization or individual for the purposes of this Act.
3. The Fund shall be applied for meeting the expenses incurred for implementing the provisions of this Act.
4. The Fund created under sub-section (I) shall be administered by such persons or any authority and in such manner as may be specified in the rules made by the State Government.

The Act also created the BEE in the Ministry of Power to implement its provisions. The linkages between the BEE and the various agencies involved in energy efficiency issues at the central and state levels are illustrated in **Figure 5**.

FIGURE 5. LINKAGES BETWEEN THE BEE AND VARIOUS AGENCIES INVOLVED IN ENERGY EFFICIENCY ACTIVTIES AT THE CENTRAL AND STATE LEVELS



2.1.2 ENERGY CONSUMPTION DISCLOSURE

Recognizing that energy is a key input in the production process and a key determinant of the overall cost of production, the Department of Company Affairs in the mid-1980s mandated that publicly traded companies should report on their energy use as a separate line item in their balance sheets. This is one of the earliest measures instituted by the Indian government to highlight the importance of energy use in industrial processes, and to establish a system for collecting primary data on energy use.

2.1.3 DEPRECIATION BENEFITS

The Government of India offers accelerated depreciation benefits (80 percent in the first year) for a range of energy-efficient equipment and devices. Accelerated depreciation benefits can be applied to (1) specialized boilers and furnaces; (2) instrumentation and monitoring systems for monitoring energy flows (e.g., digital heat loss meters, infra-red thermographs, waste heat recovery equipment, and cogeneration systems); (3) electrical equipment (e.g., automatic voltage controllers, time-of-day energy meters, and power factor controllers for alternating current motors); and (4) EE manufacturing devices (e.g. burners, thin film evaporators, fluid drives and fluid couplings, gas cylinders, glass manufacturing equipment, and renewable energy devices).

2.1.4 TARIFF AND NON-TARIFF SUPPORT FOR ENERGY-EFFICIENT EQUIPMENT

India lacks a comprehensive system of tariff and non-tariff support to promote the uptake of energy-efficient equipment. For several years, industrial associations have been advocating for tariff and non-tariff incentives. Recently, the State Governments of Delhi and Haryana announced a marginal reduction in the value added tax on the sale of compact fluorescent lamps (CFLs). It is likely that in the future such

schemes will be extended to offer reductions in excise and custom duties on other types of energy conservation equipment.

2.1.5 INCENTIVES AND REBATES FROM INDIAN RENEWABLE ENERGY DEVELOPMENT AGENCY (IREDA) AND OTHER AGENCIES

In addition to the rebates provided by the Indian government, key financial intermediaries supported by the Government of India offer incentives and rebates to promote EE projects. These include:

- an interest rebate of 1 percent for furnishing security of a bank guarantee or a pledge of fixed-deposit receipt or an unconditional and irrevocable guarantee of an All India Public Financial Institution with an "AAA" rating or the equivalent;
- an interest rebate of 0.5 percent for timely payment of interest and repayment of loan installments; and
- special concessions for entrepreneurs belonging to under-privileged sections of society and for entrepreneurs establishing EE projects in specific locations.[10]

In addition to the above measures, Indian Renewable Energy Development Agency (IREDA) offers a 100 percent grant for carrying out pre-implementation activities, including an energy audit and preparation of detailed project reports. These grants are provided on a cost-reimbursable basis upon loan approval (i.e. after the audit and analysis have resulted in a bankable project). Similarly, State Nodal Agencies for EE in some states, such as the Maharashtra Energy Development Agency and the Gujarat Energy Development Agency, offer grants of INR 25,000 which can be applied towards the cost of energy audits carried out by industries and public sector organizations (urban local bodies). In the oil and refineries sector, the Petroleum Conservation Research Association has provided the services of its energy audit experts (for free) to factories for several years.

In 2004, the Bangalore Electricity Company implemented the billing pass-through mechanism, which was supported with technical assistance from USAID **(Box 2)**. Although the billing pass-through mechanism is not a specific policy directive, it has since been approved by regulators in several different states, and has been implemented by three utilities in Maharashtra and one utility in Haryana.

Box 2. Utility Billing Pass-through Mechanism to Recover Investments in End-use Efficiency

With technical assistance from the USAID/India's ECO II Program, the Bangalore Electricity Supply Company (BESCOM) successfully demonstrated the use of a utility billing pass-through mechanism for the purchase of CFLs. This program was implemented by BESCOM using a pre-qualification process that resulted in significant price reductions for high-quality CFLs from a number of suppliers. This mechanism allowed BESCOM customers to purchase CFLs from short-listed suppliers (Philips, Osram, and Asian Electronics) at a number of pre-designated retail shops. The customers received the CFLs free of charge and paid for them in the form of deductions from their monthly utility bills over a period of 9 months. The program mobilized an investment of more than USD 500,000 for 125,000 CFLs installed in the BESCOM service area. The model has since been successfully replicated by utilities in Mumbai (Reliance Energy Limited, Tata Power Limited and the Maharashtra State Electricity Distribution Company Limited).

10 These include scheduled castes and scheduled tribes, women, persons with physical disabilities, ex-servicemen, and those setting-up projects in Northeastern states (i.e. Sikkim, Jammu and Kashmir), newly created states, islands and estuaries.

2.2 REGULATORY DIRECTIVES IN SUPPORT OF EE INVESTMENTS

Most Indian utilities have been restructured into separate businesses for power generation, transmission and distribution. In most cases, Indian electricity regulators set tariffs on a "cost plus" basis, which allows generators to earn a 14 percent return on equity.[11]

The Electricity Act, 2003 provides the authority to state regulatory commissions to issue directives that promote EE and demand-side management (DSM). Two mechanisms have been identified as potential candidates for utility-driven EE implementation: (1) the allowance of recovery on EE investments through a billing pass-through mechanism and (2) the creation of a pool of funds to implement EE projects.

The creation of a pool of funds was successfully implemented in the State of Maharashtra. Under a directive from the Maharashtra Electricity Regulatory Commission, utilities in Maharashtra were able to use a load management charge to initiate EE initiatives **(Box 3)**. The load management charge was discontinued after a period of one-and-half years by order of the Appellate Tribunal. Nevertheless, this regulatory intervention has resulted in the utilities in Maharashtra developing DSM programs and budgets that are consolidated in the tariff approval process. Maharashtra Electricity Regulatory Commission now allows utilities to pass DSM program expenditures through the tariff by combining them in the rate base, following the submission of an implementation plan, which must include a monitoring and assessment component.

Box 3. Implementation of Utility Levy Collection to Create a Pool of Funds

The Maharashtra Electricity Regulatory Commission issued a directive to distribution licensees (under Section 23 of the Electricity Act, 2003) to curb demand. The directive applied to the Maharashtra State Electricity Board, Brihan-Mumbai Electric and Supply Undertaking, Mula Pravara Electric Cooperative Society, Tata Power Company Limited, and Reliance Energy Ltd., and allowed them to levy a load management charge on customers whose consumption exceeded 500 kilowatt-hours per month during the months of May and June 2005 (June and July in case of the Brihan-Mumbai Electric and Supply Undertaking). Utilities in Maharashtra levied a fee of INR 1 per kilowatt-hour for electricity consumed in excess of 80 percent of the consumption recorded in the corresponding billing months in 2004. The Maharashtra Electricity Regulatory Commission directive also allowed a rebate of INR 0.50 per kilowatt-hour for customers whose consumption was lower than 80 percent of the consumption during the corresponding billing months in 2004. In its detailed order, Maharashtra Electricity Regulatory Commission directed the utilities to maintain a separate account for the load management charge levy fees collected and insisted that levy fees be used to initiate energy conservation and demand-side management initiatives. Through this pool of funds, the utilities implemented EE initiatives in the residential sector and for street-lighting.

11 See http://www.cercind.gov.in/13042007/Terms_and_conditions_of_tariff.pdf

2.3 BEE-SUPPORTED, MARKET-BASED EE IMPLEMENTATION

The CDM Executive Board of the UN Framework Convention on Climate Change recently announced that projects which facilitate the replacement of incandescent lamps with CFLs can generate tradable Certified Emission Reductions.[12] In order to capitalize on this opportunity, BEE has developed a novel initiative to promote CFLs in India using the CDM. The program is called *Bijlee Bachat Lamp Yojana* (*trans.* Program to Promote Electricity-Saving Lamps), which is referred to as the BEE CFL Initiative in this report. Adopting a programmatic approach to the CDM, the BEE is helping lower high transaction costs associated with obtaining CDM approval by setting common guidelines which all electricity distribution companies in India will be required to follow. The guidelines will include minimum quality standards for CFLs. In return, the BEE will facilitate speedy approval of the CDM projects by India's Designated National Authority for the CDM.

2.4 TECHNICAL ASSISTANCE

In recent years, several donor agencies, including USAID, the German Agency for Technical Cooperation and the International Finance Corporation, have funded technical assistance efforts to build capacity and experience in the design and implementation of EE financing schemes. **Attachment 3** provides a brief summary of various donor programs in India targeted at EE finance.

12 The CFL programs save energy and result in reductions in greenhouse gas emissions. Project developers can receive a payment for certified emissions reductions under the framework of the Clean Development Mechanism.

3. REVIEW OF EE FINANCING PROGRAMS AND MECHANISMS

The range of financing programs and mechanisms available in India have included technical assistance and pilot programs implemented by donors and multilateral banks, lending schemes implemented by commercial banks and public institutions, and government-backed market interventions (e.g., bulk procurements of energy-saving CFLs). **Table 8** provides an overview of financing options that have either been implemented in the recent past or are currently available in India for financing EE projects. These schemes include donor and multilateral financing, commercial bank lending, and government-supported and public-sector finance. The table describes the type of financing program or mechanism and whether each scheme is closed or is currently operational.

TABLE 8. BRIEF DESCRIPTION AND AVAILABILITY OF VARIOUS EE FINANCING PROJECTS AND SCHEMES

DONOR AND MULTILATERAL FINANCING			
Agency	**Financing project or mechanism**	**Sector or purpose**	**Comments**
World Bank	Second Renewable Energy Project	For EE and renewable energy	Completed
ADB	Industrial Energy Efficiency Project	Industrial EE	Completed
COMMERCIAL BANK LENDING			
Agency	**Financing project or mechanism**	**Sector or purpose**	**Comments**
World Bank loan through ICICI Bank	USD 5 million, 7 to 9% annual interest, 3 to 5 year terms	EE for industry	Completed
YES Bank	USD 10 million, 3 year terms, normal interest rate	Industry, commercial, agriculture, and SMEs	Completed
State Bank of India	5 to 7 years term, normal interest rate	For all sectors	Loans available, subject to Bank's norms
IREDA	Line of credit	For all sectors that meet set criteria	World Bank line of credit completed, regular financing available
ECO housing finance	0.5 to 1.5% interest rebate for housing that meets criteria	Housing sector in Pune and Mumbai	Recently initiated

GOVERNMENT-SUPPORTED AND PUBLIC-SECTOR FINANCE			
Agency	**Financing project or mechanism**	**Sector or purpose**	**Comments**
Urban development funds	At conventional rates of interest	For municipal sector, street lighting, water works	Beginning made with ESCOs in two states
State energy conservation funds	Preliminary stage of development.	Sectors to be identified	Some international donors active

Each type of financing scheme and project type is reviewed further below. This review builds upon and updates some of the India-related material contained in the World Bank's three country study (Taylor et. al, 2008).

3.1 TYPES OF FINANCING

3.1.1 DONOR AND MULTILATERAL FINANCING INSTITUTIONS

Over the years, bilateral donors and multilateral institutions have supported the creation of innovative financing options for EE projects in India.[13] Presently, ADB is engaged in discussions with at least one Indian state to support the creation of state energy conservation funds, and the World Bank is exploring the feasibility of setting up a partial risk guarantee fund for EE financing in cooperation with the BEE. It is probable that current interest in accessing carbon finance options for EE projects will result in bilateral donors and multilateral institutions offering additional financing options in partnership with their carbon funds.

The World Bank. The World Bank supported a multi-year pilot effort to promote the removal of barriers to EE financing in India, Brazil, and China. The project's final report includes case studies of IREDA's Energy Efficiency Loan Fund, cluster EE lending for small and medium enterprises (SMEs) by Indian banks, and for leasing of energy efficiency equipment (Taylor et. al, 2008).[14] The World Bank previously provided a line of credit of USD 350 million to ICICI Bank for EE, and a line of credit (USD 5 million) and technical assistance to IREDA for the Second Renewable Energy project.

Asian Development Bank. From 1994 to 2005, the ADB was instrumental in initiating and funding the Industrial Energy Efficiency Project in India to promote efficient and environmentally sustainable industrialization. The project's objective was to support specific government initiatives, including: (1) expanding energy sector reforms toward demand-side management of energy-intensive industries, (2) reducing energy shortages by increasing EE, (3) improving the overall efficiency and international competitiveness of the industries, and (4) integrating environmental considerations into project design and implementation.

The project found three main reasons for market failure of EE initiatives: (1) lack of available capital, especially for smaller enterprises, (2) inadequate information on appropriate equipment and technology, and (3) under-emphasis on EE investment financing by domestic financial institutions. While almost all

13 These include the World Bank, ADB, United Nations Environment Program as well as bilateral donor agencies, such as Kreditanstalt für Wiederaufbau and USAID.

14 This was limited to lease financing of capacitors, used for power factor improvement and energy savings.

outputs of this ADB project were achieved, limited demand for loans from sub-borrowers precluded efforts to establish a revolving-fund that would have provided additional financing for EE projects.

Another technical assistance project supported by ADB concluded that the main barriers to the provision of financing for EE projects in smaller and medium-sized industries were the credit risks of the borrowers and a lack of knowledge about EE project lending among local banks.[15] As a result, ADB decided to shift its focus from public-sector loans to the provision of partial credit guarantees by the Bank's Private Sector Operations Department. At the time of this report, discussions between ADB and the Government of India concerning the establishment of a partial credit guarantee facility are ongoing.

3.1.2 COMMERCIAL EE FINANCING

It is difficult to find reliable data on the market size for EE finance and investments in India. In general, banks and financial institutions do not track EE lending as a distinct area of business, unless they have initiated a specific EE-focused lending program. Feedback from the industry indicates most of the EE initiatives tend to be funded by the promoters themselves. Interviews conducted during this study reveal that most EE investments in the industrial, commercial and public sectors are not classified as EE investments *per se*. These investments are often made as a part of routine operation, maintenance and working capital arrangements.[16]

Nevertheless, a few commercial EE financing mechanisms have been recently implemented in India. The first bank to launch such an initiative was the State Bank of India under the Project Uptech, and this was soon followed by lending facilities at Canara Bank and Union Bank of India in 2004. The Board of Directors of the Bank of India and the Bank of Baroda approved their respective EE schemes in 2006. Two private sector banks, ICICI Bank and Yes Bank, have also undertaken initiatives to finance EE projects. It is important to note that most of the commercial EE financing schemes available in India have concluded or are close to being concluded. In general, banks have decided to roll EE projects into their overall portfolio and use general lending criteria and requirements to evaluate EE projects.

While the following discussion is not intended to be exhaustive, it does highlight prominent examples of EE initiatives that have been carried out by Indian banks.

Cluster Lending for SMEs by Public Sector Indian Banks. The term *cluster lending* refers to lending operations targeted at industries that share economic interests or policy concerns. Cluster lending programs support investments that (1) increase SME competitiveness through the upgrading of technologies, (2) decrease operational and production costs through reduced wastage and increased efficiencies, (3) increase productivity, or (4) improve product mix.

Lending to SMEs is a government-mandated priority for Indian banks, which reflects the Government's view that SMEs play a critical role in generating economic growth, employment, and exports. Historically, SMEs within specific industrial groupings (e.g., textiles and metallurgy) have established operations in the same geographic location. Traditionally, reaching out to individual SMEs has posed significant challenges owing to their informal organization, less-than-adequate accounting and financial record-keeping systems, and limited human resources that can negotiate with financial institutions, all of which increase transaction costs and lending risks. However, SMEs that carry out similar activities often form "clusters" or associations to represent their interests and act as a natural marketing partner and aggregator. Donors and banks have identified these clusters as also having the potential to serve as a nodal point for communicating with and organizing EE projects with a group of end-users.

15 The project was carried out during the period 2003-2005.

16 This is not to imply in any manner that promoter-supported EE investments are not desirable.

To service the energy efficiency financing needs of the hard-to-reach class of SME customers, the State Bank of India developed a cluster lending strategy (Project Uptech), and several banks followed with their own approaches. To date, SME cluster lending in India has focused either on a specific sector or technology group, or else on a geographically grouped cluster that includes several industrial categories but concentrates on a few technical interventions as a way of minimizing assessment and appraisal costs (Taylor, 2006).

Table 9 compares the EE schemes offered by some of the key commercial banks in India.

TABLE 9. COMPARISON AMONG EE SCHEMES OFFERED BY KEY COMMERCIAL BANKS

Description	ICICI Bank	State Bank of India	Yes Bank	IREDA
Sectors financed	commercial, industrial, SME, public	industrial, SME	commercial, industrial, SME, agriculture	commercial, industrial, SME, agriculture
Technology financed	EE Service, industrial EE equipment (boilers, waste heat recovery), lighting	industrial cogeneration	industrial EE equipment (cogeneration, boilers, waste heat recovery)	DSM (installation of capacitor banks),[17] industrial EE equipment in sugar and cement mills, waste heat recovery
Lending to new customers	yes	no	case by case	yes
Term of loan	3 to 5 years	5 to 7 years	3 years	6 to 10 years
Interest rates	7 to 9%	commercial	not applicable	10 to 12%
Penalties and rebates	yes	yes	not applicable	yes
Collateral requirements	depends on type of project, risk, etc.	existing lien through working capital engagement	assets or guarantees	Extension of charge on the assets provided as security for the existing advance, including the extension of grantee cover where available

17 Consists of a number of individual capacitors installed for power factor improvement and energy savings.

ICICI Bank. ICICI Bank has been financing energy efficiency projects for almost a decade in the industrial, commercial, SME, and public sectors. Most of its projects have been supported through a USD 5 million credit line from the World Bank, and all loans have been fully repaid. The majority of projects received loans based on cash flow financing, at an annual percentage rate of 7 to 9 percent, with terms of 3 to 5 years. ICICI has financed a range of products, including EE equipment, thermal EE (e.g., industrial boilers, waste heat recovery, industrial cogeneration), and electrical products (e.g., heating ventilation and air-conditioning, lighting, water pumping, and street lighting). The energy savings from the projects range from 15 to 30 percent. ICICI has discontinued schemes targeted specifically at financing EE projects, and has adopted a position that it will continue to finance EE projects as long as they meet the bank's general lending criteria.

Yes Bank. Yes Bank has also set up an initiative to finance EE projects for SMEs and companies in the industrial, commercial, and agricultural sectors. To date, Yes Bank has allocated USD 10 million. The loan tenure is typically three years, at the ongoing commercial interest rate. Financing is based on collateralization of assets or a guarantee. Some of the products financed include EE equipment, industrial boilers, waste heat recovery, and industrial cogeneration. Yes Bank has announced that it is in the final stages of implementing this initiative, and it does not intend to announce any new schemes focused on EE. All future EE loans will be "mainstreamed" and processed per general lending guidelines and criteria.

State Bank of India. The State Bank of India was one of the first banks in India to start financing EE projects. The value of EE projects funded by the bank is estimated at INR 10 million, and the majority of these loans have been disbursed through their established lending mechanisms. The loan term is five to seven years; interest is offered at prevailing commercial rates. The products financed have included EE retrofits, new equipment, and cogeneration in the textile, food, paper, and machining industries. Currently, the bank is developing industrial-sector EE projects with a minimum funding amount of INR 10 million.

Eco-Housing Finance. USAID/India has sponsored a project called the Mainstreaming Eco-housing Initiative, managed by the International Institute for Energy Conservation, which designed a one-to-five star rating system for multi-storey apartments. Through this initiative, mortgage financing is offered by Indian banks at attractive rates, with rebates from 50 to 150 basis points, for those developers whose projects adhere to the stipulations laid out by the Eco-housing Initiative. Recently, the Bank of Maharashtra has entered into an agreement with a property developer in Pune to offer mortages with rebate points.

3.1.3 PUBLIC SECTOR EE FINANCING

Several energy-intensive sectors in the public (municipal) sectors present high energy savings potential. Municipal water pumping and treatment, sewage pumping and treatment, public buildings and street-lighting all fall under this category, which have an energy conservation potential of at least 20 percent.

Financing EE Street Lighting. Municipal street lighting programs have resulted in significant energy savings by using a shared-savings model. For example, the City of Nashik in Maharashtra implemented a successful municipal street lighting program, with financing from ICICI and using an ESCO-based, shared-savings model. During the first phase of this program, half of the city's 25,000 street lights were replaced with energy-efficient lights, resulting in an energy savings of 30 percent during the first year. The technology increased the brightness of lights during rush hours, and regulated the voltage based on time, area and car density. The first loan was repaid in three years, and the second loan was repaid within the allotted period. Other examples in the City of Sangli and State of Karnataka indicate that most projects cost less than INR 5 million and result in successful reflows.

Financing EE Public Buildings. The BEE launched an energy efficiency program in six high-profile public buildings in the National Capital Region in 2005. Under this initiative, three ESCOs implemented EE programs in three buildings, which are currently being monitored. At the same time, The World Bank, using funding from the Global Environment Facility, implemented a similar ESCO approach in three Indian states, with IREDA as an on-lending institution. The project resulted in EE projects for three public buildings in Gujarat and Andhra Pradesh, using a performance contracting model. In addition to the performance contracting initiative, the departments of public buildings in the three states are in the process of implementing their own model of EE Public Buildings program, supported through their state budgets. This step also marks the initiation of low-transactions costs-based implementation of the public sector EE initiative, and is based on the lesson learned that public financing (through state budgets, leveraged with debt through the banking sector) can potentially prove to be a viable implementation model.

Several Indian states are now in the process of developing programs targeted at financing EE projects in public buildings. For example, USAID's ECO-III Program is designing a public buildings program in the State of Gujarat that would be similar to the United States Federal Energy Management Program. However, the Indian market is different from the United States market, and there are several challenges: (1) the public financing support structures that helped this program succeed in the United States is not easily available in India; and (2) the ESCO industry in India is not as mature as in the United States. Nonetheless, several public building projects (four in Delhi, two in Andhra Pradesh and Gujarat) are under way.

Development and Tax Rebates for EE Housing. Local governments in India are piloting a few programs to promote EE investments in residential buildings. For example, the Municipal Corporation of Greater Mumbai (MCGM, 2008) and the Pune Municipal Corporation (PMC, 2008) plan to offer rebates on development fees paid by developers and on property taxes paid by residents for certified Eco-Housing projects.

Financing EE Water Pumping. Municipal water pumping programs can result in significant energy savings, but they have been attempted in only a handful of locations. All municipal projects in water pumping are at the design stage. Past models developed by the ICICI Bank and others have not been replicated. USAID/India's Financial Institutions Reform and Expansion-Debt (FIRE-D) Program supported EE through municipal bonds in Ahmadabad and Gujarat. With support from multilateral banks, lessons from this program were used in the design of several state-driven municipal infrastructure funds that have included an EE finance component. Notable among these funds is the Tamil Nadu Urban Development Fund, which has begun to finance municipal water and sewage pumping EE programs implemented by ESCOs. Overall, the Fund has short-listed sixty urban local bodies, forty of which have signed up for the program. Nearly 50 percent of the funds distribution has been through ESCOs (e.g., Asian Electronics and Elpro International Ltd.).

3.1.4 GOVERNMENT-SUPPORTED EE FINANCE INITIATIVES

Governments intervene in markets to stimulate consumer awareness and promote investment, especially in cases where public goods and services are at stake. Simply relying on the market alone can lead to a diminished provision of public goods and services (i.e. EE technologies and projects). Within the EE sector, one of the ways in which governments have traditionally intervened is to establish policy mandates that either create or stimulate specific markets (e.g., utility DSM programs, or feed-in tariffs for renewables) or that help to aggregate demand and thereby lower transactions costs. This section describes a number of government initiatives by the Indian government to support or stimulate financing for EE projects.

Indian Renewable Energy Development Agency (IREDA) EE Initiative. IREDA provides financing for EE projects and equipment as well as loans for manufacturing and market development.[18] Through their EE Initiative, IREDA offers a variety of terms and conditions, for example covering up to 70 percent of financing for ESCO projects and up to 80 percent of EE equipment costs at interest rates varying from 10 to 12 percent. Loan terms vary from 6 to 10 years. IREDA provides a rebate of 1-1.5 percent if the borrower can furnish the security of a bank guarantee.

Under a line of credit from the World Bank, approximately USD 20 million was committed to EE financing, and this was fully utilized. The interest rate for these projects was about 2 percent below IREDA's normal financing rate, and this was linked to the specific parameters of the project and the project owner. IREDA has been involved in various EE projects such waste heat recovery, DSM (i.e., installation of capacitors), and energy equipment in sugar and cement mills.

IREDA has built up in-house technical and financial expertise, but also relies on outsourcing. To assist in pipeline development, IREDA has built a network of business development centers and strategic allies throughout India, consisting of: technical consultancy organizations; state nodal renewable energy agencies; local and national productivity councils; private consultancy organizations; non-governmental organizations; and technical institutions and agencies. IREDA provides these partners with training and some financial resources. In addition, the partners receive incentive payments based on implementation, after loan disbursement and commissioning. Although certain aspects of the EE business were new to IREDA's project and technical services department, many of the issues involved in appraising EE and renewable energy projects are similar. Technical assessment of projects is done in-house, although specialized consultancies are used on a case-by-case basis for certain larger projects.

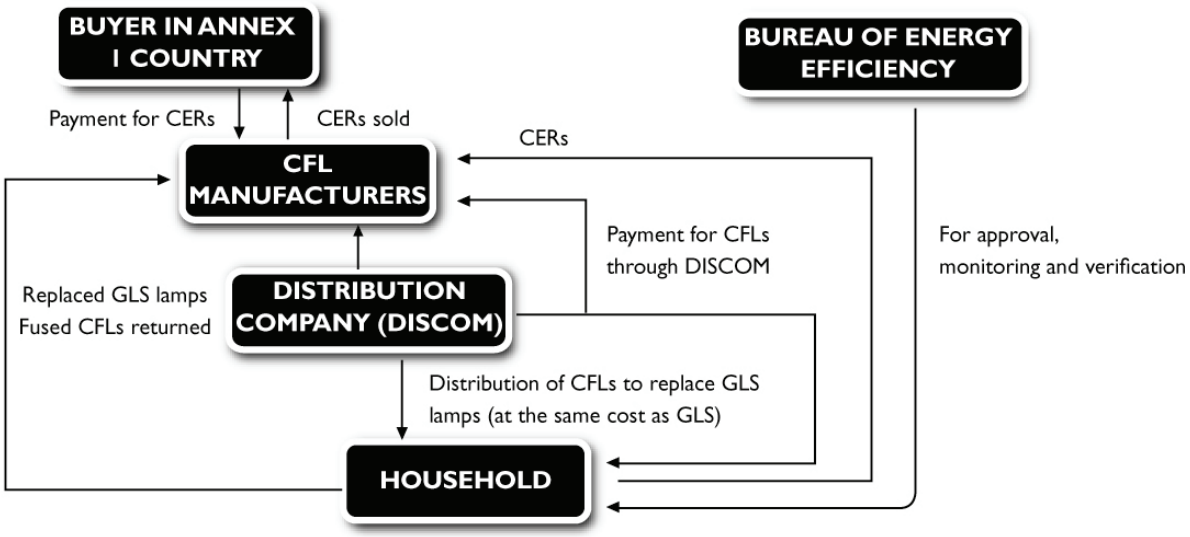
IREDA has established credibility in the EE financing market, building upon its successful track record in lending for renewable energy projects. To date it has successfully financed EE projects in the following industries: sugar, paper, textile, steel/sponge iron, heavy chemicals, cement, power generation and DSM in electric utilities, including ESCO projects that rely on performance contracting or revenue sharing.

To date, IREDA has approved 19 projects, totaling USD 60 million, and 11 of these have been fully commissioned (i.e., the loan agreement has been signed, the loan fully disbursed, and the project has been completed). The average project size is large (USD 4 million), since the majority of the current loan portfolio consists of large co-generation and waste heat recovery projects. However IREDA has also financed several smaller loans (in the range of USD 200,000 - 800,000) for equipment replacement and DSM, including motors, control systems, capacitors, lighting, pumping systems, and boilers.

BEE Facilitation of Clean Development Mechanism Projects for Energy-Saving Lamps. During the past several years, governments and utilities in India and several other Asian countries (e.g. Indonesia and Vietnam) have pursued large-scale bulk procurement projects for energy-saving CFLs. These projects provide economies of scale, since high-quality lamps can be specified, purchased, and distributed to many customers at a very low price. In India, BEE has taken the lead on facilitating development of bulk purchase projects for CFLs under the umbrella of the CDM. The BEE strategy will facilitate the capture of revenue streams from the carbon reductions in the form of certified emission reductions. **Figure 6** portrays how BEE plans to pursue a programmatic approach to obtain CDM approval for a specific methodology for monitoring and reporting carbon emissions reductions.

18 IREDA was incorporated as a public limited company in March 1987 for financing renewable energy, and its business rules were amended later to include energy efficiency.

FIGURE 6. THE ROLE OF DIFFERENT ORGANIZATIONS IN BEE'S PROGRAM TO FACILITATE CLEAN DEVELOPMENT MECHANISM PROJECTS FOR CFLS IN INDIA.



All Indian states and municipalities will then be able to use this methodology and implement bulk procurement projects. As long as they conform to the approved methodology and adhere to the product standards and guidelines issued by BEE, they can be assured of streamlined and cost-effective approvals both within the Indian government (i.e. Designated National Authority) and by the CDM Executive Board (EB). On the project development side, distribution companies enter into partnerships with CFL suppliers, and distribute discounted lamps to the utility's consumers. The CFL suppliers and their consultants are responsible for monitoring and verifying the CFL energy savings, and for tracking the certified emission reductions generated. The revenue obtained from the sale of certified emission reductions is shared between the CFL suppliers, their consultants and the distribution utility. Key elements of the transactional arrangements are as follows:

- The programmatic CDM framework is developed by the Government of India, and is currently being considered for approval by the CDM Executive Board; subsequently, CFL manufacturers joining the scheme can develop a project that is registered with the CDM EB, with the approval of the CDM programmatic framework.
- CFL manufacturers establish agreements with distribution companies to develop CFL bulk procurement contracts.
- The distribution company receives discounted CFLs from the CFL suppliers.[19] The lamps are required to adhere to certain quality standards (e.g., lifetime of 10,000 hours).
- The distribution company establishes buy-back mechanisms under which each burnt-out CFL is returned for about INR 2, so that it can be collected and sent to disposal facilities where the mercury it contains can be safely disposed.
- CFL suppliers and their CDM consultants prepare and secure registration of their activity as a CDM project, within the framework of the approved programmatic CDM activity of the BEE.

19 It is expected that the CFLs will be priced around INR 10-15 per lamp, which is approximately 15 percent of the current cost of CFLs in India, and on a par with the market cost of incandescent lamps.

- Certified emission reductions generated can be traded with countries classified as *Annex I countries* under the UNFCCC, helping the countries to achieve their emission reduction requirements.

The transactions proposed by BEE and the Ministry of Power are presented in **Figure 6**. It is important to note the strong link between utility marketing and the generation of certified emission reductions; this link is critical in order to use carbon finance to significantly reduce the cost of CFLs and accelerate their uptake.

Several Indian states have recently announced plans to develop CDM projects for CFLs. The Uttar Pradesh Power Company has signed a memorandum of understanding with two companies (CantorCO2e and Banyan Environmental Innovations) under which Uttar Pradesh Power Company will distribute 22 million CFLs at a cost of INR 10 per lamp (Business World, May 2008). Through this effort, Uttar Pradesh Power Company hopes to mitigate a part of the current 2,000 megawatts capacity shortage in Uttar Pradesh. The carbon brokers hope to recover their investment of INR 100 per lamp within two years and then make an annual return of INR 66 per lamp over the lifetime of the CFL. The State Electricity Boards of Andhra Pradesh, Tamil Nadu and Kerala have also announced tenders to undertake similar procurements.

State Energy Conservation Funds. Under the Energy Conservation Act, 2001, states are expected to establish State Energy Conservation Funds (SECFs). Several states are in the process of establishing SECFs and have issued orders to establish procedures for expenditures for these funds. These states plan to populate their funds with receipts from levies or charges, as well as with contributions from the BEE for EE activities in the state. Kerala and Madhya Pradesh have initiated efforts to establish SECFs, with donor technical assistance.[20] It is expected that both of these states will launch their SECF and start to support EE projects in their states by early 2009. No specific details are currently available on the priority sectors, types of projects, or types of investments for the funds.

Other Initiatives. A new Global Environment Facility initiative called the Seed Capital Assistance Facility was launched in 2007 for implementation in Asia and Africa. The facility is aimed at helping early-stage clean energy enterprises and projects access start-up seed capital from commercial energy investors. The Facility is being implemented through United Nations Environment Programme, the ADB, and the African Development Bank. The facility could potentially be used to support the scale-up of EE projects in India.

3.1.5 MARKET-BASED MECHANISMS

The most common method of financing EE projects is debt financing. Debt financing for EE projects in India is provided through two mechanisms: (1) an owner-driven EE implementation by private-sector companies in India that have the capability to raise debt financing and offer the required securitization or (2) third-party financing through ESCOs, mainly for public-sector projects. Both models offer specific benefits to mitigate risk**. Table 10** shows the risk mitigation possibilities through conventional EE projects and projects implemented by ESCOs.

20 The Asia Pacific Partnership for Clean Development and Climate and USAID, through the ECO-Asia Clean Development and Climate Program, is supporting the development of a SECF in Kerala. The ADB is supporting the establishment of a SECF in Madhya Pradesh.

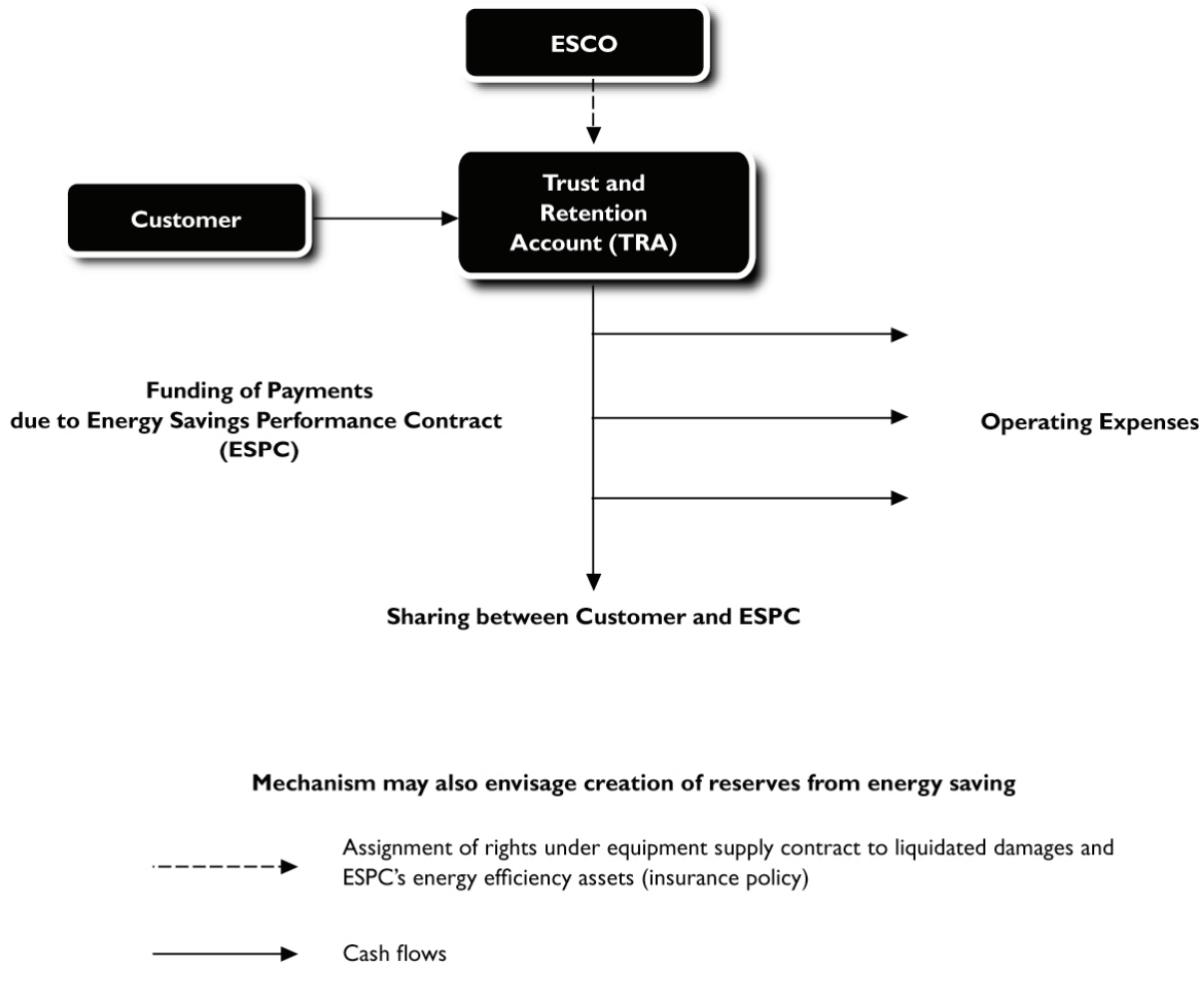
TABLE 10. RISK SHARING AMONG STAKEHOLDERS UNDER THE ESCO MODEL

Model/Risk	Conventional	Self-financed	ESCO-implementation
Completion	customer	customer and ESCO	ESCO
Performance	customer	customer and ESCO	ESCO
Savings	customer	customer and ESCO	ESCO
Credit	not applicable	not applicable	lender
Financing	not applicable	customer	lender
Monitoring and Verification	customer	customer and ESCO	ESCO

Source: Public Private Infrastructure Advisory Facility, 2007

One of the key barriers to the implementation of public sector EE projects is loan securitization for government-sector clients. **Figure 7** shows a model that has been suggested to mitigate the risk of delayed payments from the government entity: the establishment of a trust and retention account (Public Private Infrastructure Advisory Facility, 2007).

FIGURE 7. PAYMENT RISK MITIGATION TECHNIQUE FOR PERFORMANCE CONTRACTING



Financing by Owners or Vendors. Many EE projects in India are financed by owners or vendors. Most investments in retrofits and expansion are funded through working-capital and bridge-funding arrangements with banks, supported by equity financing from owners. As such, even the owners of public buildings and facilities have shown in a recent project sponsored by IREDA and the World Bank that the low-cost and no-cost solutions with low payback periods are quickly adopted. The constraint with this approach was that the high cost, longer payback options were not taken up for implementation. Thus, the full range of EE projects could not be financed under this window.

Vendors also play an important role in the development of financing mechanisms by providing operational and maintenance support, and associated warranties. As such, the investments and portfolio developed through this mechanism is not captured directly as the EE investments. Through a very initial estimate, a number of the experts interviewed stated informally that owner and vendor financing may be contributing more than 50 percent of investments in the EE market.

The Ministry of Power has been recognizing achievers of energy conservation since 1999, when the scheme of National Energy Conservation Awards was started. Over the last nine years, applicants for the awards have invested more than USD 1.6 billion, which resulted in a peak demand reduction of 1,420 megawatts, along with savings of 1.6 billion liters of oil, 5.2 million tons of coal, and 19 billion cubic meters of gas. For the year 2007, 384 applicants for the National Energy Conservation Awards reported investments of USD 700 million, and achieved annual savings of USD 438 million, from savings of 1.6 billion kilowatt-hours (Ministry of Power, 2007).

3.2 BARRIERS TO EE FINANCING

The surveys and interviews carried out for this report provided in-depth feedback about the barriers to the implementation of EE financing mechanisms. Three main barriers were identified: (1) information barriers, (2) financial barriers, and (3) other barriers.

3.2.1 INFORMATION BARRIERS

- **Lack of reliable information.** There is a lack of systematic and reliable information available on the EE potential in the Indian economy (by sector, subsector, consumer and project type) and the details of EE projects financed in India (by banks, financial institutions, and other investors). This hinders the development of large-scale EE investment plans, government programs to support EE investment, and the evaluation of past programs.

- **Lack of bank awareness.** Lenders are unfamiliar with EE technologies and approaches and require technical support to appraise and manage lending to EE projects. Some of the banks surveyed stated that lack of awareness on the part of the project proponents and the lack of trained personnel within the bank were the major barriers limiting lending for EE projects.

- **Information dissemination to large numbers of small-scale users.** India's industrial structure results in a very large number of small and medium enterprises (3 million firms), which contribute 60 percent of the country's gross domestic product. Reaching the decision-makers of these firms to facilitate the implementation of EE projects poses significant hurdles and increases transaction costs.

3.2.2 FINANCIAL BARRIERS

- **Reluctance to make initial investment.** Industries are reluctant to make an initial investment in the costs of energy audits, preparation of detailed project reports, etc. Industries have been seeking soft support for these up-front costs, which can be recouped from the energy savings after the project is implemented.

- **Limitations in bank appraisal methods.** The financial feasibility of EE projects has to be assessed by analyzing how increased productivity and energy savings improve company cash flow. Lenders often do not have the capacity to apply suitable appraisal methodologies.
- **Barriers to lending to new clients.** Lenders have procedural requirements for new clients and usually prefer to lend to existing customers. Enlisting and signing up new customers is a significant barrier and reduces the pool of potential EE project investments.
- **Ageing equipment stock in municipalities**. The municipal sector in India typically has equipment that is more than twenty years old. Substantial energy savings can be realized if this equipment is replaced with the latest EE technologies. However, there is a severe constraint on capital availability in municipalities, and as a result the investments often do not materialize.
- **Concerns about financial strength of ESCOs.** ESCOs should expeditiously address concerns about their financial strength by developing strategic partnerships with banks that can provide financing and lines of credit for products on which they guarantee the technical performance.
- **Perceived risks of SME lending.** The financial institutions surveyed indicated that it is not a lack of capital that is hindering EE investments. Rather, it is the perceived risks associated with lending to the SME sector, where there are insufficient systems for tracking and reporting financial accounting, production and output, and energy use and savings. Moreover, SMEs are reluctant to divulge information on their production and energy consumption.

3.2.3 ENERGY INSECURITY, INVESTMENT PRIORITIES AND LACK OF CONFIDENCE IN ESCOs

- **Businesses focus on security of electricity supply**. In an environment of crippling energy shortages and brownouts, most entrepreneurs are focused on building new generation capacity (either grid-based or captive), and there is not enough capital or entrepreneurial talent pursuing EE investment opportunities. For example, when faced with 4-8 hours of non-availability of power, energy users would prefer to invest in captive generation rather than in energy-saving equipment.
- **Low priority of EE investments**. With the rapid growth of the Indian economy, unit business managers do not consider EE investments as a high priority, and instead they prefer to invest in production-oriented assets or in marketing and distribution channels in order to increase their market share.
- **Lack of confidence in ESCOs.** Business managers tend to lack confidence in ESCOs, and this may reflect a lack of experience with the ESCO business model. It may also reflect the fact that working with an ESCO requires sharing a large volume of data, and managers are reluctant to share these data. If ESCOs could propose monitoring methods that are less data-intensive, it may encourage business managers to work with them. Another factor is the limited experience of ESCOs in India, and the lack of widely available success stories. This lack of familiarity with successful examples hinders the ability of ESCOs to develop and market their services.

4. RECOMMENDATIONS

4.1 UPDATING DATA ON EE POTENTIAL IN INDIA

In order to understand how to tap the vast potential for EE investment in India, it is important to systematically map and identify EE opportunities. The first recommendation is for utilities, state-designated nodal agencies, and the BEE to initiate a process of systematically collecting, analyzing, and sharing data on energy end-uses and EE potential (e.g., unit EE potential, energy intensity by sector, etc.). BEE has already started the task of collecting information on large commercial-sector consumers (designated consumers). Once the results of energy audits for commercial consumers are reported back to the nodal agency at the state level (State Designated Agencies or SDA) and to BEE, this will provide an abundance of data on the EE potential for large classes of buildings and factories. BEE should take the initiative to build capacity in states for the SDA to regularly collect and analyze the data in order to estimate the EE potential in a state. The following is a suggested list of steps:

- consolidate current information at the BEE on EE implementation case studies;
- develop a categorical listing of energy end-uses and estimates of end-use EE potential (e.g., motors and drives, air conditioning, lighting, pumping, agriculture and thermal systems); and
- develop a state-specific EE database, which would be initiated by the state nodal agencies and facilitated by BEE.

Table 11 presents some initial recommendations on the data generation process related to end-use consumption.

TABLE 11. DATA GENERATION PROCESS WITH RESPONSIBILITIES

Data	Source	Frequency	Responsible Entity
Energy intensity in large industry	industry associations and utilities	annual	BEE and electricity utilities
Energy intensity in SMEs	industry associations and utilities	annual	SDA
EE appliances	manufacturers	annual	BEE

4.2 CAPACITY BUILDING NEEDS OF MAJOR STAKEHOLDER GROUPS

The surveys and interviews carried out for this study clearly point to the need for a well-crafted technical assistance effort to scale up investments in EE opportunities in India. **Table 12** outlines a set of advisory services that could complement the energy data collection and analysis activities described in the previous section.

TABLE 12. SUMMARY OF CAPACITY-BUILDING NEEDS FOR VARIOUS ACTORS IN THE EE ARENA

Stakeholder Group	Capacity Building Needs
Banks and financial institutions	• Training in performance characteristics of EE technologies • Stronger risk-sharing mechanisms, e.g., loan loss reserves • Incorporate the Credit Guarantee Trust concept for State Energy Conservation Funds • Special credit lines for EE equipment suppliers
Policymakers	• Capacity-building for state regulatory commissions on the application of levy funds for EE • Regulations for phasing out energy inefficient equipment in industry
Implementing organizations	• Preparation of bankable industrial grade audits and project reports • Industry and SME associations take on the role of ESCOs • Common formats for reporting energy audit results • Training of officials from state designated agencies to analyze energy audit reports
International donors	• Support state-level market needs assessment studies for EE financing • Training in establishment and operation of State Energy Conservation Funds

Banks and Financial Institutions. In order to scale up EE investment, it will be necessary to continue and expand training efforts for bank officers across the country. This training should build awareness among bank officers of the importance of EE, while also providing them with updated information on the reliability and performance characteristics of various EE technologies.

These training efforts should be designed to strengthen the capacity of banking officers to:

- **Issue standardized energy service agreements.** The use of standardized formats for energy service agreements will be needed in order to streamline business models; incorporate minimum safeguards and mechanisms for honoring obligations and resolving disputes; and, most importantly, recognize the predominant rights of lenders, as is done with power purchase agreements in the financing of independent power projects.
- **Consider cash-flow financing.** It will be important to influence bankers to understand and seriously consider extending loans based on cash-flow analysis, rather than just asset-based analysis.
- **Include EE analysis in project appraisals.** EE analysis should be presented to the banks not as a separate activity, but as a function that can easily be added to the normal list of activities in a project appraisal. A well-designed training course should encourage banks to modify or extend their existing appraisal techniques to include an evaluation of the benefits of EE projects. In order to reduce technical project risks, lenders will need to stipulate minimum technical and commercial standards.
- **Develop risk-sharing mechanisms**. Risk-sharing mechanisms (e.g., partial credit guarantees and loan loss reserves) can be used to encourage the sponsors of viable, "bankable" projects to develop large-scale EE projects with cash-flow financing, and not just on the basis of balance-

sheet financing. Similarly, a credit guarantee trust can be used to support the establishment of State Energy Conservation Funds.[21]

- **Establish vendor credit lines.** Financial institutions can also consider setting up special credit lines for vendors that supply EE equipment and technologies.

Policy Makers. International experience shows that both utility-based incentives and government-driven regulations are needed to spur development of EE markets. It will therefore be important to undertake a broad-based capacity development program at the state regulatory commissions in order to enhance the deployment of EE technologies and projects.

The Bureau of Indian Standards and BEE have begun to launch minimum energy performance standards and energy labeling, respectively, for appliances and equipment. At the same time, feedback from survey respondents indicates that there is also a need for a focused effort to phase-out inefficient equipment from the industrial sector. Similarly, using its powers under the Energy Conservation Act of 2001, the BEE has announced a list of designated consumers in nine industrial sub-sectors. The next step will be to require mandatory implementation of EE projects, as specified in the Act.

The Maharastra Electricity Regulatory Commission has enacted a load management charge that will serve as a source of funding for EE efforts in that state. The concept is similar to that used for public benefits charges levied by US states, in which funds from a utility tariff are dedicated for the promotion of EE measures. It will be essential to provide training for staff at state regulatory commissions on the application of tariff fees and levies to establish funds dedicated for EE technologies and projects.

Implementing Organizations. Energy auditing in India has evolved with partial support for audits from agencies such as the Petroleum Conservation Research Association, the State Development Bank of India, and state nodal agencies. Though a large number of audits have been carried out in the industrial, commercial, and public sectors, the quality of audits is still a matter of some concern. There is a need to provide some form of technical assistance and incentives for converting audits into detailed project reports that lead to specific action and investment.

There is a need for direct intervention to actively engage the industrial sector through industry associations, qualified energy audit firms, and engineering service companies that facilitate and undertake project implementation. New forms of ESCOs may have to evolve to address the specific needs of the Indian EE market. Traditional ESCO models adopted in the developed countries may not be appropriate, especially in cases where owners and vendors are able to implement low-cost, no-cost, and short-payback options on their own. Given this situation, the application of traditional ESCO models in India may not be successful in some cases.

There is also a need to develop common formats for reporting the results of energy audits. Such an effort could facilitate the sharing of data among states and also increase the probability that energy audits meet basic quality standards. BEE is working on this task, and it is imperative that this be completed in the near future. The state nodal agencies will also need training in order to review and analyze the audit reports.

International Agencies. Multilateral agencies such as The World Bank, the ADB, and the United Nations Development Programme have played a key role in building capacity in Indian institutions in the area of energy audits, ESCOs, and financing of EE (through lines of credit). The surveys carried out for this report reinforce the finding of other assessments that there is a need for special-purpose funds (e.g., State Energy Conservation Funds) to provide a special focus and drive the implementation of EE projects. In this regard, the recently initiated support for two Indian states (Maharashtra and Madhya Pradesh) to develop State Energy Conservation Funds is a step in the right direction. There is also an

21 The State Industrial Development Bank for India has developed a credit guarantee trust for SMEs, and this could be a useful example.

opportunity for interested agencies to support market assessments for EE financing in other states, and to follow this up with training and technical assistance targeted at the establishment and operation of State Energy Conservation Funds. Attachment 4 provides an overview of best practices related to specific business models as well as a list of potential advisory services that could be supported by bilateral donor organizations and multilateral banks.

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ATTACHMENTS

Attachment 1: List of Survey Respondents

Mr. Jaisingh Dhumal
Chief Manager
ICICI Bank Limited

Mr. Abraham Easo
State Bank of India

Mr. Deval
Union Bank of India

Mr. Inguva Viswanath
Chief Manager
Bank of India

Mr. Vivek Mehra
Yes Bank Limited

Ms. Nandra
Canara Bank

Dr. G C Datta Roy
DSCL Services Co. Ltd.

Mr. R Vasu
Intesco Asia (Pvt) Limited

Mr. Tambe
Asian Electronics Limited

Mr. A A Khatana and Mr. P K Pandey
Indian Renewable energy Development Agency (IREDA)

Attachment 2: Survey Questionnaire

1. Which of the sectors has your Institution financed or do you plan to finance for energy efficiency projects?

2. What type of financing options does you institution provide?

3. Please provide us with a brief description of a few specific products listed below:

   - *Total Cap on the fund*
   - *Tenure of financing schemes Funding norms (Equity/Debt Ratios)*
   - *Eligibility and Sectors*

4. Does your financing link with working capital engagement of borrowers preferred technologies? If not, please comment on which technologies that you have financed before.

5. Do you lend to new customers?
   - *Collateral requirements*
   - *Moratorium*
   - *Term of the loans*
   - *Interest rates*
   - *Penalties and rebates*

6. Can you please give details of any current financed EE project/program?
   - *Types of Projects*
   - *Technology description*
   - *Date financed*
   - *Funding amounts and collateral requirements (other securitization)*
   - *Status of reflows*
   - *Learning from this example (sector or business-specific)*
   - *Rate of Return*

   Did you experience any barriers in reflows or discomfort due to securitization or performance?

7. The following questions relate to how EE Projects could become cost competitive and be implemented on a wider scale:

   - *What institutional reforms are necessary in your opinion to generate large-scale uptake of your financing products?*
   - *What are some of the key procedural barriers affecting the EE market in India?*
   - *Do you foresee the role of new and emerging EE technologies that can be funded in the Indian context? What is needed to encourage greater development and deployment of EE technologies in India?*
   - *Do you see lack of capital that can be targeted at EE financing? Do you have any suggestions on improving access to and affordability of capital?*
   - *What risk/return profiles are being utilized by financiers? How are they benchmarking and evaluating potential projects? What are the criteria for investment?*

Attachment 3: Summary of Key Donor Programs

United States Agency for International Development

USAID has been engaged in the Indian market for some time. Over the past decade, USAID mobilized in excess of USD 25 million technical assistance to Indian stakeholders from government and private sector. Among several programmatic interventions offered by USAID, the following are relevant to this report.

- Establishment of a loan fund moderated by ICICI through the Energy Conservation and Commercialization and Greenhouse Gas Abatement Program (GEP) in excess of USD 10 million
- Application of a Development Credit Authority (DCA) mechanism of USD 5 million, currently moderated by Yes Bank

Specific interventions offered under Energy Conservation and Commercialization Loan Fund are captured under the interview findings from ICICI. At the time this report was prepared, current data about the market take-up of Yes Bank's Development Credit Authority were not available.

German Agency for Technical Cooperation Clean Development Mechanism India

India has been a priority partner country of German Development Cooperation for more than 40 years. The German Agency for Technical Cooperation (GTZ) has been active in India on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) for almost all of this period. The objective of the cooperation program has been to improve EE in electricity producers and energy consumers and contribute to climate protection leading to a decoupling of energy demand from economic growth.

GTZ and Kreditanstalt für Wiederaufbau jointly implement the Indo-German Energy Programme. The broad focus of the Indo-German Energy Program is to support the implementation of the Energy Conservation Act. The bilateral cooperation involves local and international professionals and supports:

- labelling of EE of household appliances and energy intensive industrial equipment;
- certification of energy managers and energy auditors;
- setting norms and standards for energy intensive industries;
- transfer and promotion of cutting edge technology to reduce energy consumption;
- promotion of the Clean Development Mechanism; and
- operation of one of the largest web portals on this subject

Results achieved so far include:

- 1.4 billion Euros have been invested in EE and climate protection measures.
- The energy management website set up under the program has proved to be very popular in India.
- 4,500 energy managers and 3,500 energy auditors have been certified.
- Indian certified emission reductions worth EUR 160 million have been sold abroad.
- Rules and regulations under the Energy Conservation Act have been vetted.
- EE measures result in EUR 150 million annual reduction of energy costs.
- Energy consumption labels have been introduced and accepted by the market for four major electric end-user devices.

International Finance Corporation

The International Finance Corporation, the BEE, and the Alliance to Save Energy have launched a program aimed to facilitate market transformation and replicate municipal EE projects on a large scale in India. As part of the program, the institutions have jointly developed the *Manual for the Development of Municipal Energy Efficiency Projects in India* to help municipalities, ESCOs, other EE providers, and financial institutions. Through cost-effective actions, municipalities can bring about significant savings in energy, resulting in financial, environmental, and social benefits for citizens (International Finance Corporation, 2008).

Attachment 4: Discussion of EE Finance Business Models and Ideas for Technical Assistance

This Attachment suggests two business models for EE finance programs that are worthy of further research and development and could be subjects for support by bilateral and multilateral donors and others.

Partial Credit Guarantees or Risk Sharing Facilities

A set of commercial banks in India have been active in and/or expressed interest in EE project finance, such as through the World Bank/ Global Environment Facility EE finance program implemented with IREDA. A need and opportunity exists for properly structured partial credit guarantees (PCG) and risk-sharing facilities (RSF) to be offered by ADB or the International Finance Corporation to support expanded commercial financial institution financing of EE projects, to address some of the risk barriers cited in the report. Such a program could be made available to multiple banks. The PCG mobilizes the plentiful liquidity that exists in the India financial system. To succeed, it should be combined with technical assistance programs to prepare projects for investment and to build financial institutions' lending capacities. The PCG would have to offer significant risk cover to move the risk horizon of the participating financial institutions, and be priced attractively. It therefore should include some concessional or donor funds within multilateral development banks' PCG structure to allow these banks to assume greater risks and price the PCG attractively.

A PCG program could target multiple end-user markets, including SMEs. As part of the technical assistance program, new financial products, supported by the PCG, can be developed, launched and marketed as deal flow in new market segments is developed. Eligible borrowers can include both end-users and ESCOs. Vendor finance programs can be set up between EE equipment vendors and participating financial institutions as one strategy to generate deal flow. Participating banks can also enter into marketing partnerships with interested utilities (e.g., to provide loans to end-users participating in a utility DSM program). Thus, the financing which a PCG support can be applied flexibly to fund deals that originate through multiple marketing channels, working with several market aggregators.

As each new financial product is developed, the participating financial institutions and the guarantor would define and agree on the credit structure and underwriting guidelines for the loans to be covered under the PCG. A key goal is to create both a strong credit structure and a financial product that is attractive to the prospective borrowers. This means less reliance on fixed asset collateral and more on the end-user's cash flow, which is improved by energy cost savings generated by the EE project. The PCG is intended to give participating financial institutions a risk management tool to prudently extend their risk horizons, enter new markets and develop and offer new financial products.

State Government Pooled Finance Program for Municipal EE Projects

Several state governments in India (Karnataka, Andhra Pradesh, Tamil Nadu, and Maharashtra, for example) are interested in undertaking programs to develop and finance municipal EE projects, for cities within their respective states. State governments have a responsibility and certain programs and budget authority for development of municipal infrastructure. It is a proper duty of a state government to promote municipal EE as part of good governance, prudent fiscal policies and infrastructure development. There may be direct fiscal benefits for states, where they have some financial responsibility for infrastructure, operations or energy expenditures of the municipalities. Project types include: efficient street lighting (including use of dimming technologies), efficient water pumping in water and wastewater facilities, and EE in public buildings and facilities. Many states have already

sponsored studies for municipal EE projects, so an initial project pipeline will typically already exist or can be readily developed.

States act as a market aggregator and marketing partner. As discussed in the main body of this report, state governments have ready interest and mandates for such programs. The program would be led by appropriate state government nodal agencies (Urban Development, Energy, Water Supply and Sanitation, Urban Development Investment and Finance Corporation, as applicable) and would offer (1) access to EE project finance, and (2) project development technical assistance services to a pool of municipalities programmatically.

States may also play a role in the financing structure. One efficient method of raising capital budget for money for state and municipal projects is through bond financing. A state could issue bonds and then on-lend the proceeds to participating municipalities, using pre-defined credit and underwriting guidelines. To create a sound credit structure, the borrowing municipality must typically pledge a defined revenue stream and dedicate it to debt service. In some cases, it may be applicable to consider allowing the municipalities to pledge revenues they receive from a state government, for instance, the Karnataka State Government directly pays municipal electricity bills and these monies could be pledged into an escrow account as part of the loan security. Such an instrument could apply to all municipalities receiving this subsidy, thereby enhancing their creditworthiness. There may also be a need for multilateral development bank guarantees to enhance the sale of local currency bonds into the capital markets. This would mobilize local savings and contribute to financial market deepening, and thus has been adopted by the International Finance Corporation, ADB, and others as an instrument of choice. States may also offer grants and incentives for the municipal EE capital investments. For example, Maharashtra State offers 75 percent funding support to municipalities to conduct energy audits and 23.33 percent capital grants to implement EE projects in their water supply and sanitation systems.

Procurement of EE projects could also be pooled amongst the several municipalities. This aggregates demand for EE project and services, as well. This type of program could significantly support ESCO development, a key barrier to which are the high project sales and development costs and risks. The program would prepare projects for investment and get the end-users "decision-ready". The project could then be the subject of a competitive procurement, as required in the public sector, via a request for proposal process. The request for proposal would present the project to the EE and ESCO business community. A well-designed project will find a ready response. Many EE and contracting firms exist which have core capacities in EE systems, engineering and turnkey construction but do not self-identify yet as "ESCOs" but can be recruited to respond. Typical municipal projects will be in the range of USD 250,000 on the very small end to up to USD 10-15 million in size, with an average of USD 1-3 million estimated as typical. So, in aggregate this market can be sufficiently large to attract the larger most capable contracting firms and also to justify the transaction costs of a bond issue structuring and origination.

The sponsoring state agencies will need assistance to implement and institutionalize the program, building their capacities to sustain it in the medium to long term. Development agencies can provide such assistance. States will need assistance in program design and structuring the financing mechanism. In operations, municipalities will typically need assistance such as: (1) preparing system inventories, energy cost and consumption data and load profiles for participating municipalities; (2) assessing EE investment opportunities at a preliminary feasibility level; (3) supporting decision-making to determine appropriate project implementation plans ("detailed project reports" or DPRs, as termed in the India context), including desired levels of outsourcing, and project financing plans; (4) arranging project financing through the municipal fund mechanism; (5) preparing request for proposal documents, including appropriate provisions and evaluation methodologies for ESCO contracting, and advice in

conducting the procurement process and evaluating proposals; (6) preparing and negotiating project implementing contracts, such as, turnkey construction contracts, service agreements, performance guarantees, and/or ESCO Energy Services Agreements; and (7) providing independent engineering reviews of project systems and savings estimates. Such investments may also include assessment, development and sale of carbon credits, (or certified emission reductions) and development of cooperative agreements with electric utilities which are seeking to acquire demand side management and load management resources, as applicable.

Concessional funding could also support the financing structure, help cover costs of structuring the financing program, and also provide some credit support for the bond issue, for example, first loss reserve funding within a multilateral development bank guarantee. Such a program is highly replicable among the various Indian states.

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