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ENERGY EFFICIENCY MARKET ASSESSMENT FOR INDIA

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MOVING MARKETS FOR ENERGY EFFICIENCY (MMEE)

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FOREWORD

This report is one of the three energy efficiency market assessment reports prepared as a part of the "Moving Markets for Energy Efficiency" (MMEE) project, sponsored by the USAID Global Environment Center. The MMEE project is designed to achieve long-term market transformation by developing the enabling framework for stimulating the delivery of energy efficiency services, and demonstrating the application of the framework in target developing countries.

The report was prepared by the MMEE project team as a result of two missions to India to meet with key stakeholder organizations, including central government agencies, state government agencies, donor organizations, industry and trade associations, industrial and commercial consumers, financial institutions, NGOs, and ESCOs. It is designed to be a discussion document and will be reviewed with the MMEE Advisory Panel and the country stakeholders, to stimulate additional discussion of the key barriers to the market implementation of energy efficiency projects in India, and the approaches and mechanisms that may be employed to address these barriers. After this review, the document will be revised and used as a starting point for further discussions at the MMEE Regional Workshop planned to be held in India in mid-2000.

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I. EXECUTIVE SUMMARY

A. INTRODUCTION

This report provides an assessment of energy efficiency market in India. It has been prepared as a part of the "Moving Markets for Energy Efficiency" (MMEE) project, sponsored by the USAID Global Environment Center. The MMEE project is designed to achieve long-term market transformation by developing the enabling framework for stimulating the delivery of energy efficiency services, and demonstrating the application of the framework in target developing countries. India is one of the three countries selected in this project as a target country (Brazil and Egypt are the other two).

This report was prepared by the MMEE project team as a result of two missions to India to meet with key stakeholder organizations, including central government agencies, state government agencies, donor organizations, industry and trade associations, industrial and commercial consumers, financial institutions, NGOs, and ESCOs. It is designed to be a discussion document and will be reviewed with the MMEE Advisory Panel and the country stakeholders. After this review, the document will be used as a starting point for further discussions at the MMEE Regional Workshop planned to be held in India in mid-2000.

The report presents an overview of the general economic background and energy situation in India, the prior and current activities related to energy efficiency and the potential for energy efficiency. It uses the MMEE energy efficiency market assessment framework to identify the key drivers and barriers and presents a preliminary strategy for moving the market for energy efficiency.

B. ENERGY EFFICIENCY PROGRAMS AND POLICIES

India has long recognized that energy plays a crucial role in national economic development. Both government and industry have publicly stated the benefits of improvement in energy efficiency. Improving the efficiency of energy extraction, conversion, transportation, distribution, and utilization can lead to significant improvements in productivity, competitiveness, and job creation. More recently, the linkages between energy and the environment and the benefits of energy efficiency for both the local and the global environment have also been recognized.

During the last several decades, a number of government and industry organizations, with the assistance of multilateral and bilateral donor agencies, have undertaken a wide range of activities to develop and promote energy efficiency activities.

Central Government

The Central government has drafted an Energy Conservation Bill that would establish the Bureau of Energy Efficiency as a nodal agency to promote energy efficiency. The Bill is being revised and will be presented to the new cabinet and Parliament after the 1999 general elections. The current version of the Bill contains provisions for equipment and appliance standards and labeling, energy consumption standards and norms for major energy consumers, mandatory energy audits, training and certification program for energy auditors and energy managers, and establishment of energy conservation funds at the Central and State government levels.

Agencies of the Central government, including the National Productivity Council (NPC) and the Energy Management Center (EMC), have undertaken activities such as studies of energy efficiency potential, energy audits, demonstration projects, and assessment of energy efficiency equipment markets.

Donor Agencies

The U.S. Agency for International Development (USAID) has long been active in the Indian energy sector. The current USAID program is based on its Strategic Objective # 4 – Increased environmental protection in energy, industry and cities through increased efficiency and decreased pollution in energy supply and use, pollution reduction in selected industrial sectors, and improved urban environmental infrastructure building and services delivery in selected cities. The key USAID activities in the past were the Program for Acceleration of Commercial Energy Research (PACER), and the Energy Management, Consultation, and Training (EMCAT).

USAID is now initiating a major program called Energy Conservation Commercialization (ECO). This project will devote considerable resources to national energy efficiency policy and institutional reform, state level energy efficiency and power sector reforms, and energy efficiency market development and promotion.

The major activities of the World Bank have focused on power sector reforms under the State Power Sector Restructuring (SPSR) initiative. To assist the process of restructuring, the Bank has adopted a new lending instrument called the Adaptable Program Lending (APL). The SPSR includes a set of energy efficiency and DSM initiatives whose goals are to:

- Improve power availability and quality by reducing losses and improving the overall efficiency across all consuming sectors
- Develop a flatter load shape through the use of efficiency measures, innovative tariffs and other load management techniques
- Utilize the customer-owned on-site generation and cogeneration facilities to reduce shortages and add equipment such as capacitors, transformers and voltage regulators to improve power quality

The bank is working with a number of bilateral donor agencies that are providing Technical Assistance (TA) funds to support these activities.

The Asian development Bank has undertaken two major projects. In cooperation with the Dutch government, which provided a grant of $ 3 million. ADB started a project with the Industrial Credit and Investment Corporation of India (ICICI) as the Executing Agency. Six major industry groups were studied – sugar, paper, glass and ceramics, fertilizer, textiles and cement. As a result of this effort, ADB is now developing a $ 200 million EE Loan Program which will be implemented in 2002.

ADB also initiated a project with the Industrial Development Bank of India (IDBI) to study energy efficiency improvements in 11 industrial sectors, and to establish a line of credit for small to medium enterprises (SMEs) for financing EE improvements. The total amount of funds is $ 150 million, and $ 143 million of this loan has been committed in 25 EE projects, with minimum energy savings of 18%, and some industries showing savings in excess of 45%.

The U.K. Department of International Development (DfID) has funded TA projects for incorporating DSM activities in the restructuring and reform process in the states of Orissa and Haryana. Other bilateral donor agencies have also participated in energy efficiency activities in India. These include the Canadian International Development Agency (CIDA), and the Danish, Norwegian, Dutch, and German aid agencies.

Industry and Trade Associations

Two associations, the Confederation of Indian Industry (CII) and the Federation of Indian Chambers of Commerce (FICCI), have been very active in promoting energy efficiency.

CII activities have included energy summits and workshops, development of benchmarks for energy consumption, initial development of certification procedures for energy auditors, energy efficiency manuals, and a national energy efficiency awards program. CII has also established a working group on energy labeling.

FICCI activities have focused on small to medium enterprises (SMEs). Programs include cluster audits (technical diagnostic studies for clusters of industrial firms) and financing mechanisms for SMEs. FICCI has also developed a large database on energy efficiency including audit manuals, best practices guidebooks, and a technology options database.

NGOs

Two NGOs working in the energy field are the Council of Energy efficiency Companies in India (CEECI) and the Consumer Education and Research Center (CERC). CEECI was established by CONSERVE (a not-for-profit NGO dedicated to promoting energy conservation and efficient use of energy in India), with technical assistance from the Alliance to Save Energy using USAID funds. CONSERVE's activities have focused on

addressing the major barriers to EE. A major effort has been the publication of a Directory of Energy Efficiency Companies in India. This Directory includes over 200 organizations.

CERC was founded by Mr. Maubhai Shah approximately 20 years ago and has achieved some success in establishing a credible track record as an independent, consumer-oriented product testing organization. CERC is similar to "Consumer Reports" in the U.S. although on a much small scale. CERC publishes *Insight*, a publication that provides articles on the safety and performance of household appliances and compares them with manufacturers' claims. CERC has been promoting the need for increased EE in the domestic sector as this load is growing significantly with the introduction of previously unavailable and/or unaffordable home appliances (e.g., air conditioners, clothes washers).

Energy Service Companies (ESCOs)

A number of energy service companies (ESCOs) have been established in India. These include two joint ventures of Indian and U.S. ESCOs, INTESCO Asia Limited) and Thermax-EPS Limited, and two other ESCOs – Tata Honeywell, the Indian affiliate of the U.S. controls company, and the ESCO established by the DCM Shri Ram Consolidated Group. A number of other Indian organizations, including M.K. Raju Consultants, Dalal Consultants, Kirloskar Consultants, and Kinetics India, have undertaken ESCO-type projects.

The experience of these organizations has been quite mixed. While the ESCO and performance contracting concept has been generally well received by large energy users, few performance contracting projects have actually been implemented.

C. POTENTIAL FOR ENERGY EFFICIENCY IN INDIA

(to be added)

D. KEY MARKET DRIVERS AND BARRIERS

The application of the MMEE framework to India has led to the identification of the following market drivers and barriers:

Macro-Economic and General Business Conditions

The following conditions are favorable to the development and sustainability of markets for energy efficiency services:

- Democratic political system, although the Central government has been somewhat unstable
- Stable economy
- Adequate financial and business infrastructure

- Reasonable taxation policy with some tax incentives for energy efficient equipment
- Somewhat stable currency (better than neighboring Asian countries)
- Legal system conducive to contracts and agreements (although enforcement is cumbersome)

The following factors are less conducive and represent barriers that need to be overcome:

- Current business practices and culture do not promote EE. which is viewed primarily as a technical (or engineering issue) not critical to the mainstream business operations. EE is NOT considered a "Boardroom Issue".
- Lack of demonstrated and articulated commitment to GCC concerns.

Regulatory and Policy Considerations

The key regulatory and policy considerations are as follows:

- **National Commitment to EE** – The government of India has long recognized and publicly articulated the benefits of energy efficiency and the need for energy efficiency as a national policy tool. A national Energy Conservation Bill has finally been drafted and will be presented to the new cabinet and Parliament.
- **Privatization** – Significant privatization activity is underway in some of the States. Orissa, Haryana, Uttar Pradesh, Gujarat, and Andhra Pradesh are aggressively moving towards privatization of the electricity sector.
- **Regulatory Incentives** – India passed the Electricity Regulatory Commissions Act in 1998, which established the Central Electricity Regulatory Commission (CERC) and enables the states to establish State Electricity Regulatory Commissions (SERCs). While the enabling legislation provides the SERCs the authority to develop incentives (and/or disincentives0 that will promote and facilitate energy efficiency, none of the commissions have yet established any such regulatory initiatives.
- **Codes/Standards** – There are no existing building codes or standards for major energy equipment. The EE Bill contains provisions for establishing codes and standards.
- **Pricing Signals** – In all states, prices to residential and agriculture sectors are subsidized. Industry prices are high.
- **Subsidies and Cross-Subsidies** – In most states, there are significant subsidies and cross-subsidies in energy prices.
- **Importing EE Equipment** – Some (but not all) EE equipment is exempt from tariffs and duties. However, much EE equipment is manufactured locally.

Customer Factors

- **Awareness of Benefits of EE** - Small energy users do not recognize the benefits of EE and lack information on the techniques of EE. Executives of large energy-using organizations, while being aware of the potential benefits of EE, do not consider EE as being a "business issue" worthy of consideration at the Board level. Also, many customers still believe in minimizing first cost when purchasing energy using equipment, rather than consider the life cycle costs.
- **Information on EE Technologies, Products and Equipment** - NPC, CII, FICCI and other industry organizations have made important efforts to provide information to industrial energy users on EE technologies, products and equipment. However, additional efforts are needed, particularly for educating residential and small commercial consumers. An important issue is that many energy consumers feel that if EE is nationally important, the government should pay for it.
- **Perceived Risk of EE Technologies** - The lack of knowledge or experience with energy efficient technologies creates a perception of risk that inhibits the end users from investing in such technologies. Most Indian industrialists are generally unwilling to be the first to invest in a new technology.
- **Acceptance of EE Service Providers by End-Users** - The energy services industry is still in its infancy in India, and end-users are not sufficiently familiar with the concept to adopt performance contracting using ESCOs.
- **Awareness of GCC Benefits of EE** - The benefits of EE projects for addressing GCC concerns are not well articulated in India.
- **Credibility of EE Service Providers** - Energy end-users in India do not yet have a positive view of the credibility of the energy efficiency service providers and the value they bring.
- **Hassle-Free Installation** - For industrial consumers, there is a perception that the implementation of EE projects often interrupts the production process, and therefore there is a resistance towards such projects wherever industrial mangers are under pressure to produce more.
- **Efficient End-User Decision Processes** – Inefficiencies in the decision-making process lead to inadequate consideration of energy-related factors and limit the implementation of energy efficiency in industry. Similarly, decisions by residential and commercial consumers are based on many factors unrelated to EE.
- **Champions or Promoters of EE Ethic** - There are very few "champions" of the energy efficiency ethic in India.
- **Successful Business Model of EE Service Delivery** - The energy services industry in India is relatively new, and the existing business culture and infrastructure are not supportive to create successful "business models" for energy services delivery by the private sector.

- **Attractive Payback Periods** - Studies of energy efficiency potential and related technologies have clearly demonstrated that there are numerous excellent opportunities for implementation of EE projects. However. despite apparently attractive economics, many EE projects do not get implemented.
- **Availability of Internal Capital for EE Projects** – Energy efficiency is mostly low on the priority list of energy consuming organizations, and therefore. cannot compete effectively for scarce internal capital resources.
- **Recognition of Importance of Energy Costs** - Most large industrial and commercial consumers appear to have recognized the importance of energy costs in their operations, and the need to control and reduce these costs. With respect to the smaller residential and commercial customers, there is a lesser degree of realization of the importance of energy costs.
- **Transaction Costs** - The "transaction costs" faced by energy consumers trying to implement EE projects are often quite high.

Financing of EE Projects

- **Availability of External Funds for EE Projects** – Donor agencies have made funds available for EE projects and have attempted to develop financing mechanisms programs for channeling such funds. However, there has been limited success in these efforts.
- **Willingness of Financial Institutions to Consider EE Projects** - Most financial institutions in India generally do not have good knowledge, understanding, or experience with EE projects.
- **Low Pre-Development and Transaction Costs to Prepare Bankable Projects** - The costs involved in identifying and qualifying projects. and conducting the needed feasibility assessments, are high relative to the size of the investment in the EE equipment or products.
- **Enhancing the Creditworthiness of Some End-Use Customers** - Many owners of facilities economically attractive EE projects, (particularly small to medium size enterprises or SMEs) may not be considered creditworthy by financial institutions due to their small size, weak financial structure, or lack of experience with project financing.

Market Delivery Channels

- **Availability of EE Technologies, Products, and Equipment** - Most types of energy-efficient technologies, products and equipment are either readily available in India or can be imported relatively easily.

- **Presence and Capabilities of Energy Service Companies (ESCOs)** - The ESCO industry in India is in its infancy, and few ESCO projects have been successfully completed.
- **Supporting Infrastructure to Assist Energy Service Companies (ESCOs)** - Some of the supporting infrastructure to assist the implementation of EE projects exists, but this is quite inadequate relative to the size of the market.
- **Transfer of Successful EE Technologies** -. Many technology transfer activities have been undertaken in India with the help of donor agencies.

E. PRELIMINARY STRATEGY FOR MOVING THE MARKET

The preliminary strategy outlined herein is summarized below.

ENABLING POLICY AND REGULATORY FRAMEWORK

National Energy Efficiency Legislation

The government should enact national energy efficiency legislation. To be effective, such national legislation should contain the following types of provisions. Many of these provisions are already incorporated in some form in the current version of the Energy Conservation Bill.

- Establishment of the Bureau of Energy Efficiency (BEE) as a nodal agency to coordinate and promote government activities related to EE.
- Authorization for the BEE to work collaboratively with industry organizations to develop standards and benchmarks for energy efficiency on a sector by sector basis, and also to establish voluntary targets for energy efficiency
- Empowerment of the BEE to impose mandatory audits that would be phased in if the progress towards meeting the voluntary targets in unsatisfactory
- Establishment of mechanisms for data collection, and analysis of the data to develop and publish the standard s and benchmarks and to monitor progress towards the voluntary targets
- Development of a program for training and certifying energy auditors and energy managers

Codes and Standards

The government should establish minimum energy efficiency standards and norms for major energy consuming equipment, and a labeling scheme for appliances and equipment. Also, the government should establish Central Building Codes for new construction require all Central government facilities to abide by these codes, and develop guidelines for adapting the Central Building Codes to the State levels. Another important area is the

establishment of standards, norms, and/or benchmarks for major energy consuming sectors.

Taxation and Tariff Policies

The government should use taxation policy for facilitating and promoting energy efficiency markets. Possible incentives include extension of the 100% depreciation rule to all energy efficiency equipment, provision of tax incentives for local manufacturing of EE products, education or elimination of customs duties on EE equipment. Also, the government should evaluate existing tax barriers (such as any Octroi or other taxes that may limit flow of energy efficiency equipment across states) and make recommendations to appropriate agencies for any desirable changes that would facilitate market implementation of energy efficiency projects.

Emphasizing the Linkage between Energy Efficiency and the Environment

The new Bureau of Energy Efficiency (BEE) should have the responsibility of working closely with the Ministry of Environment to develop appropriate collaborative effort to promote the benefits of EE to meet national environmental goals and commitments.

Regulatory Initiatives

The BEE should be assigned the responsibility of developing and recommending guidelines and procedures for SERCs to provide appropriate incentives and procedures that would facilitate the promotion and implementation of DSM and energy efficiency measures by the distribution entities regulated by the SERCs.

Establishment of Energy efficiency Targets for Government Facilities

The Central and State governments should establish targets for improved energy efficiency in government facilities.

Collaboration and Coordination with Other Agencies

The Central government should establish an Inter-Ministerial coordination mechanism that would require frequent consultations among the Bureau of Energy Efficiency and appropriate other agencies and ministries.

ACTIONS TO DEVELOP A MARKET FOR ENERGY EFFICIENCY

Government Procurement

The BEE to develop guidelines and procedures that will incorporate Life Cycle Analysis (LCA) principles for procurement of designated energy-using equipment using Central or State government funds.

Establishment of an Energy Efficiency Fund

The government should create the Central and State Energy Conservation Funds and leverage other financing resources from donor agencies or from public or private sector financial institutions to subsidize audits and/or partially fund energy efficiency implementation activities. BEE should also establish a "revolving fund" for loans or grants (on a competitive basis) to customers, ESCOs, NGOs, and/or industry or consumer associations, to implement energy efficiency projects. To achieve the maximum level of leveraging, it may be useful to require the BEE to appoint a fund manager to raise resources (from domestic and international investors, bilateral aid agencies, MDBs, IFC, etc.) and allow for the use of innovative lending instruments.

ACTIONS TO PROMOTE INFORMATION AND AWARENESS

Publication of Energy Efficiency Benchmarks

BEE should update the database on energy consumption per unit of production for major industry groups publish energy efficiency benchmarks based on this data.

Information and Education of Financial Institutions

The BEE should inform and educate financial institutions (FIs) on the benefits of energy efficiency and provide information on the energy efficiency benchmarks and norms, so that the FIs can incorporate energy efficiency considerations in their lending decisions.

Public Awareness and Information Campaigns

BEE needs to initiate efforts to further inform and educate the public regarding the methods and techniques of energy efficiency and the need for an "energy conservation ethic".

Establishment of a National Energy Efficiency Awards Program

The government should develop and adopt a program of nominating, recognizing, and rewarding firms that have successfully implemented energy efficiency projects.

INITIATIVES TO DEVELOP ENERGY SERVICE DELIVERY INFRASTRUCTURE

Facilitating the Establishing an ESCO Trade Association

The existing ESCO industry in India is in a nascent stage. The government should provide assistance for the establishment of an ESCO Association along the lines of the associations that have been established in Egypt and Brazil.

Development of a Training and Certification Program for Energy Auditors and Energy Managers

A training and certification program addressed to the needs of energy management in large energy consuming facilities should be established.

Facilitating Financing of EE Projects

Actions should be taken to facilitate financing of EE projects, including the establishment of Central and State Energy Efficiency Funds, leveraging resources from donor agencies, educating financial institutions on energy efficiency projects, and developing procedures and guidelines for donor agencies and major public sector financing organizations for facilitating the participation of energy service delivery organizations in projects financed by these institutions

Development of Financing Mechanisms to Finance Small Projects

Mechanisms such as financial intermediaries and project aggregation need to be developed and demonstrated in the Indian market to reduce the transaction costs related to financing of EE projects.

Government Procurement of EE Services

Large Central and state government facilities in India should procure energy services performance contracting (ESPC) services delivered by ESCOs.

Development and Demonstration of "Business Models" of EE Implementation

The demonstration of replicable "business models" that provide illustrations of how such projects can be designed, bankable proposals prepared, financial closings completed, and projects implemented, will be of tremendous value to energy users and ESCOs.

Development of Standard Contracts and Agreements for EE Services Contracts

To facilitate performance contracting and ESCO projects, there is a need for developing standard contracts and agreements adapted to the Indian business and legal system.

Development of Guidebook for Preparation of Bankable Projects

ESCOs and other energy efficiency service providers need to have a guidebook for the preparation of bankable projects that would be more understandable to financial institutions, and thereby increase the probability of successful financing of such projects.

II. COUNTRY PROFILE

A. INTRODUCTION

The Republic of India, located in Southern Asia, is the world's second most populated country, with a population of about 984 million (in 1998) and a population growth rate of about 1.7%. India is the world's largest democracy, with a bicameral Parliament or Sansad consisting of the Council of States or Rajya Sabha (a body consisting of not more than 250 members, up to 12 of which are appointed by the President, and the remainder are chosen by the elected members of the state and territorial assemblies); and the People's Assembly or Lok Sabha (545 seats; 543 elected by popular vote, 2 appointed by the President). The President elected by an Electoral College consisting of the elected members of both houses of Parliament and the legislatures of the states. The Prime Minister is elected by the parliamentary members of the majority party following legislative elections. Politically, India is subdivided into of 25 States and 7 Union Territories.

India is the world's seventh largest energy consumer, and the energy consumption is growing rapidly to keep pace with the population and economic growth. To keep up with the increasing demand for energy, India is planning major energy infrastructure investments, particularly for electric power and imports of Liquefied Natural Gas to support power projects. The country has traditionally relied on coal, primarily from domestic sources, for production of electric power.

In recent years, most of the Indian states have been unable to meet the increasing demand for electric power, and shortages and curtailments have been quite common. Energy efficiency has been receiving increasing attention and a national Energy Conservation Bill has been drafted and will be presented to the cabinet in the near future.

B. ECONOMIC BACKGROUND

India's economy encompasses traditional village farming, modern agriculture, handicrafts, a wide range of modern industries, and a multitude of support services. About 67% of India's labor force work in agriculture, which contributes 25% of the country's GDP.

The 1990's have been a time of rapid economic transition in India. After several decades of pursuing protectionist "import substitution" trade policies and placing severe limitations on foreign investment, India began to open up to foreign investment and trade. By the mid-1990's, India's real GDP growth rate had reached a rate of 7.4% (1995-96).

Policy changes have been implemented to encourage foreign investment. Tariffs on imported capital goods have been lowered, and in some cases eliminated (such as equipment for large-scale power generation projects). Restrictions on foreign ownership have been relaxed. Previously, foreign ownership had usually been limited to a minority ownership stake. Now, in many sectors, majority foreign ownership is permitted.

The reforms have provided new opportunities for Indian businesspersons and an estimated 300 million middle class consumers. The government has avoided debt rescheduling, attracted foreign investment, and revived confidence in India's economic prospects since 1991.

Significant political resistance to economic liberalization persists, and a strong element of the Bharatiya Janata Party (BJP), which was the leader in the national coalition government, supports a policy of "self reliance." Nevertheless, in office, the BJP-led government has not moved to reverse the course of economic reforms. Further reforms are expected to be delayed through 1999 until the ongoing elections are concluded, and a new permanent government takes office.

In 1998, in response to nuclear weapons tests conducted by India, the U.S. imposed sanctions against India. These sanctions slowed India's real GDP growth to 4.6% in 1998-99, but growth is expected to climb back to 5.5% in 1999-2000 and 6.0% in 2000-01. Net Foreign Direct Investment (FDI) flows have been affected by the sanctions, and foreign direct investment fell to $7.6 billion in fiscal 1998, down from $15.1 billion in 1997.

Many of the country's fundamentals, including savings rate (26% of GDP) and reserves (now about $30 billion), are healthy. India's exports, currency, and foreign institutional investment were affected by the East Asian crisis in late 1997 and 1998. Exports fell 5% in 1998 mainly because of the fall in Asian currencies relative to the Rupee. However, capital account controls, a low ratio of short-term debt to reserves, and enhanced supervision of the financial sector helped insulate it from near term balance-of-payments problems.

An overview of key economic statistics is provided below.

ECONOMIC OVERVIEW

Currency: Rupee
Exchange Rate (6/17/99): US$1 = 43.2 rupees
Gross Domestic Product (GDP, FY1998E): $479 billion
Real GDP Growth Rate (FY1998E): 4.6% (FY1999E): 5.5%
Inflation Rate (FY1998E): 12.8% (FY1998E): 7.8%
Current Account Balance (1998E): -$7.9 billion
Major Trading Partners: United States, Japan, United Kingdom, Germany, and Russia
Trade Balance (1998E): -$13.1 billion
Exports (1998E): $34.0 billion
Imports (1998E): $47.1 billion
Major Export Products: Gems and jewelry, engineering goods, clothing, cotton, textiles, leather and leather manufactures, iron ore, chemicals, software
Major Import Products: Petroleum and petroleum products, machinery, iron and steel, edible oils, chemicals, fertilizers
Monetary Reserves (4/99, non-gold): $28.3 billion
External Debt (1998E): $93.1 billion

NOTE: FY (Fiscal Year) 1998 is April 1, 1998 to March 31, 1999; FY1999 April 1, 1999 to March 31, 2000)

Source – U.S. Energy Information Administration

C. THE ENERGY SECTOR

The Legislative Framework

The legislative authority under Article 246 of the Constitution of India is split between the Union and the States with concurrent jurisdiction of both over some subjects. Of the subjects reserved for the Union or Central government, the following relate to energy.

- Atomic energy, and mineral resources necessary for its production
- Regulation and development of oil fields, mineral oil resources, and petroleum and petroleum products
- Regulation of mines and mineral development as declared by the Parliament
- Regulation of labor and safety in mines and oil fields
- Regulation and development of inter-state rivers

Concurrent jurisdiction is mentioned in only one major energy-related subject, i.e. electricity.

Public sector control has been dominant in the energy sector. Administered pricing regimes are still in place for electricity, most petroleum products, including crude oil produced in the country, and the bulk of coal sales. Most of the capacity in electric power generation, the entire capacity in transmission, and the bulk of the capacity in distribution is either with public sector corporations, owned, either by the Central or the state governments, or the state electricity boards (SEBs). Coal production is entirely in the public sector. Similarly, the bulk of exploration and production (E&P) for oil and gas, and refining for oil, is in the public sector.

Restructuring and Privatization

The power sector has seen rapid changes since 1991 when the entry of private power companies was facilitated. The entry of private power generators is now actively sought by the state governments and some governments are contemplating privatization of existing distribution networks. A proposal for the entry of private entrepreneurs in the transmission sector is also under consideration. A substantial portion of the incremental capacity in the Ninth Five Year Plan is expected to come from private initiatives.

In the petroleum sector, the New Exploration Licensing Policy announced in early 1997 has facilitated the entry of the private sector, both domestic and foreign, into E&P of oil and gas. A significant share of the increase in refinery capacity will be in the private or joint sectors.

In the coal sector, private enterprise has been permitted to re-enter after more than two decades of public sector dominance. Currently, only coal users like power and steel plants have been permitted to mine coal for captive use. However, further rationalization and restructuring of the sector is under the consideration of the Central government.

Energy-Related Organizations of the Central Government

The major Central Government agencies with responsibilities in the energy sector are listed below.

Department of Atomic Energy - The Department of Atomic Energy is entrusted with the responsibility of designing, erecting, commissioning, and operating nuclear power plants.

Ministry of Power - The Ministry of Power (MoP) is concerned with perspective planning, policy formulation, processing investment needs of public sector projects, monitoring power projects, training and manpower development, and conservation. Many agencies assist the Ministry in executing its policies and programs:

- The Central Electricity Authority, constituted under the Electricity (Supply) Act 1948, advises the Ministry on technical and economic matters.
- The Rural Electrification Corporation was set up in 1969 with the primary objective of providing financial assistance for rural electrification programs.
- The National Hydro-electric Power Corporation, incorporated in 1975, is instrumental in planning, promotion, and development of hydroelectric power in the country.
- The National Thermal Power Corporation is the premier thermal power generator of the country with around 20% of the total generation capacity.
- The Power Finance Corporation was incorporated in 1986 with the objective of mobilizing capital from non-budgetary sources for providing term finance for power projects.
- The Power Grid Corporation of India Limited, incorporated in 1989, is the main provider of extra high-voltage and high-voltage transmission networks in the country.
- The Energy Management Center, established in 1989, is an executive agency under the Energy Conservation Cell in MoP, which designs and coordinates the implementation of energy management programs.

Ministry of Coal - The Ministry of Coal is responsible for the development of coal and lignite reserves in India. The key related organizations are public sector undertakings (PSUs) such as the Coal India Limited and its subsidiaries, and the Neyveli Lignite Corporation Limited. Coal India Limited is mainly responsible for monitoring the performance of its subsidiary companies, long-term planning, conservation, and R&D of coal mining. The subsidiary companies are responsible for commissioning and execution of new and ongoing coal-mining projects.

Ministry of Petroleum and Natural Gas - The Ministry of Petroleum and Natural Gas is responsible for exploration and production (E&P) of crude oil and natural gas as well as for refining, distribution, and marketing of petroleum products and natural gas. Its role also extends to exports and imports of crude oil and petroleum products. These functions are performed through various PSUs. Engineers India Limited provides engineering consultancy services for the development of petroleum, petrochemicals, ocean engineering, and other related chemical industry development programs. The Gas Authority of India Limited was incorporated in 1984 with the primary objective of constructing the cross-country Hazira-Bjapur-Jagdishpur gas pipeline. The Oil and Natural Gas Corporation and Oil India Limited are the two PSUs engaged in E&P of oil with the former having a dominant share. The Indian Oil Corporation, the Hindustan Petroleum Corporation Limited, and the Bharat Petroleum Corporation Limited refine and market all the refined products of indigenous refineries as well as imported petroleum products. Ministry of Non-conventional Energy Sources

Ministry of Non-conventional Energy Sources (MNES) – MNES was created in 1992, by separating the erstwhile Department of Non-conventional Energy Sources from the MoP. The MNES is responsible for the development of new and renewable sources of energy such as biogas, biomass, solar, wind, small hydro power, ocean, geothermal, alternate fuels, hydrogen, and draught animal power. The Ministry's programs are implemented through the state renewable energy agencies, electricity boards, R&D institutions, industries, and non-governmental organizations. The Indian Renewable Energy Development Agency (IREDA), acts as the implementation arm of MNES and offers both technical know-how and financial assistance in promoting renewable energy technologies.

Energy Policy Unit of the Planning Commission - The Planning Commission is the think-tank of the Government and is responsible for framing policies for the growth and development of the country. Within the Planning Commission, the Energy Policy Unit aims to ensure adequate energy supplies at a minimum cost, achieve self-sufficiency in energy supplies, protect the environment from the adverse impact of injudicious use of energy resources, and develop capabilities for the formulation of sustainable energy policies by the Government.

Energy Resources

India has significant indigenous energy resources, particularly coal. Petroleum consumption exceeds domestic production, and the country relies on large amounts of oil imports. Electricity production has not been able to meet increasing demand and significant shortages and curtailments are quite common in every region of India.

Electricity

India is investing heavily in new electric power generation capacity, as total generation is about 30% below demand. Although 80% of the population has access to electricity, power outages are quite common. The government has targeted capacity increases of 47,000 megawatts (MW) between 1997 and 2002, split evenly between state companies and the private sector. India has estimated total additions of 111,500 MW will be needed in the 1997-2007 period covered by the current and following five-year Plans.

India's State Electricity Boards (SEBs), which run the power distribution infrastructure and most current generating capacity, are mostly in poor financial health, which has limited their ability to fund investment in new infrastructure. One reason is the sale of power at subsidized rates, which do not cover costs (particularly in the agricultural sector). Another problem is the high level of transmission and distribution losses, which are estimated at 21%, as opposed to the international average of 10%. Average utilization of generating capacity stands at only slightly more than 50%. With World Bank assistance, two states (Orissa and Haryana) have begun to implement reforms. Several other states (Andhra Pradesh, Rajasthan, Uttar Pradesh, and Gujarat) are also initiating reform and restructuring programs. The restructuring process has been most advanced in Orissa, where the unbundling of the electricity sector has been completed and the distribution sector has been privatized through a competitive bidding process.

While there is not currently a unified national power grid, India plans to link the SEB grids eventually, and has set up a state company, Powergrid, to oversee this process. India has established a Central Electricity Regulatory Commission (CERC), and enacted legislation for establishing State Electricity Regulatory Commissions (SERCs) to set tariffs and promote competition.

India's government is currently encouraging the construction of "mega-projects," defined as plants with capacity of more than 1,000 MW for thermal plants and more than 500 MW for hydroelectric plants. In July 1998, the government announced an easing of rules related to foreign investment in the power sector. Proposals for investments up to 15 billion rupees (about $350 million) involving up to 100% foreign equity will now be approved automatically. Automatic approval will be given for investments in generation or distribution from hydroelectric, coal, lignite, oil, or gas power plants, but not for nuclear plants and associated distribution networks.

Since the SEBs are in poor financial condition, some foreign investors have demanded and received guarantees of their payments from the Indian state governments, and in a few cases from the national government as well. Demand risk is minimized by "take or pay" contracts, which guarantee a minimum level of payment regardless of actual usage.

Oil

Oil accounts for about 30% of India's total energy consumption. The majority of India's roughly 4.0 billion barrels (down from 4.3 billion a year earlier) of oil reserves are located in the Bombay High, Upper Assam, Cambay, Krisha-Godavari, and Cauvery basins. The offshore Bombay High field is by far India's largest producing field, with production of 257,000 barrels per day (bbl/d) in 1997. India's average production level for 1998 is estimated at 661,000 bbl/d. India imported 1.1 million bbl/d in 1998, which accounted for about 60% of total oil consumption. Nigeria was the largest source of Indian imports in 1998, accounting for roughly 215,000 bbl/d of Indian imports.

Future oil consumption in India is expected to grow rapidly, to 1.9 million bbl/d by 2000 and 3.1 million bbl/d by 2010. India's oil import expenditure is expected to rise from $5.9 billion in 1998/99 to $7.9 billion in 1999/2000, due to rising imports and a rise in prices. India is attempting to limit its dependence on oil imports somewhat by expanding domestic exploration and production. To this end, the Indian government is pursuing the New Exploration Licensing Policy (NELP), announced in 1997, which permits foreign involvement in exploration, an activity long restricted to Indian state owned firms.

Recovery rates are another part of the supply problem for India. Recovery averages only 28% in currently producing Indian fields, well below the world average. India hopes that allowing foreign investment will bring in proprietary technology that is not available to Indian State firms, and thereby increase overall recovery rates.

In a restructuring of the state-owned oil sector, two of the main firms, India Oil Corporation (IOC) and Oil and Natural Gas Corporation (ONGC), have formed a strategic alliance and swapped 10% of their respective shares. As ONGC is an upstream producer and IOC is a downstream refining and distribution firm, the stated aim of the alliance is to create an entity which can compete with the major multinational oil firms.

In the past decade, India has imported a large quantity of refined products, as it did not have the refining capacity to keep up with growing demand. A number of new projects currently underway, however, are projected to increase India's domestic refining capacity enough to catch up with domestic demand by 2002.

While retail gasoline sales are still controlled by state firms, several multinationals have entered the Indian lubricants market, which was deregulated five years ago. Over one third of the market is now held by such firms as Shell, Exxon, and Caltex. While these operations are relatively small, they are seen as allowing the majors to study the Indian market, establish brand recognition, and prepare for the eventual deregulation of the Indian retail petroleum products sector.

Natural Gas

Indian consumption of natural gas has risen faster than any other fuel in recent years. From only 0.6 trillion cubic feet (Tcf) per year in 1995, natural gas use is projected to reach 1.2 Tcf in 2000 and 1.9 Tcf in 2005. Increased use of natural gas in power generation will account for most of the increase, as the Indian government is encouraging the construction

of gas-fired electric power plants in coastal areas where they can be easily supplied with liquefied natural gas (LNG) by sea. Given that domestic gas supply is not likely to keep pace with domestic gas demand, India will have to import most of its gas requirements, making it one of the world's largest importers of LNG.

India is investing heavily in the infrastructure required to support increased use of natural gas, building LNG terminals and pipelines. It is also reducing the flaring of gas produced as a by-product of oil production. The largest state sector projects will be conducted by Petronet, a joint venture between ONGC, the Gas Authority of India Ltd. (GAIL), and the National Thermal Power Corporation (NTPC). IOC, which was originally to be included in the Petronet consortium but was dropped when the Indian Petroleum Ministry restructured the deal, may build some separate projects of its own.

Almost 70% of India's natural gas reserves are found in the Bombay High basin and the state of Gujarat. Current projects include enhancing gas production at the Tapti fields and recovering previously flared gas at the Bombay High oilfield.

Coal

Coal is the dominant fuel in India, satisfying more than half of India's energy demand. Power generation accounts for about 70% of India's coal consumption, followed by heavy industries. Consumption is projected to increase to 465 million short tons (Mmst) in 2010, up from 342 million in 1997. India is the world's third largest coal producer (after the China and the United States), so most of the country's coal demand is satisfied by domestic supplies. Indian coal has a high ash content and low calorific value, so coking coal must be imported. Major Indian coal fields are found in Bihar, West Bengal, and Madhya Pradesh.

The Indian government controls almost all coal production, which has been plagued by low productivity, distribution problems, and loss of markets to higher quality, less expensive imports. Nearly all of India's 390 mines are under Coal India Ltd. (CIL), which accounts for about 90% of the country's coal production. A change in policy has been proposed by the BJP government, however, which would allow Indian private sector firms (with only minority interest on the part of foreign investors) to develop new coal mines. Current policy allows private mines only if they are "captive" operations that feed a power plant or factory. Parliamentary approval of the change is pending.

Prior to the imposition of sanctions, India had signed loan agreements with the World Bank and Japan's Export-Import Bank for a $1.6 billion coal sector rehabilitation program. It aims to modernize and expand existing mines to produce an additional 110 Mmst of power grade coal by 2001-2002. The World Bank loan agreement also requires India to prepare a revised regulatory framework for the coal industry by September 1999.

Renewable Energy

The Indian government is actively promoting the application of non-conventional sources of energy to supply the country's energy needs, including wind, hydro, biomass, and solar photovoltaic (PV) technologies. The Indian Renewable Energy Development Agency (IREDA) operates under the Ministry of Non-Conventional Energy Sources.

Estimates of India's renewable energy resources and market potential (based on data from the U.S. Energy Information Administration's Renewable Energy Annual 1997) are provided below:

- Solar - India's solar resources are about 4.5 kilowatt-hours per square mile. Market potential is estimated at 30 MW.
- Wind - India had 845 MW of wind generating capacity in 1997, ranking fourth in the world.
- Biomass - India's biomass resources are estimated at 17,000 MW, with market potential of 3,800 MW.
- Geothermal - Geothermal resources are estimated at 2,000-10,000 MW, but market potential is limited.

In addition, India estimates it has 86,000 MW of hydroelectric generating potential, only 26% of which has been tapped.

Key Energy Statistics

Proven Oil Reserves (1/1/99): 4.0 billion barrels
Oil Production (1998E): 659,000 barrels per day (bbl/d)
Oil Consumption (1998E): 1.8 million bbl/d
Net Oil Imports (1998E): 1.1 million bbl/d
Crude Oil Refining Capacity (1/1/99): 1.1 million bbl/d
Natural Gas Reserves (1/1/98): 19.0 trillion cubic feet (Tcf)
Natural Gas Production (1997E): 0.7 Tcf
Natural Gas Consumption (1997E): 0.7 Tcf
Recoverable Coal Reserves (1998E): 82.3 billion short tons
Coal Production (1997E): 329 million short tons (Mmst)
Coal Consumption (1997E): 342 Mmst
Net Coal Imports (1997E): 13 Mmst
Electric Generation Capacity (1/1/97): 97 gigawatts (GW), including 73 GW thermal, 21 GW hydro, 2 GW nuclear
Electricity Generation (1997E): 426 billion kilowatthours (80% conventional thermal; 18% hydro; 2% nuclear)

Source – U.S. Energy Information Administration

III. ENERGY EFFICIENCY PROGRAMS AND POLICIES

A. OVERVIEW

India has long recognized that energy plays a crucial role in national economic development. The per capita energy consumption in India is very low, particularly compared to developed countries, while the energy consumption per unit of GDP is high. The development of energy resources has always been considered a national priority, but has fallen short of the needs to support the economic development. The insufficiency of energy supplies to meet energy demands, particularly in the electric power sector, has been a serious issue from the perspective of industrial growth.

Both government and industry have publicly stated the benefits of improvement in energy efficiency. Improving the efficiency of energy extraction, conversion, transportation, distribution, and utilization can lead to significant improvements in productivity, competitiveness, and job creation. More recently, the linkages between energy and the environment and the benefits of energy efficiency for both the local and the global environment have also been recognized.

During the last several decades, a number of government and industry organizations, with the assistance of multilateral and bilateral donor agencies, have undertaken a wide range of activities to develop and promote energy efficiency activities. This section provides an overview of some of the more salient such activities. The section is subdivided by the nature or type of organization, including:

- Central government agencies
- Donor agencies
- Industry and trade associations
- Non-government organizations (NGOs)
- Energy service companies (ESCOs)

B. CENTRAL GOVERNMENT AGENCIES

The National Energy Conservation Bill

Efforts towards the development of a national energy conservation bill started in 1986 with the Advisory Board on Energy. The Board was asked by the government to develop and enact suitable legislation to promote energy conservation based on the experience of other

countries. The Board entrusted this task to the Indian Law Institute (ILI). The ILI recommended comprehensive legislation (a draft "energy management law"), and suggested the establishment of a nodal organization called the National Energy Conservation Organization (NECO) to regulate energy use and mandate conservation of energy. This draft law provided fiscal incentives, disincentives and penalties and called for the creation of a fund for energy conservation, together with establishment of energy efficiency standards.

The Energy Management Center (EMC) was established in April 1989 by the Ministry of Power in collaboration with the European Union to promote energy conservation activities. The EMC serves as an executive agency of Ministry of Power. It has been focusing its attention on research, training of senior technical personnel and development of data on energy usage and dissemination of information to the main energy consuming sectors through workshop, seminars, multimedia, awareness campaign etc. EMC also helps in formulation of policy and designing of program on energy conservation and serves as a nodal point at the central level for monitoring and coordinating of energy conservation activities in the country.

In 1994 the Ministry of Power (MoP) set up an Inter-Ministerial Group to review the various legislative measures and to further explore the desirability of comprehensive legislation for energy conservation. This Group concluded that there was a need for legislation that would incorporate a number of important elements necessary for providing a "push" for energy conservation activities. The Group also stated that there were other elements that were essentially of an executive nature and need not be part of a legislative package.

The results of the recommendations of this Group led to the development of an initial draft of an Energy Conservation Bill. This Bill proposed the creation of the Bureau of Energy Efficiency in the Ministry of Power, and included provisions for:

- Mandatory energy audits
- Certification of energy auditors
- Building codes
- Standards and norms for energy consuming equipment and appliances
- Energy labeling
- Establishment of an energy conservation fund
- Information and awareness programs

In August 1998, the MoP established a one-man committee to review and make recommendations regarding the legal, administrative and financial framework for the Bureau of Energy Efficiency, and the roles of the Central government, State governments, and other government and non-government organizations engaged in various aspects of energy conservation. The commission consulted with a number of important stakeholders

and reviewed much background information form local and foreign sources. It made a number of recommendations on the Bill and presented a revised Bill.

This revised Bill, called the Energy Conservation Bill - 1998, was approved by the cabinet in early 1999. However, before it was presented to Parliament for approval, the Central government fell, and new elections were called.

Additional comments have been received by the MoP on the current version of the Bill, particularly relative to making some of the provisions of the Bill more "market-oriented". The MoP is considering these comments and is likely to develop another revision of the Bill to be presented to the new government when it is constituted in October 1999. After approval by the new cabinet, the Bill will be presented to Parliament.

National Productivity Council (NPC)

The National Productivity Council (NPC) has long been active in conducting energy audits and identifying energy efficiency opportunities. NPC has a staff of 45 energy experts and 40 environmental experts who assist industry.

NPC is assisting all industrial facilities. There are approximately 3000 large enterprises (Annual Revenue over Rs. 25 Crores or $ 6 million), 20,000 medium (Rs. 4-25 Crores, or $ 1 - 6 M) and 2.5 million small (under Rs. 4 Crores, or under $ 1M)

NPC initially focused on large industries. Extensive assessments of EE options have been conducted for 250 companies in 14 major industrial sectors. NPC estimates that over Rs. 250 Crores ($ 100 million) have been saved by 70 facilities that have invested in EE options. Unfortunately, little specific documented information is available on the implementation of these options and the resulting savings.

NPC believes that the technologies for energy savings are available in the Indian market. The key challenge is identifying the most suitable technologies and developing the appropriate implementation schemes. NPC further believes that funds are available for the right projects, but the problem is in the procedures for obtaining the funds that can take too long.

NPC is also working with SMEs where the audits are even more important. There is a lack of good audit manuals or technology profiles of the SMEs. NPC has worked with small plants in the paper industry (40-50 TPD) and assisted in identifying EE and cogeneration opportunities. Unfortunately, implementation has been limited due to the cost of capital being too high (18%). NPC is working with SIDBI to find financing for clusters of these enterprises. The German aid agency GTZ has also funded NPC to work with SIDBI for small enterprises.

Current focus is on paper, textiles, pesticides, and tannery industries. It is believed that these offer "tremendous potential" for EE. NPC assured us that a wide range of EE equipment is available in the local market at reasonable prices. Examples include:

- Motors
- Compressors
- Pumps
- Refrigeration equipment
- Boilers
- Burners
- Furnaces
- Cooling towers
- Heat exchangers
- Monitoring systems

NPC believes that utilities (SEBs) have not played a major role in promoting EE and should be targeted in the future.

The Energy Management Center (EMC)

The Energy Management Center was established in 1989 as an executive agency under the Energy Conservation Cell in MoP, which designs and coordinates the implementation of energy management programs. The EMC has initiated several interesting activities to overcome the barriers to EE implementation. The reactions to these initiatives illustrate some of the barriers.

- EMC sent letters to all the SEBs asking them to replace 40-Watt lamps with more efficient lamps. Certificates and test reports from the MoP showing the efficiency and demonstrating the benefits of the alternative lamps were also sent. After 8 months and many reminder letters only 5 SEBs had done any implementation.
- Attempts were made to stimulate the market for EE products through government procurement of EE equipment and appliances such as air conditioners, domestic water heaters, fans, water coolers, etc. The Director General of Supply was asked to develop guidelines for purchasing only efficient products (BIS approved products + x%). However, the lack of sustained effort and the inertia on the part of the govt. agency led to limited success
- EMC asked the Bureau of Indian Standards (BIS) to release information on the results of the tests of different appliances. However, BIS was unwilling to do this due to objections from the manufacturers and suppliers
- EMC funded the Center for Monitoring the Indian Economy (CMIE) to develop a database on the energy consumption per unit of product from information provided in the Annual Reports of 1700 publicly traded corporations. Unfortunately, this

activity was suspended due to lack of funds before the database was completed and any analyses could be done to develop benchmarks

- EMC funded the Federation of Indian Chambers of Commerce and Industry (FICCI) to develop a database on energy efficient technologies. FICCI has a website (www.bisnetindia.com) where some of the resulting information is available. This website has an "Energy Efficiency Information Center" which includes:
  - Energy Audit Manuals
  - Best Practice Guides
  - Indian Business News on Energy Sector
  - Business Opportunities
  - Energy Efficiency Company Profiles
  - Energy Efficiency Publication Index
  - Energy Conservation Calendar of Events

EMC was also responsible for drafting key elements of the Energy Conservation Law, including the following:

- Establishment of the Bureau of Energy efficiency (BEE). The EMC staff will be absorbed into the BEE.
- The BEE is likely to be organized into four sections
  - Labeling
  - Audits
  - Building Codes
  - Information Dissemination
- The initial version of the Law was mostly mandatory and was considered to be very difficult to implement. The second version is more enabling and is viewed to be easier to implement.
- Minimum Efficiency Standards – for domestic appliances and industrial equipment. The current draft includes non-mandatory standards with incentives for high efficiency items (such as 100% depreciation in the first year). BIS is assisting EMC in developing the standards
- Labeling – includes a pro-active approach to labeling
- Mandatory Energy Audits – for large energy users (including power stations, industrial plants, T&D systems, large commercial facilities, and transportation facilities)
- National Exam for Energy Auditors (analogous to Accountants) – the syllabus for such an exam is being developed by EMC in association with organizations such as CII, TERI, NPC, CEA, etc.)

- Building Code – The Central Building Research Institute is working on developing guidelines that can be adapted by the states to local conditions
- EMC and MoP are working closely with industry associations such as FICCI, CII, TERI, and with other Ministries in drafting the Law.

EMC is also working on capacity building for energy auditors. These activities include:

- Training in auditing and pre-investment studies
- Establishment of an information dissemination center in Bangalore
- Development of financing "transaction models"
- Development of a database and website

EMC is also initiating the following new projects

- A scheme for agricultural pump-set rectification including related financing models

Implementation of energy savings options in 3 industries, including the development of a mechanism for a self-sustaining financing model

C. DONOR AGENCIES

USAID Activities

The U.S. Agency for International Development (USAID) has long been active in the Indian energy sector. The USAID/India Energy Program began the 1960s with the financing and construction of 15 thermal power plants and several hydropower projects. Later the USAID program focused on science and technology development (in the 1980s), and privatization and technology commercialization (in the 1990s). Currently the major focus of the program is on greenhouse gas (GHG) emissions reduction.

The USAID program is based on its Strategic Objective # 4 – Increased environmental protection in energy, industry and cities through:

- Increased efficiency and decreased pollution in energy supply and use
- Pollution reduction in selected industrial sectors
- Improved urban environmental infrastructure building and services delivery in selected cities

The overall approach emphasizes technical assistance, training, partnerships, leveraging of resources, and commercialization. The key energy program areas are

- Efficient power generation
- Renewable energy
- Clean coal
- Utility and regulatory partnerships

- Energy Training Program (ETP)
- Clean Technologies Initiative (CTI)
- Demand-Side Management
- Regulatory reform and restructuring
- Energy conservation and commercialization (ECO)

The USAID is cooperating with the World Bank in the DSM/EE component of its State Power Sector Restructuring (SPSR) program (see below) in Haryana. This includes efforts related to DSM capacity building, agricultural DSM, biomass cogeneration, regulatory reform, and distribution systems improvement.

One of USAID's initiatives is the Program for Acceleration of Commercial Energy Research (PACER). This program works through a major development finance institution (ICICI) to provide conditional grants for market-driven research to develop energy-efficiency and renewable energy technologies with good potential for near-term success.

Another major effort is the Energy Management, Consultation, and Training (EMCAT) project, conducted during the period 1994 to 1999. EMCAT has included identification and support of policy reforms related to power sector regulation and restructuring, increasing investment in EE and DSM, promoting innovative financing of EE projects, ESCO training and trade missions, labeling of refrigerators and other activities to promote EE.

USAID is also participating in other broader energy development efforts including the Intra-regional cooperation in sustainable energy in South Asia (Bangladesh, Nepal, Pakistan, Sri Lanka, and India).

The most significant USAID activity related to energy efficiency is the ECO project. The project design for this five-year effort has been completed, and the project is expected to be initiated by early 2000.

The ECO project has the following broad objectives:

- Engage India more broadly in GCC actions
- Provide a flexible, long-term contractual vehicle to permit the USAID Mission to continue its efforts to improve energy efficiency (EE) in India
- Achieve increased environmental protection in industry by reducing waste and improving EE
- Help India's economic liberalization process by promoting market-oriented solutions for EE implementation
- Leverage World Bank and other donor funding for EE

- Assist in implementing President Clinton's Climate Change Action Plan by creating a policy and market environment that will achieve significant GHG reductions through more efficient energy production and use.

The project will consist of the following major components:

1. Energy Efficiency Policy and Institutional Reform
   - EE policy and institutional support
   - EE in consumer appliances
   - EE in government facilities and private buildings
   - Regulatory reform and restructuring
2. State-Level EE and Power Sector Reform
   - Utility DSM/EE capacity building
   - State EE financing schemes
   - DSM/EE in privatization of distribution
   - Efficient end-use applications in agriculture
3. EE Market Development and Financing
   - Technical and project structuring services
   - Financial incentives and credit enhancement
   - EE industry support
   - Efficient technology promotion
   - Market conditioning and promotion
   - Non-sugar cogeneration

World Bank Programs

During the 1980s and 1990s the World Bank (WB) followed a three-pronged approach for the power sector in India:

- Support to the Central government agencies for achieving sector-wide improvements
- Financing the investment needs of certain SEBs
- Financing existing private power utilities

While the WB loans helped to build power plants and transmission and distribution facilities, and the technical and financial performance of the Central government agencies

and private utilities was considered satisfactory, the performance of the SEBs was generally unsatisfactory. Most SEBs resisted pricing and tariff reforms, and their technical, financial and institutional performance continued to be well below international standards. The WB disbursed only $ 400 million of the total commitment of $ 1.8 billion to the SEBs.

The Bank asked several SEBs to incorporate demand-side management (DSM) and energy efficiency principles in their operations. A DSM planning project (that included development of marginal cost based tariff recommendations) was conducted using Bank funds by the Maharashtra SEB (MSEB). However, after the planning study was complete, there was no implementation of the study recommendations.

In the 1990s, the Bank, in cooperation with the Central government, initiated a program of power sector reforms. These reforms included State Power Sector Restructuring (SPSR) projects in Bihar, Haryana, Rajasthan, Uttar Pradesh, and Orissa. Of these, the Orissa effort has been the most advanced, with implementation of the restructuring taking place during the 1997 to 1999 period.

To assist the process of restructuring, the Bank has adopted a new lending instrument called the Adaptable Program Lending (APL). Under an APL, the bank can enter into a long-term agreement for providing financial assistance over an extended period to support the reform process. However, the loan funds are disbursed in increments, depending on the progress achieved at each step of the reform process. The Haryana SPSR, currently in process, was financed using the APL, and a large loan for Andhra Pradesh using APL is pending Board approval.

The SPSR includes a set of energy efficiency and DSM initiatives whose goals are to:

- Improve power availability and quality by reducing losses and improving the overall efficiency across all consuming sectors
- Develop a flatter load shape through the use of efficiency measures, innovative tariffs and other load management techniques
- Utilize the customer-owned on-site generation and cogeneration facilities to reduce shortages and add equipment such as capacitors, transformers and voltage regulators to improve power quality
- Enhance revenues by selling the savings achieved in low-tariff customers to meet unsatisfied demands in the high-tariff sectors

The Bank has worked with other donor agencies (such as the U.K. Department of International Development) to develop and implement investment projects in energy efficiency and DSM as a part of the SPSR program. The efforts have focused on

- establishing technical capabilities and skills and institutional mechanisms for identifying, designing, developing and implementing DSM projects
- Creating a load research function and developing load shape databases
- Developing and implementing demonstration projects

- Designing and implementing financial intermediation and on-lending procedures

The bank is working with a number of bilateral donor agencies that are providing Technical Assistance (TA) funds to support these activities. Examples include:

- Orissa – U.K. DfID
- Haryana – USAID
- Rajasthan – CIDA
- Andhra Pradesh - Norwegian AID agency

The Bank has also negotiated a loan (amounting to $ 30 million) in cooperation with the Global Environmental Facility (GEF) which is providing TA funds ($ 5 million) to the Indian Renewable Energy Development Agency (IREDA) to finance end-use efficiency projects using ESCOs and innovative financing techniques.

Asian Development Bank Activities

ADB's EE activities in India started in 1992. In cooperation with the Dutch government, which provided a grant of $ 3 million, ADB started a project with the Industrial Credit and Investment Corporation of India (ICICI) as the Executing Agency. Six major industry groups were studied – sugar, paper, glass and ceramics, fertilizer, textiles and cement. The French agency ADEME conducted audits of 45 industries and identified areas for EE improvement. Also with the assistance of CII and TERI, energy efficiency implementation manuals were developed, and seminars were conducted in three cities – Chennai, Mumbai, and Delhi. The results were disseminated to industry, government, financial institutions and consumers.

As a result of this effort, ADB is now developing a $ 200 million EE Loan Program which will be implemented in 2002.

In 1994, ADB initiated another TA with the Industrial Development Bank of India (IDBI) to study energy efficiency improvements in 11 industrial sectors, and to establish a line of credit for small to medium enterprises (SMEs) for financing EE improvements. The total amount of funds is $ 150 million, and the line of credit is being administered by IDBI. As of September 1999, $ 143 million of this loan has been committed in 25 EE projects, with minimum energy savings of 18%, and some industries showing savings in excess of 45%. Examples include conversion from the wet to the dry process in the cement industry, switching to modern looms in textiles, cogeneration and process improvement in sugar mills, and cogeneration in the paper industry. Separate sector-specific reports have been prepared for each of the 11 industries and are being published.

ADB's experience from these efforts indicates that:

- The potential for energy savings is high

- There is generally a lack of awareness of energy use and savings potential
- It is difficult to convince management to think of EE
- Management is often unwilling to change out equipment that is working even if it is 30 to 50 years old and is very inefficient.

Another very important lesson from ADB's experience is that IDBI lacked the capacity to identify and track projects and therefore spent little effort towards this end. According to ADB, the financial institutions need to develop a portfolio of eligible projects that can then be evaluated and funded with the MDB funds.

ADB has also been involved in regulatory reforms at the state level. ADB's experience in these activities has been somewhat mixed. The time lags involved in structural reform are long, and the State Electricity Boards (SEBs) are resistant to change. Customers are disillusioned with the services provided by the local SEB and have little trust in the SEB.

Much of ADB's reform activity has focused on the restructuring, disaggregation and corporatization of the SEBs. ADB is currently funding TA projects related to electricity restructuring in Gujarat and Madhya Pradesh. Also, ADB is cooperating with the World Bank in West Bengal, Andhra Pradesh, Uttar Pradesh, and Haryana.

ADB is also working with IREDA to fund renewable energy projects. A $ 100 million fund has been established (60 M for wind, 25 for bagasse cogeneration, 10 for biomass, and 5 for solar).

ADB has also funded another TA for environmental management at the state level. This TA focuses on clean technologies for environmental management in Gujarat and in Madhya Pradesh.

The U.K. Department Of International Development (DfID)

The U.K. Department of International Development (DfID) has been quite active in funded TA projects related to regulatory reform and restructuring. One of the largest such projects has been the restructuring of the power sector in Orissa. In addition to funding the reform and restructuring efforts, ADB also initiated a significant DSM project with the Orissa Grid Corporation (GRIDCO). This project included:

- Establishment of a DSM Cell within GRIDCO
- Training and capability building of the DSM Cell staff
- Development and implementation of a load research program
- Design and benefit/cost assessment of DSM program
- Identification and evaluation of a set of demonstration projects
- Development of bankable project proposals for World Bank financing

DfID feels that the DSM project in Orissa has met with limited success. This is partly due to the many barriers to energy efficiency and partly due to the inability of the TA contractor to develop bankable EE projects. A key issue encountered in the Orissa DSM project was the unwillingness of the recipient – GRIDCO – to on-lend the WB funds for EE projects in the private sector.

Discussions are currently underway to explore other financing mechanisms for disbursing the WB loan funds. Options include using the local office of the Industrial Development Bank of India (IDBI), the Ministry of Finance in Orissa or other state agencies to on-lend the funds. The on-lending process is complicated due to the WB's requirement that any agency involved in the process be vetted for creditworthiness by the WB, a process that takes a great deal of time and effort.

DfID is taking a cautious approach to DSM and EE in view of this experience.

Other Donor Agencies

Other donor agencies that have been active in EE projects in India include:

- The Canadian International Development Agency (CIDA) and the India-Canada Environment Fund – The Canadian organizations are involved in the restructuring activities in Rajasthan. The CIDA is also assisting the Energy Management Center in establishing a training and certification program for energy auditors. The Canadian Standards Association is providing technical assistance in the areas of standards and labeling.
- The Norwegian Aid Agency – supporting the restructuring activities (including agricultural energy efficiency improvement) in Andhra Pradesh
- The Dutch government – has assisted ADB in financing studies of EE in specific industrial sectors
- The Danish Aid Agency – in cooperation with the European Union, funded the initial establishment of the Energy Management Center.
- The German Aid Agency (GTZ) – has also cooperated with the EU in funding EE activities in India.

The UN-ESCAP conducted a workshop on Business Opportunities in Marketing Energy Efficiency in Delhi.

D. INDUSTRY AND TRADE ASSOCIATIONS

Confederation of Indian Industry (CII)

The CII has recognized that a very important barrier to implementing EE projects is the fact that while many corporate executives talk about it, it is considered mainly a "technical

issue" rather than an important "business issue" worth considering at the Board level. As a result, EE gets little attention from top management. CII is trying to change this perspective of EE.

CII has initiated the following activities:

- The Chennai Energy Summit to get corporate executives to exchange information about EE issues
- Establishment of a Working Group on EE labeling (including representatives of manufacturers of refrigerators, air conditioners, and geysers). The Bureau of Indian Standards is a member, and the Canadian Standards Association is providing technical assistance
- Sponsorship of the Labeling Workshop in Ahmedabad on June 10-11, 1999
- Assisting the establishment of competitive suppliers for EE products
- Initiating activities for establishing mandatory energy audits (as will be required when the EE Bill is passed). Related activities include development of certification procedures for energy auditors. The Canadian aid agency (CIDA) through Canadian Universities is providing technical assistance.
- Initiating the development of benchmarks for energy consumption per unit of product
- Establishing a National EE Awards Program
- Developing sector-specific EE manuals with benchmarks
- Matching donor initiatives with capabilities of the recipients
- Publishing success stories of EE projects, authored by CEOs of major corporations.

The Southern Regional Office of CII has developed EE Manuals for six major industries under the sponsorship of ADB. CII is also working on CDM and market-based mechanisms such as CO2 trading.

Federation of Indian Chambers of Commerce and Industry (FICCI)

FICCI has undertaken a number of EE initiatives. Their focus is on small to medium size enterprises or SMEs (those who may not be able to get funding from IDBI or ICICI). The primary members of FICCI are the Chambers of Commerce and Industry (CCIs). The members represent over 140,000 establishments, thereby providing a very large network.

In 1991 FICCI initiated an audit program. A team, consisting of FICCI staff and empanelled consultants, visits the facility and conducts the audit. These audits lead to recommendations for EE project implementation and FICCI provides brochures and other technical information to the customers to assist implementation.

Recently FICCI has initiated the concept of "cluster audits" which are essentially technical diagnostic studies of specific enterprises for energy and environmental issues. The current focus is on SMEs in the metal fabrication, agribusiness, petroleum and chemicals, and honey processing industries. The cluster audits define generic processes and options for EE and environmental improvement. FICCI does not recommend specific products or vendors, but proposes generic solutions. Group meetings are conducted to discuss the findings and proposed solutions. The services described above are provided free to the SMEs.

FICCI is working with the SIDBI (Small Industry Development Bank of India) to offer financing for implementation. Unfortunately SIDBI does not have the technical capability for conducting due diligence on EE projects, so FICCI has established a cooperative relationship with ICICI, and attempts to get collective wisdom of all approved research an technical institutes.

FICCI views itself as a facilitator and not an implementor, and would welcome the participation of the private sector in EE implementation.

FICCI has developed a large database on EE. It includes:

- 128 audit manuals
- 80 best practices guidebooks
- A technology options database that includes
    - Technology profiles
    - Supply sources
    - Best practices
    - Checklists
    - Success stories
    - Standards
    - Government regulations

Most of the information in the database is from European sources. There is a need to strengthen the U.S. side of the information. This database is on the FICCI website (www.bisnetindia.com).

E. NON-GOVERNMENT ORGANIZATIONS (NGOs)

Council of Energy Efficiency Companies in India (CEECI)

A key NGO working in the energy efficiency field is the Council of Energy Efficiency Companies in India (CEECI). This organization was established by CONSERVE, a not-

for-profit NGO dedicated to promoting energy conservation and efficient use of energy in India. CEECI was established with technical assistance from the Alliance to Save Energy using USAID funds. CEECI has initiated a number of activities to promote EE.

CEECI's activities have focused on addressing the major barriers to EE. A major effort has been the publication of a Directory of Energy Efficiency Companies in India. This Directory includes over 200 organizations.

Another activity being initiated by CEECI is the Energy Audit of Shram Shakti Bhawan (a building housing the Ministry of Power). This project may involve ESCOs and will be targeted at setting up Shram Shakti Bhawan as a "model energy efficient building". The audit would lead to an energy service company (ESCO) model contract for effecting improvements in energy conservation.

The scope of this energy audit includes the electrical distribution systems, lighting, water management, air conditioning and ventilation (including heating) in the various floors of Shram Shakti Bhawan. Among the energy saving measures, the audit would also evaluate incorporation of passive infra red sensors (occupancy sensors) to control air-conditioning, ventilation and lighting in the room and other such technologies.

Other activities include establishment of Working Groups

- A Product Working Group to develop Council policy recommendations on energy performance standards for equipment and buildings and recommendations on equipment labeling. The Group will also identify elements in the Indian tax code and tariff structure that impede the introduction of energy-efficient equipment.
- A Communications Working Group to develop strategies for raising the Council's profile including designing a Council logo, writing editorial articles in trade journals, advertising in major newspapers and organizing educational seminars, etc.
- A Policy Working Group to develop the Council's positions on energy policy issues, including but not limited to utility reforms, fiscal policy, and transmission and distribution issues. The Group will craft policy recommendations to Parliament and the Ministries and to develop the Council's legislative strategy.

CEECI also has a Website on the Alliance to Save Energy's web page.

Consumer Education and Research Center (CERC)

The CERC was founded by Mr. Maubhai Shah approximately 20 years ago and has achieved some success in establishing a credible track record as an independent, consumer-oriented product testing organization. CERC is similar to "Consumer Reports" in the U.S. although on a much small scale. In early 1998, CERC began a monthly publication titled *Insight* that provided articles on the safety and performance of household appliances and compares them with manufacturers claims. The magazine has a circulation about 10,000 and needs about 35,000 paid subscriptions to become self-sustaining.

CERC has been promoting the need for increased EE in the domestic sector as this load is growing significantly with the introduction of previously unavailable and/or unaffordable home appliances (e.g., air conditioners, clothes washers). Mr. Shah of CERC believes that households are significantly increasing their electricity consumption and that more work is needed to test and publish results of EE home appliances.

CERC is currently the beneficiary of a large grant from the USAID Mission, and is also involved in the USAID energy labeling project for refrigerators

F. ENERGY SERVICE COMPANIES

During the last several years, a number of energy service companies (ESCOs) have been established in India. The first ESCO (established in 1995) was INTESCO-Bhoruka Limited (now called INTESCO Asia Limited), a joint venture between the U.S.-based International Energy Services Company and Bhoruka Power Corporation Limited, an India IPP based in Bangalore.

Energy Performance Services, another U.S.-based ESCO, then established EPS-Thermax Limited (now called Thermax-EPS Limited, in collaboration with Thermax, a manufacturer of energy efficiency equipment in Pune.

Recently, two other ESCOs have been formed – Tata Honeywell, the Indian affiliate of the U.S. controls company, has established a business unit to conduct performance contracting projects, and the DCM Shri Ram Consolidated Group has established an ESCO in Delhi.

A number of other Indian organizations, including M.K. Raju Consultants, Dalal Consultants, Kirloskar Consultants, and Kinetics India, have undertaken ESCO-type projects.

The experience of these organizations has been quite mixed. While the ESCO and performance contracting concept has been generally well received by large energy users, few performance contracting projects have actually been implemented. Interviews with some of the ESCOs have identified the following problems:

- Indian industry is generally skeptical of new concepts and it is difficult to sell the ESCO/performance contracting concepts to management
- Energy efficiency is generally viewed as a "technical" or "engineering" issue and not a "business" issue deserving top management or Board attention
- Indian mangers are unwilling to pay for the type of energy audit it takes to develop bankable project proposals. Many audits conducted in the past have been of poor quality and ESCOs suffer from a credibility gap with industry managers
- The project development costs for EE projects are relatively high due to the inexperience of ESCOs and the lack of sufficient prior projects
- EE projects are generally small and it is difficult to finance them

- Non-recourse financing is generally not available in India
- There are no standard contracts and agreements for ESCO projects
- Standardized procedures for monitoring and verification of energy savings are not established
- Financial institutions do not easily understand the ESCO and performance contracting concepts

IV. ENERGY EFFICIENCY MARKET POTENTIAL IN INDIA

A. OVERVIEW

There have been several studies of the potential for energy efficiency in India. The most comprehensive assessment of energy efficiency potential in India was conducted by Nadel and others in early 1990s. The results of this study indicated a potential of over 15,000 MW. Other studies have indicated the potential for energy efficiency in the residential sector to be in excess of 20% of the consumption.

The Central government, in its Eighth Five-Year Plan targeted a savings of 5,000 MW, of which 1,550 were in the industrial sector from upgrading of energy-using equipment and from improved operating and management practices. Recent efforts by the Industrial Development Bank of India (IDBI) to finance EE improvement projects in the industrial sector demonstrated savings in industrial facilities ranging from a minimum of 18% to a maximum of over 45%. Some of the measures leading to these improvements include energy-efficient motors for pumps, compressors, and fans as well as variable sped drives, and cogeneration of electricity and thermal energy. High potential for energy efficiency exists in the steel, sugar, pulp and paper, cement, textiles, fertilizers, chlor-alkali, pharmaceuticals, and petrochemical industries.

B. ENERGY EFFICIENCY POTENTIAL IN THE INDUSTRIAL SECTOR

(TO BE ADDED)

C. ENERGY EFFICIENCY POTENTIAL IN THE RESIDENTIAL SECTOR

(TO BE ADDED)

D. ENERGY EFFICIENCY POTENTIAL IN THE COMMERCIAL SECTOR

(TO BE ADDED)

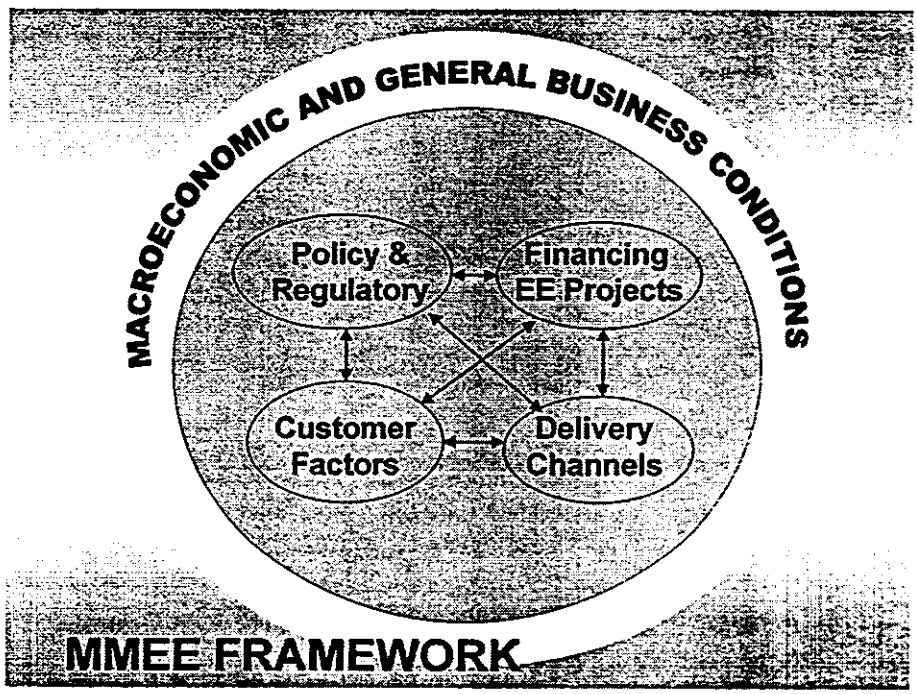
E. ENERGY EFFICIENCY POTENTIAL IN THE AGRICULUTURAL SECTOR

(TO BE ADDED)

V. KEY MARKET DRIVERS AND BARRIERS

A. INTRODUCTION

The MMEE project has developed a general framework for identifying the key factors influencing the transformation of energy efficiency markets to establish and sustain private sector market activities for the implementation of EE projects. The framework attempts to provide a comprehensive listing of the barriers to energy efficiency implementation, and the methods that have been employed or proposed to address these barriers. The framework is designed to be applicable to developing countries to define the actions needed to address the barriers to the establishment of long-term sustainable markets for energy efficiency.



The framework identifies five categories of influencing factors:

- Macro-economic and general business conditions
- Policy and regulatory considerations
- Customer factors
- Financing of energy efficiency projects
- Market delivery channels

The MMEE project team has attempted to apply this framework to define and assess the key market drivers and barriers influencing the development of sustainable market mechanisms for the delivery of EE services in India.

The discussion below presents an overview of each of these sets of influencing factors.

B. MACRO-ECONOMIC AND GENERAL BUSINESS CONDITIONS

A number of macro-economic and general business conditions are pre-requisites to the successful and sustainable implementation of energy efficiency programs by the private sector in India. To justify investments in the energy efficiency market, private sector organizations need to be able to anticipate:

- a large market potential
- manageable business risks
- market conditions conducive to the development, financing and implementation of projects
- expected returns on investment commensurate with the risks

The key factors that represent minimum criteria for successful private sector operation in the energy efficiency market are discussed below.

Stable Political Environment

India represents the world's largest democracy and since independence for the U.K. in 1947 has held peaceful democratic elections at the national and state levels. For about four decades, a single party, the Congress Party, had a majority government at the Center and in most states. However, in recent years, there has been a lack of a single dominant party with an absolute majority and several coalition governments have been formed at the Center. These coalitions have been proven to be somewhat unstable and a number of national elections have been held in the last five years.

Despite the many changes in the Central government, the economic reforms initiated in the early 1990s have been continued. Therefore the instability of the government at the national level has not had a severe impact on the private sector.

Economic Growth

The economy in India has been growing at a reasonably high rate. Economic liberalization has continued, including encouragement of foreign investment, reduction of import tariffs, relaxation of foreign ownership limitations, and reduction of the bureaucratic permitting and licensing requirements. These reforms have generally been favorable to growth and development of a viable private sector.

The economic sanctions imposed by the U.S. following India's nuclear weapons tests in 1998, did affect the flow of foreign investment during 1998 and 1999, and resulted in a slowing down of the economic growth rate. However, the economy appears to be recovering from the sanctions, and the growth rate is now continuing at the pre-sanctions level.

Interest rates and inflation rates have been stable (at least relative to neighboring Asian countries), thereby providing conditions favorable to private sector investment and operation. India also has a large domestic consumer market, which has allowed it successfully weather the economic crisis that has plagued a number of South Asian economies

Financial and Business Infrastructure

India has a very strong financial and business infrastructure, developed originally under the British rule. There are a number of major business groups, many of which are international in scope. Public and private financial institutions provide financing to support industrial growth.

Taxation Policy

India has a reasonable taxation policy that generally does not inhibit private sector investment. Taxation policy has been used in the past to facilitate and promote certain national goals and objectives. The promotion of energy efficiency and renewable energy has been a national goal, and certain tax incentives (such as 100% depreciation for some types of equipment) have been provided.

Stability of the Currency

The Indian Rupee has suffered some devaluation relative to the U.S. Dollar and other western hard currencies. However, the devaluation has been far less drastic than some of the other Southeast Asian countries. The currency stability has not been a major inhibitor to foreign investment.

Legal system

India's legal system is based on English common law, and includes limited judicial review of legislative Acts. India accepts compulsory jurisdiction of the International Court of Justice. The legal system is quite conducive to contracts and agreements, although enforcement is slow and cumbersome by western standards.

Current Business Practices and Culture

While India's general business ethic and culture is conducive to private sector activities, energy efficiency is not a "mainstream" activity in business. The existing business culture does little to promote energy efficiency projects. This could be caused by a lack of

understanding of the economic and environmental benefits of energy efficiency, by a focus on increasing production rather than on cost control, and in some cases the reluctance to accept services form external service providers.

Top management of industrial firms generally view energy efficiency as a "technical" or "engineering" issue rather than as a "business" issue deserving their attention. This lack of vision at the "Board level" represents a key barrier to energy efficiency.

National Commitment to GCC Concerns

Energy efficiency options offer some of the most cost-effective approaches to meet GCC goals. A national commitment to addressing GCC concerns will therefore provide a significant motivation for EE projects. While India has shown an increasing level of commitment to addressing GCC issues, the relationship of energy efficiency to GCC has not been sufficiently highlighted. Industry organizations such as CII are working with Central government agencies, with support from donor organizations such as USAID, to articulate and publicize the need for increased commitment to GCC, and the role and benefits of energy efficiency to meeting GCC goals and objectives

C. REGULATORY AND POLICY CONSIDERATIONS

National Commitment to EE

The government of India has long recognized and publicly articulated the benefits of energy efficiency and the need for energy efficiency as a national policy tool. The need for national legislation promoting energy efficiency was identified in the early 1980s, and a number of efforts were initiated towards this objective. A national Energy Conservation Bill has finally been drafted and approved by two successful governments at the Cabinet level. However, in both cases, the governments fell before the Bill was submitted to Parliament. The current version of the Bill attempts to stress reliance on market forces.

Privatization

Significant privatization activity is underway in some of the States. Orissa, Haryana, Uttar Pradesh, Gujarat, and Andhra Pradesh are aggressively moving towards privatization of the electricity sector.

Regulatory Incentives

India passed the Electricity Regulatory Commissions Act in 19Electricity 98. This Act established the Central Electricity Regulatory Commission (CERC) to establish a bulk tariff policy, regulate interstate transmission, and regulate bulk sales of power.

The Act also enables the states to establish State Electricity Regulatory Commissions (SERCs). Orissa and a number of other states have established such commissions. While the general enabling legislation provides the SERCs the authority to develop incentives

(and/or disincentives0 that will promote and facilitate energy efficiency, none of the commissions have yet established any such regulatory initiatives. The establishment of regulatory incentives to influence SEBs and privatized distribution utilities may represent a key driver for energy efficiency.

Energy Efficiency Codes and Standards

The establishment of codes and standards for energy using facilities, products, technologies, and equipment serves to promote increased energy efficiency in the marketplace by:

- providing information to consumers
- eliminating inefficient equipment and products form the market
- providing a signal to manufacturers and suppliers
- establishment of more energy-efficient facilities

India currently does not have energy efficiency codes and standards, but these are a key element of the proposed Energy Conservation Bill.

Pricing Signals

The pricing of energy is most states in India is significantly influenced by social and political priorities. Such pricing practices lead to various types of subsidies and cross-subsidies, and provide incorrect market signals that often limit the investments in EE projects. The provision of the appropriate pricing signals, based on the true cost of supplying energy, will facilitate the market implementation of EE options. In India, electricity prices to residential and agricultural sectors are generally subsidized, while electricity prices to industry are high relative to the cost of providing such service.

While there appears to be some movement towards marginal cost based, pricing, there has been little implementation of tariff reform in most states.

Subsidies and Cross-Subsidies

In most states, there are significant subsidies and cross-subsidies, particularly in electricity prices. Tariff reform is a target for the SERCs, but it may take some time before such reforms are actually implemented.

Importing Energy Efficiency Equipment

Some (but not all) EE equipment is exempt from tariffs and duties. However, much EE equipment is manufactured locally.

D. CUSTOMER FACTORS

Customer factors represent major barriers to implementation of energy efficiency in India. The key issues are discussed below.

Awareness of Benefits of Energy Efficiency (EE)

Small energy users do not recognize the benefits of EE and lack information on the techniques of EE. Executives of large energy-using organizations, while being aware of the potential benefits of EE, do not consider EE as being "mission critical". Usually, EE is seen as a way to reduce costs only, and therefore does not receive adequate attention especially if the energy bills do not represent a significant part of the operating costs.

Also, many customers still believe in minimizing first cost when purchasing energy using equipment, rather than consider the life cycle costs.

Information on EE Technologies, Products and Equipment

Adequate information on EE technologies and other related products and services is necessary to increase the adoption of EE by end users. Customers, market delivery channels, and investors will be reluctant to embrace EE products and services if they view them as state-of-the-art or out-of-the-lab solutions especially in the case of the conservative business community. Additionally, lack of readily available information on EE products, services and implementation approaches contribute to the earlier barrier of awareness.

NPC, CII, FICCI and other industry organizations have made important efforts to provide information to industrial energy users on EE technologies, products and equipment. These efforts have included demonstration projects, guidebooks and manuals, seminars and workshops, and web sites. Many of these efforts have been supported by funding from donor agencies.

Lesser efforts have been devoted to educating residential and small commercial consumers on relevant EE technologies, products and equipment. While some NGOs (particularly the Consumer Education and Research Center) have made significant efforts in this regard, many consumers still lack the needed information.

Another interesting aspect of government efforts to promote EE has been that, while government organizations have tried to educate customers on the national benefits of EE, many energy consumers feel that if EE is nationally important, the government should pay for it.

Perceived Risk of EE Technologies

The lack of knowledge or experience with energy efficient technologies creates a perception of risk that inhibits the end users from investing in such technologies. Most Indian industrialists are generally unwilling to be the first to invest in a new technology. This factor has also been a key barrier to the development of an ESCO industry in India.

Some of the existing ESCOs have stated that many industrial consumers ask for examples of prior successful projects in India before they will accept an energy efficiency implementation proposal because they are concerned about the potential risks of such projects.

Acceptance of EE Service Providers by End-Users

The energy services industry is still in its infancy in India, and end-users are not sufficiently familiar with the concept to adopt performance contracting using ESCOs. Due to lack of demonstrated ESCO projects, the ESCO industry does not have sufficient credibility, and users perceive it to be a risky proposition.

As indicated above, many industrial managers are very risk-averse and want to see many successful completed ESCO projects before they will accept ESCO proposals. This factor makes the development of a new industry ver y difficult.

Awareness of GCC Benefits of EE

The benefits of EE projects for addressing GCC concerns are not well articulated in India. Some efforts are currently underway, under the sponsorship of USAID to help project developers understand the key issues related to GCC and take advantage of the financial and economic benefits that may be available form GCC related projects. Energy Efficiency projects may qualify for some GCC benefits and it is important that energy mangers and ESCOs have information on the linkages between GCC and energy efficiency.

Credibility of EE Service Providers

Energy end-users in India do not yet have a positive view of the credibility of the energy efficiency service providers and the value they bring. This is partly because of the "newness" of the energy efficiency and performance contracting concepts, the lack of a large number of successful completed projects, and the natural skepticism of Indian managers towards outside service providers.

End users in India are not accepting EE service providers either because they don't trust them, or they don't appreciate the value they bring, or because they have more economic and familiar options such as used equipment market players, or self implementation, and other less efficient means.

The result is that the market does not value the benefits of using energy service providers such as ESCOs, thereby limiting market implementation of EE projects.

Hassle-Free Installation

For industrial consumers, there is a perception that the implementation of EE projects often interrupts the production process, and therefore there is a resistance towards such projects

wherever industrial mangers are under pressure to produce more. In the residential and small commercial market, the "transaction cost" related to identifying and selecting EE equipment and products is too high form the consumer perspective.

Efficient End-User Decision Process

The processes by which decisions are made are unique to each industry, size of business, type of business, management style, and many other factors. The likelihood of implementation of EE projects will be determined by the energy management decision authority. Decisions on equipment upgrade or capital investments in India are often made by business professionals with no knowledge of energy use. Such decisions may be are made based on production factors without due consideration of energy-related factors. Such inefficiencies in the decision-making process limit the implementation of energy efficiency in industry. Similarly, decisions by residential and commercial consumers are based on many factors unrelated to EE and EE considerations are often not very important in the process.

Champions or Promoters of EE Ethic

There are very few "champions" of the energy efficiency ethic in India. One that has been in existence for about 20 years is the Consumer Education and Research Center (CERC), founded by Mr. Manubhai Shah. CERC has achieved some success in establishing a credible track record as an independent, consumer-oriented product testing organization. CERC is similar to "Consumer Reports" in the U.S. although on a much small scale. In early 1998, CERC began a monthly publication titled *Insight* that provided articles on the safety and performance of household appliances and compares them with manufacturers claims.

In 1998, the Council of Energy Efficiency Companies of India (CEECI) has been established. This organization was established by CONSERVE, a not-for-profit NGO dedicated to promoting energy conservation and efficient use of energy in India, using technical assistance from the Alliance to Save Energy with funding from the USAID. CEECI has initiated a number of activities to promote energy efficiency, but the organization is too new to have had any significant effect to date.

Successful Business Model of EE Service Delivery

The energy services industry in India is relatively new, and the existing business culture and infrastructure are not supportive to create successful "business models" for energy services delivery by the private sector. The ESCO industry in India has been struggling to adapt western practices to India to develop such business models, but with limited success to date. The lack of such models providing win-win situations has limited the entry of more players and service delivery outlets to consider EE initiatives.

Attractive Payback Periods

Studies of energy efficiency potential and related technologies have clearly demonstrated that there are numerous excellent opportunities for implementation of EE projects. Results of project implementation by the IDBI have shown savings in the range of 18 to 45 % at payback period under 2.5 years. Nevertheless, many energy consumers do not find these opportunities attractive enough to implement. This may be the result of other barriers such as lack of attention at the top management level, limited internal capital, and lack of experience with EE projects. Where internal funds are not available, such opportunities present attractive returns to ESCOs, but the ESCO industry is yet to gain a major foothold ion India. The result is that despite apparently attractive economics, many EE projects do not get implemented.

Availability of Internal Capital for EE Projects

As discussed earlier, energy efficiency is not considered a "mainstream" or "business" issue deserving top management attention. As a result, EE is mostly low on the priority list of energy consuming organizations, and therefore, cannot compete effectively for scarce internal capital resources.

Recognition of Importance of Energy Costs

Most large industrial and commercial consumers appear to have recognized the importance of energy costs in their operations, and the need to control and reduce these costs. This recognition is further enhanced by the efforts of industry associations and donor agencies. However, recognizing the importance of energy costs has not necessarily led to significant actions to reduce these costs. This lack of action is due to the other barriers cited herein.

With respect to the smaller residential and commercial customers, there is a lesser degree of realization of the importance of energy costs. Such lack of recognition does present a barrier to EE implementation in these sectors.

Transaction Costs

The "transaction costs" faced by energy consumers trying to implement EE projects are often quite high, due to:

- small project size
- limited infrastructure for EE service delivery
- limited experience with successful business models
- lack of sufficient education of financial institutions re EE projects

E. FINANCING OF EE PROJECTS

Availability of External Funds for EE Projects

The availability of funds for EE projects and the development of financing mechanisms are very important to the establishment of a viable market for energy efficiency. Most energy users do not want to commit their own funds. ESCOs need appropriate financing sources and mechanisms for channeling funds to EE projects. The World Bank, Asian Development Bank, and other donor agencies are making funds available for EE projects and organizations such as IREDA, IDBI, ICICI, etc. are developing programs for channeling such funds. However, there has been limited success in these efforts and there are many institutional barriers to the channeling of funds to EE projects. The typical barriers include high transaction costs, inability to finance small projects and creditworthiness of certain end users.

Willingness of Financial Institutions to Consider EE Projects

Most financial institutions in India generally do not have good knowledge, understanding, or experience with EE projects. Therefore they tend to have limited interest and capability to provide funds for EE projects. Public sector financial institutions such as IDBI and ICICI have, with donor agency assistance, developed financing programs for EE projects, but most of these have been limited to large projects. Few private financial institutions have shown much interest in EE projects. The limited availability of funds form financial institutions, particularly for small projects, constrains the ability of EE service providers to offer comprehensive services.

Ability to Finance Small Projects

The typical size of an energy efficiency project is small relative to energy supply projects (such as power plants, transmission and distribution facilities, natural gas pipelines, etc.). Successful delivery of EE services requires the ability to finance such small projects. The costs of financial due diligence and preparation of transaction documents for small projects often make these projects difficult to finance.

The large financial institutions such as IDBI and ICICI are not particularly interested in financing such small projects. What is needed is a "financial intermediary model" that will enlist smaller public and private financial institutions in the channeling of available funds to eligible EE projects.

Low Pre-Development and Transaction Costs to Prepare Bankable Projects

The energy service providers need to assess the technical and financial feasibility of EE projects efficiently and effectively in order to develop bankable project proposals. The costs involved in identifying and qualifying projects, and conducting the needed feasibility assessments, are high relative to the size of the investment in the EE equipment or

products. EE service providers in India lack the knowledge and understanding of the needs of financial institutions. The costs of hiring financial consultants to develop financing proposals can be quite significant. All these factors make the costs of preparing bankable project proposals relatively high, and limit the ability of EE service providers to access traditional financing sources

Enhancing the Creditworthiness of Some End-Use Customers

Many owners of facilities economically attractive EE projects. (particularly small to medium size enterprises or SMEs) may not be considered creditworthy by financial institutions due to their small size, weak financial structure, or lack of experience with project financing. The techniques of credit enhancement for such projects are not well known in India. Therefore, many attractive projects do not get implemented.

F. MARKET DELIVERY CHANNELS

Availability of EE Technologies, Products, and Equipment

Availability of EE technologies, products, and equipment is key to the success of delivering energy efficiency services. Fortunately this is not a barrier in India. Most types of energy-efficient technologies, products and equipment are either readily available in India or can be imported relatively easily.
However, energy efficiency is not being adequately "marketed" by manufacturers and suppliers.

Presence and Capabilities of Energy Service Companies (ESCOs)

The ESCO industry in India, as discussed in Section 3 above, is in its infancy. During the last several years, a number of energy service companies (ESCOs) have been established, including:

- INTESCO Asia Limited
- Thermax-EPS
- DCM Shri Ram Consolidated Industries
- Tata Honeywell

Several other energy efficiency companies, including M.K. Raju Consultants, Dalal Consultants, Kirloskar Consultants, and Kinetics India, have undertaken ESCO-type projects.

The experience of these organizations indicates that while the technical capability and skills are available, the ability of these organizations to successfully establish a thriving ESCO market has been severely hampered by the barriers listed herein.

Supporting Infrastructure to Assist Energy Service Companies (ESCOs)

To achieve success, the ESCO industry needs many supporting elements necessary to conduct business. Information sources, product channels, legal tools, financing vehicles, and organizations with capabilities in auditing, engineering, project management, construction management etc. are needed. Moreover these types of organizations need adequate training.

Some of the supporting infrastructure to assist the implementation of EE projects exists, but this is quite inadequate relative to the size of the market. As an example, there is a very limited supply of qualified and trained auditors. Good quality energy audits have been conducted by organizations such as NPC, CII, FICCI, etc. but the level of implementation of audit recommendations is very inadequate. Some states have legislated mandatory audits, but the quality of audits is not specified. As a result, many audits are being conducted by unskilled individuals.

Examples of some other barriers include:

- Lack of sustainable training centers to maintain skills and knowledge
- Limited understanding of performance contracting
- No compatible financial vehicles
- Limited supply of EE equipment and products
- Difficulty in obtaining data
- Lack of EE supporting policy

Transfer of Successful EE Technologies

Continuous transfer of new technologies and business initiatives is necessary to maintain and increase the capacity of the market delivery channels. Many technology transfer activities have been undertaken in India with the help of donor agencies.

VI. PRELIMINARY STRATEGY FOR MOVING THE MARKET

A. INTRODUCTION

The previous sections of this report have provided an overview of the economy and the energy sector in India, identified the current and prior energy efficiency activities of the major stakeholders, provided estimates of the energy efficiency potential in India, and defined the key market drivers and barriers. Based on this information, this section attempts to outline an overall strategy to move towards a sustainable energy efficiency market in India.

This definition of a preliminary strategy will be discussed with key stakeholders and modified and expanded as necessary. It will be presented and discussed at a Regional workshop co-sponsored by the MMEE project with a number of Indian stakeholder organizations in mid-2000.

The preliminary strategy outlined herein consists of the following key elements:

- Enabling policy and regulatory framework
- Actions to develop a market for energy efficiency
- Actions to promote information and awareness
- Initiatives to develop energy service delivery infrastructure

Each of these is described below.

B. ENABLING POLICY AND REGULATORY FRAMEWORK

As previously identified in this report, the potential for energy efficiency in India is very high, and the implementation to date has been limited. Initial efforts by the Central and state governments primarily focused on studies of specific EE measures and technology demonstrations with assistance from donor agencies. In the last decade there has been increasing recognition of the need for an overall policy framework that will facilitate the achievement of the potential through market implementation of energy efficiency projects.

National Energy Efficiency Legislation

A key component of an enabling framework is national energy efficiency legislation. The Central government has drafted the Energy Conservation Bill, which is expected to be presented to the new cabinet and then to Parliament in the near future. To be effective, such national legislation should contain the following types of provisions. Many of these provisions are already incorporated in some form in the current version of the Bill.

- Establishment of a nodal agency to coordinate and promote government activities related to EE. The current version of the Bill proposes the establishment of the Bureau of Energy Efficiency (BEE)
- Authorization for the BEE to work collaboratively with industry organizations to develop standards and benchmarks for energy efficiency on a sector by sector basis, and also to establish voluntary targets for energy efficiency
- Empowerment of the BEE to impose mandatory audits that would be phased in if the progress towards meeting the voluntary targets in unsatisfactory
- Establishment of mechanisms for data collection, and analysis of the data to develop and publish the standard s and benchmarks and to monitor progress towards the voluntary targets
- Development of a program for training and certifying energy auditors and energy managers

Codes and Standards

The national energy efficiency legislation contains a number of provisions that should be implemented as soon as possible. These include

- Establishment of minimum energy efficiency standards and norms for major energy consuming equipment
- Development and establishment of a labeling scheme for appliances and equipment
- Establishment of Central Building Codes for new construction and requirement for all Central government facilities to abide by these codes
- Development of guidelines for adapting the Central Building Codes to the State levels
- Establishment of standards, norms, and/or benchmarks for major energy consuming sectors (including industrial and large commercial)

Taxation and Tariff Policies

The government should use taxation policy for facilitating and promoting energy efficiency markets. Possible incentives include:

- Extension of the 100% depreciation rule to all energy efficiency equipment
- Provision of tax incentives for local manufacturing of EE products
- Reduction or elimination of customs duties on EE equipment

Also, the BEE should evaluate existing tax barriers (such as any Octroi or other taxes that may limit flow of energy efficiency equipment across states) and make recommendations

to appropriate agencies for any desirable changes that would facilitate market implementation of energy efficiency projects.

Emphasizing the Linkage between Energy Efficiency and the Environment

The environmental benefits of energy efficiency are very significant and can be a major driver for implementation of EE projects. The government should emphasize the linkage of energy efficiency to reduction of pollution and to global climate change (GCC). The new Bureau of Energy Efficiency (BEE) should have the responsibility of working closely with the Ministry of Environment to develop appropriate collaborative effort to promote the benefits of EE to meet national environmental goals and commitments.

It is likely that mechanisms for addressing global climate change (GCC) issues (such as the Clean Development Mechanism or CDM) will provide opportunities for financing energy efficiency projects. The BEE should identify and publicize such opportunities, and assist consumers in developing and implementing energy efficiency projects that can take advantage of such economic and financial benefits related to GCC.

Regulatory Initiatives

The establishment of the State Electricity Regulatory Commissions (SERCs) provides an excellent opportunity to develop regulatory initiatives to facilitate and promote implementation of EE by SEBs, privatized distribution companies (DISCOs) and private sector organizations such as ESCOs. Under the national legislation, the BEE should be assigned the responsibility of developing and recommending guidelines and procedures for State Electricity Regulatory Commissions (SERCs), consistent with the Regulatory Reform Act, to provide appropriate incentives and procedures that would facilitate the promotion and implementation of DSM and energy efficiency measures by the distribution entities regulated by the SERCs.

Regulatory initiatives may include:

- Establishment of a comprehensive regulatory framework for promoting DSM activities by SEBs and DISCOs
- Energy efficiency performance standards for SEBs and DISCOs
- Incentive regulation to encourage EE investments where cost-effective
- Incentives to promote collaboration between SEBs, DISCOs and ESCOs to implement EE projects
- Establishment of State Energy Efficiency Funds to leverage private sector and donor funds for infrastructure and capacity building, and for facilitating innovative financing of EE projects, and for demonstrating sustainable "business models" of private sector EE implementation.

Other regulatory initiatives that need to be implemented by SERCs include the facilitation of cogeneration or combined heat and power (CHP) projects. Regulatory and tariff barriers to such projects need to be eliminated, and the sale of power from CHP facilities to the SEBs or DISCOs should be allowed with establishment of economically based tariffs for the purchase of such power.

An innovative idea that has not yet been implemented anywhere is the bundling of blocks of demand-side and supply-side resources procured competitively from independent power producers (IPPs) and ESCOs. Since most states in India are actively seeking private power producers to develop generation resources, and such resources are procured competitively, and are subject to the jurisdiction of the SERC, it may be desirable for the SERC to require that a portion of the power being procured be from demand-side resources. While there are a number of technical, regulatory, and business issues that need to be sorted out, it would be worthwhile to consider a pilot of this approach, because it represents an excellent mechanism to stimulate the demand for efficiency resources and facilitate private sector activities to provide such efficiency resources.

Establishment of Energy efficiency Targets for Government Facilities

The Central and State governments should establish targets for improved energy efficiency in government facilities. Such an approach was successfully used by the U.S. government to demonstrate its commitment to energy efficiency.

Collaboration and Coordination with Other Agencies

The Central government should establish an Inter-Ministerial coordination mechanism that would require frequent consultations among the Bureau of Energy Efficiency and appropriate other agencies and ministries.

C. ACTIONS TO DEVELOP A MARKET FOR ENERGY EFFICIENCY

Government Procurement

An important way in which the national Bill can create a market for EE is to require Central- and State-owned enterprises to consider energy efficient equipment in their procurement decision-making. Presently, procurement decision-making is principally based on a first cost/capital cost basis (all other factors being equal) which ignores energy efficiency aspects. To overcome this, the Bill should empower BEE to develop guidelines and procedures that will incorporate Life Cycle Analysis (LCA) principles for procurement of designated energy-using equipment using Central or State government funds.

Establishment of an Energy Efficiency Fund

A key barrier to private sector implementation of EE projects is the availability of financing for EE projects. The creation of the Central and State Energy Conservation Funds, as proposed in the national legislation, is an important mechanism that should be a

high priority. The BEE should have the authority to use this Fund to leverage other financing resources from donor agencies or from public or private sector financial institutions to subsidize audits and/or partially fund energy efficiency implementation activities.

The Central and State-level funds should expressly provide resources to support audits as well as project financing. Initially such resources could be provided on a preferential basis (discounted interest) to qualified applicants. The availability of such fund programs would also have the effect of attracting donor agency funds that could be used to expand program reach through additional audits, financings or greater lending discounts. This would help to speed the pace of EE investments and the growth of the private sector in providing EE services. As such growth occurs, commercial lenders would increase their understanding and comfort in EE investments, thereby increasing their willingness to provide financing at competitive rates.

It would be an excellent idea for the BEE to establish a "revolving fund" for loans or grants (on a competitive basis) to customers, ESCOs, NGOs, and/or industry or consumer associations, to implement energy efficiency projects. Such funds have been established in other countries (e.g. the Energy Savers Fund established by the Energy Efficiency and Conservation Authority or EECA in New Zealand), and have succeeded in helping develop the infrastructure for implementing energy efficiency projects.

To achieve the maximum level of leveraging, it may be useful to require the BEE to appoint a fund manager to raise resources (from domestic and international investors, bilateral aid agencies, MDBs, IFC, etc.) and allow for the use of innovative lending instruments - loans, equity, guarantees, securitization, refinancing, etc.

D. ACTIONS TO PROMOTE INFORMATION AND AWARENESS

Publication of Energy Efficiency Benchmarks

Top management of industrial firms generally view energy efficiency as a "technical" or "engineering" issue rather than as a "business" issue deserving their attention. This lack of vision at the "Board level" represents a key barrier to energy efficiency. One approach to make energy efficiency a "boardroom issue" is to assemble and publish data on the energy efficiency of Indian firms relative to each other and to international standards. An initial effort to develop a database on energy consumption per unit of production for major industry groups was started by the EMC. This needs to be updated and the data analyzed, with the results published to inform each industry group as to where they stand relative to their colleague in terms of energy efficiency. Such information can also be used to develop the voluntary targets for energy efficiency by major consuming group.

Information and Education of Financial Institutions

The BEE should inform and educate financial institutions (FIs) on the benefits of energy efficiency and provide information on the energy efficiency benchmarks and norms, so that the FIs can incorporate energy efficiency considerations in their lending decisions.

Public Awareness and Information Campaigns

While past government and donor-funded energy efficiency activities have contributed to raising the awareness of the economic and environmental benefits of energy efficiency, much more is needed to inform and educate the public regarding the methods and techniques of energy efficiency and the need for an "energy conservation ethic". Specific actions may include:

- General promotion of the "energy efficiency ethic" by BEE
- Energy education programs in schools
- Customer education and awareness campaigns targeted at specific customer segments, particularly residential, small commercial and rural/agricultural sectors
- Cooperative activities with environmental awareness and outreach programs to inform the public on the linkage between environment and energy efficiency

Establishment of a National Energy Efficiency Awards Program

The government, through the BEE, should develop and adopt a program of nominating, recognizing, and rewarding firms that have successfully implemented energy efficiency projects. This may be done in cooperation with organizations such as CII, who already have such a program.

E. INITIATIVES TO DEVELOP ENERGY SERVICE DELIVERY INFRASTRUCTURE

Facilitating the Establishing an ESCO Trade Association

The existing ESCO industry in India is in a nascent stage. A number of ESCOs, some involving joint ventures between Indian and U.S. organizations, have been established an have completed some performance contracting projects. However, the ESCO industry is not well organized and does not a voice in national or state policy decisions. It would be useful for the industry to be better organized through an ESCO Association along the lines of the associations that have been established in Egypt and Brazil. In those countries, governments provided assistance for such organizations using donor funds.

Development of a Training and Certification Program for Energy Auditors and Energy Managers

The skills and qualifications of many organizations and individuals who conduct energy audits in India are somewhat limited, and as a result, the quality of the audits is generally not up to the requirements of a "bankable" project. Many financial institutions and the few existing ESCOs are skeptical of these audits, which cannot be used as the basis of a performance contract. Therefore, there is a need for a training and certification program for energy auditors.

Similarly, there is a need to upgrade the skills and capabilities of energy managers in industrial and large commercial facilities. A training and certification program addressed to the needs of energy management in large energy consuming facilities should be established.

Facilitating Financing of EE Projects

As discussed above, the availability of financing of EE projects has been a key barrier in India. Several actions can be taken to address this barrier (some have been already discussed above):

- Establishment of Central and State Energy Efficiency Funds
- Leveraging resources from donor agencies
- Educating financial institutions on energy efficiency projects
- Developing procedures and guidelines for donor agencies and major public sector financing organizations such as IREDA, IDBI, and ICICI for facilitating the participation of energy service delivery organizations in projects financed by these institutions

Development of Financing Mechanisms to Finance Small Projects

Another key barrier is the size of typical EE projects, which in many cases is too small for institutions such as IDBI and ICICI, due to the transaction costs involved in such project financings. To facilitate the financing of small energy efficiency projects, there is a need to develop mechanisms that reduce the transaction costs. IREDA has successfully accomplished this in its financing of renewable energy projects. The approach used by IREDA is to channel the financing through a set of "financial intermediaries" who are smaller financial institutions (banks, leasing companies, etc.). These intermediaries are used to dealing with smaller projects and have lower transaction costs.

This approach can be replicated for energy efficiency projects. To be successful, the financial intermediaries need to be informed and educated regarding EE projects and regarding the availability of funds for these projects.

A second approach to finance small projects is "project aggregation". This approach has been successfully used by a small company in Pune that offers ESCO-type services for

installing solar thermal systems. This company aggregated 20 very small (residential water heating) projects and financed the package through a leasing company that was a financial intermediary for IREDA.

Government Procurement of EE Services

An approach that has been very successful in the U.S. and Canada is the procurement of energy services performance contracting (ESPC) by large government facilities. The Federal Energy Management Program (FEMP) in the U.S. and the Federal Buildings Initiative (FBI) in Canada have competitively selected a number of ESCOs to provide ESPC services, thereby stimulating the ESCO industry. State agencies in the U.S. and Provincial agencies in Canada have also used this approach.

A similar approach should be used in India by large Central and state government facilities in India. The Ministry of Power has recently initiated a project to develop and demonstrate ESCO principles in its office building, the Shram Shakti Bhawan. The NGO Conserve has conducted the audit and is developing a performance contracting approach.

Development and Demonstration of "Business Models" of EE Implementation

While government organizations and industry associations have conducted a number of energy efficiency demonstration projects, such projects have tended to be "technology demonstrations" rather than demonstrations of how energy consumers or energy service providers can finance and implement the projects. The demonstration of replicable "business models" that provide illustrations of how such projects can be designed, bankable proposals prepared, financial closings completed, and projects implemented, will be of tremendous value to energy users and ESCOs.

Development of Standard Contracts and Agreements for EE Services Contracts

To facilitate performance contracting and ESCO projects, there is a need for developing standard contracts and agreements adapted to the Indian business and legal system. Initial attempts at developing such contracts/agreements have been made in the EMCAT project funded by the USAID. Additional work is needed in collaboration with industry groups and financial institutions.

Development of Guidebook for Preparation of Bankable Projects

ESCOs and other energy efficiency service providers have the capabilities to conduct feasibility studies, and develop detailed project reports (DPRs), but often such studies and reports do not address the concerns and needs of financial institutions to whom these are presented for financing. The development of a guidebook for the preparation of bankable projects would help project developers, ESCOs and other service providers create EE

project proposals that would be more understandable to financial institutions, and thereby increase the probability of successful financing of such projects.