NATIONAL MISSION FOR ENHANCED ENERGY EFFICIENCY

Draft Mission Document: Implementation Framework

सत्यमेव जयते

Ministry of Power

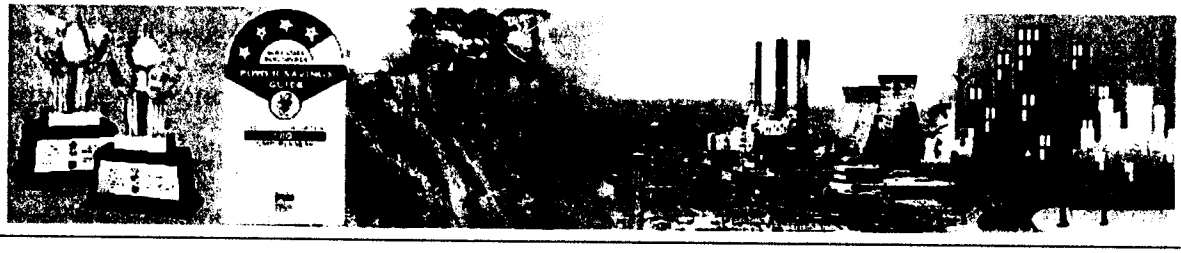
Bureau of Energy Efficiency

Government of India

ENERGY IS LIFE
BEE
CONSERVE IT

December, 2008

Contents



Overview

Chapter-I: Overview

India is faced with the challenge of sustaining its rapid economic growth while dealing with the global threat of climate change. This threat emanates from accumulated greenhouse gas emissions in the atmosphere, anthropogenically generated through long-term and intensive industrial growth and high consumption lifestyles in developed countries. Climate change may alter the distribution and quality of India's natural resources and adversely affect the livelihood of its people. With an economy closely tied to its natural resource base and climate-sensitive sectors such as agriculture, water and forestry, India may face a major threat because of the projected changes in climate essentially on account of the historical and cumulative and exacerbated carbon footprint of the developed countries. While engaged with the international community to collectively and cooperatively deal with this threat, India needs a national strategy to firstly, adapt to climate change and secondly, to further enhance the ecological sustainability of India's development path.

2. India's development path is based on its unique resource endowments, the overriding priority of economic and social development and poverty eradication, and its adherence to its civilization legacy that places a high value on the environment and the maintenance of ecological balance. India's development agenda focuses on the need for rapid economic growth as an essential precondition to poverty eradication and improved standards of living. Meeting this agenda, which will also reduce climate - related vulnerability, requires large-scale investment of resources in infrastructure, technology, and access to energy. The mission seeks to identify measures that promote our development objectives, while also yielding co-benefits for addressing climate change effects. Cost- effective energy efficiency and energy conservation measures are of particular importance in this connection. The basic tenet of the mission is to ensure a sustainable growth by an appropriate mix of 4 E's namely- Energy, Efficiency, Equity, and Environment.

3. The per capita consumption of energy in India is amongst the lowest in the world. India consumed 510 kg of oil equivalent (kgoe) per person of primary energy in 2006 compared to 7740 in USA and the world average of 1800 (*Source: IEA).* To deliver a sustained economic growth rate of 8 to 9% through 2031-32 and to meet life time energy needs of all citizens, India needs, at the very least to increase its primary energy supply by 3 to 4 times and electricity generation capacity about 6 times. As a result energy service demand growth rates will keep on increasing because of accelerated industrialization, urbanization, and an emerging consumer society. Consequently, energy efficiency across all sectors of the economy is essential to enable decoupling of energy supply growth from economic growth, while ensuring that energy service demands are met.

4. India's energy intensity (0.15 kg of oil equivalent-kgoe- per dollar of GDP expressed in purchasing parity terms) is lower than the OECD average (0.18 kgoe/GDP-PPP) has shown a downward trend. This is indicative of our prudent energy use. However, in almost every sector in India, there is a large variation in energy intensities of different units, ranging from amongst the best in the world to extremely inefficient units as well. As a result, there is room to improve energy intensity in India with current commercially available technologies and best practices. The increasing global trade liberalization and growing global competition have made productivity improvement, including energy cost reduction, an important benchmark for economic success.

5. Recognising the formidable challenges of meeting the energy needs and providing adequate and varied energy of desired quality to users in a sustainable manner and at reasonable costs, improving efficiency of conventional and non-conventional energy and its conservation have become important components of energy policy. The Energy Conservation Act, 2001 integrates these elements as a measure of express legal intent and commitment and came into force with effect from 1st March,

2002. The Bureau of Energy Efficiency was created as the nodal central statutory quasi-regulatory and policy advisory body to assist in developing policies and strategies with a thrust on self-regulation and market principles to achieve the primary objective of reducing energy intensity of the Indian economy. The Energy Conservation Act, 2001 empowers the State Governments to facilitate and enforce efficient use of energy and its conservation through their respective State Designated Agencies in consultation with the Bureau of Energy Efficiency. The Act also empowers the Government to mandate minimum energy performance standards for energy using equipments and appliances. Ministry of Power, through BEE, has initiated a Standards and Labeling Programme for end use equipments and appliances. The programme covering air-conditioners, refrigerators, tube lights, distribution transformers, ceiling fans, LPG stoves, agricultural pumps, colour TVs, and motors is already in vogue on voluntary basis, The labeling programme for air-conditioners, refrigerators, tube lights, distribution transformers is being made mandatory shortly. Fuel economy standards for vehicles is also an important area that is also been pursued by BEE which is very relevant in the present era of high oil prices. It is expected that the fuel economy standards will be announced during the year 2009.

6. The Integrated Energy Policy (IEP) lays emphasis on energy conservation and efficiency, particularly through Demand Side Measures (DSM) and estimates 15% saving of energy is possible by such interventions. The Conference of Chief Ministers chaired by the Hon'ble Prime Minister on 28th May, 2007, recognized the significant potential of saving electricity through its efficient use by DSM interventions which would provide immediate results for saving electricity. Interventions include bulk procurement and distribution of CFLs, adoption of Energy Conservation Building Code (ECBC), promoting and mandating the use of energy efficient pumps and other energy efficient and appliances. The overall energy efficiency investment market size under ESCO system of performance contract in India has been estimated by the ADB Study project team (2004) at Rs 140 bn (Rs. 14000 crores). **In order to give a renewed thrust to**

energy efficiency, the Ministry of Power and BEE strongly recommends that the year 2009 may be declared as the Year for Energy Efficiency. It also recommends that financial incentives which could be early winners such as preferential taxation for energy efficient products, and energy efficient public procurement may be announced *ab-initio* to provide positive impetus to the movement of energy efficiency by the Government.

7. The National Action Plan on Climate Change released by the Prime Minister on 30th June, 2008, recognizes the need to maintain a high growth rate for increasing living standards of the vast majority of people and reducing their vulnerability to the impacts of climate change. The Action Plan enunciates the following principles:

- *Protecting the poor and vulnerable sections of society through an inclusive and sustainable development strategy, sensitive to climate change.*
- *Achieving national growth objectives through a qualitative change in direction that enhances ecological sustainability, leading to further mitigation of greenhouse gas emissions.*
- *Devising efficient and cost-effective strategies for end use Demand Side Management.*
- *Deploying appropriate technologies for both adaptation and mitigation of greenhouse gases emissions extensively as well as at an accelerated pace.*
- *Engineering new and innovative forms of market, regulatory and voluntary mechanisms to promote sustainable development*

8. The National Action Plan outlines Eight National Missions, representing multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change. These missions are:

- National Solar Mission
- **National Mission for Enhanced Energy Efficiency**
- National Mission on Sustainable Habitat

- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a Green India
- National Mission for sustainable agriculture
- National Mission for Strategic Knowledge for climate change

9. The Ministry of Power (MOP) and Bureau of Energy Efficiency (BEE) were tasked to prepare the implementation plan for the National Mission on Enhanced Energy Efficiency (NMEEE). A draft outline was prepared by a Steering Committee of Ministry of Power under the chairmanship of Secretary (Power). The composition of the Steering Committee is at ***Annex-I-1***. It spelt out the following four new initiatives to enhance energy efficiency, in addition to the programmes on energy efficiency being pursued by MOP and BEE. They are:

a) A market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded. (**Perform Achieve and Trade)**

b) Accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable. (**Market Transformation for Energy Efficiency (MTEE))**

c) Creation of mechanisms that would help finance demand side management programmes in all sectors by capturing future energy savings. (**Energy Efficiency Financing Platform (EEFP))**

d) Developing fiscal instruments to promote energy efficiency namely **Framework for Energy Efficient Economic Development (FEEED)**

10. The draft outline of NMEEE set out a comprehensive strategy that:

(a) Creates demand for energy efficiency products, goods and services by spreading awareness about efficacy of these products and services; amending government policies

and programmes to integrate energy efficiency; prepare bankable projects to stimulate the process, incentivizing cost effective improvements in energy efficiency in energy-intensive industries and facilities, through certification of energy savings that could be traded, etc.

(b) Ensures adequate supply of energy efficient products, goods and services. This is being done by creating a cadre of energy professional by way of bi-annual certification examinations, promoting ESCOs, standards and labeling of end use equipments and appliances, preparing structured programmes to leverage international financing instruments , including the Clean Development Mechanism (CDM) to reduce transaction costs to attract private investment, etc.

(c) Creates and promotes Energy Efficiency Financing Platform (EEFP), setting up of partial risk guarantee funds, development of innovative financial derivatives of performance contracts, fiscal and tax incentives for investment in this sector.

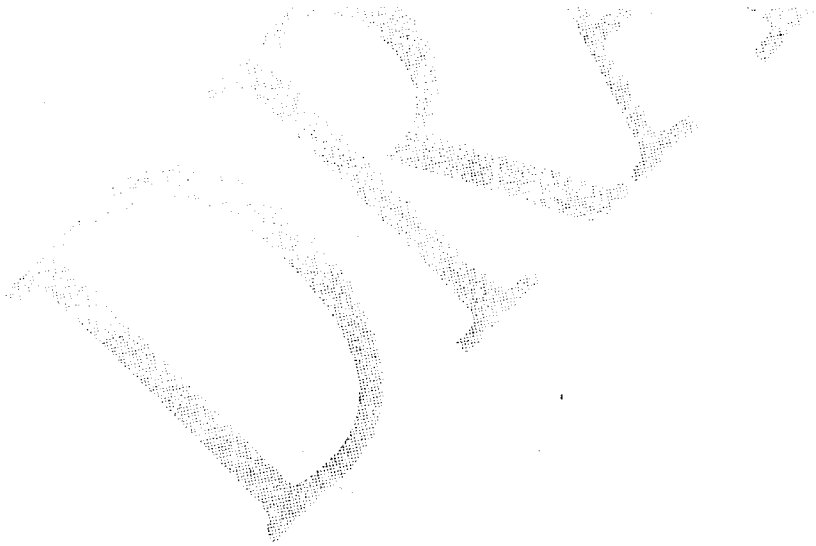
(d) Creates and adopts robust and credible monitoring and verification protocols to capture energy savings from all energy efficiency activities in a transparent manner.

(e) Takes necessary steps to overcome market failures by appropriate regulatory and policy framework to support the above.

11. **Stakeholder Consultation**: The draft outline of the NMEEE was endorsed by the Steering Committee of Ministry of Power in September, 2008 and submitted to the Prime Minister's Office (PMO). A discussion on the draft outline of NMEEE was held in PMO on 3rd October, 2008, involving various stakeholders including relevant Ministries of the Government of India, industry associations, NGOs, and academicia. MOP established two Working Groups to develop the implementation plan for the NMEEE. These Working Groups comprised of stakeholders from relevant Ministries of Government of India, Central Electricity Regulatory Commission (CERC), State Governments, Industry associations like FICCI, CII, etc., Independent Experts from

IITs, Private Financial Institutions, NGOs, etc. The two Working Groups (WGs) developed the implementation plan after extensive consultations. In addition, in order to get the views of NGOs and civil society, a consultation paper was put up on BEE website for comments and a workshop for NGOs and other participants was organized by BEE and PRAYAS Energy Group, in Mumbai on 14th November, 2008. The recommendations of the consultation have been duly considered by the Ministry and suitably incorporated in the implementation plan. The recommendations are at ***Annex-I-2***. The constitution and terms of reference of WG-I and II are at ***Annex-I-3***. The WGs, in turn, set up various topical sub-groups for the terms of reference given to them.

12. **Structure of the Report**: The implementation plan, in the next four chapters, details each one of the initiatives based on the recommendations of the WGs. The next two chapters deal with institutional arrangements, manpower and financial requirements, and timelines respectively.



Perform Achieve and Trade (PAT)

Chapter-II: Perform Achieve and Trade (PAT) Scheme

The Energy Conservation Act, 2001 has identified 15 large Energy Intensive Industries for energy efficiency improvements. Section 14 (e) and 14 (g) empower the central government, on the recommendations of BEE, to prescribe energy consumption norms and standards. The Government has, in March, 2007, notified units in 9 industrial sectors, namely Aluminum, Cement, Chlor-Alkali, Pulp & Paper, Fertilizers, Power Generation Plant, Steel, and Railways, as Designated Consumers (DCs). These industries have to appoint an energy manager, file energy consumption returns every year and conduct mandatory energy audit. They also will have to adhere to the energy consumption norms specified by the Government. The Perform Achieve and Trade is proposed as a market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded. The main issues relevant to the PAT mechanism are as under:

i. Methodology for setting Specific Energy Consumption (SEC) norm for each designated consumer in the baseline year and in the target year.
ii. Verification process for SEC of each designated consumer in the baseline year and in the target year by an accredited verification agency
iii. Issuance process for Energy Savings Certificates (ESCerts) to those designated consumers who exceed their target SEC reduction
iv. Trading Process for ESCerts
v. Compliance and reconciliation process for ESCerts.
vi. Cross sectoral use of ESCerts and their synergy with Renewable Energy Certificates.

2. **Methodology for setting Specific Energy Consumption (SEC) norm for each designated consumer:** The PAT mechanism would provide energy efficiency improvement targets for each industrial unit/establishment which is a designated consumer (DC) under the Energy Conservation Act. Table 1 lists the notified sectors, the minimum energy consumption threshold in each sector, and the number of units that are probable designated consumers in these sectors as intimated by the BEE.

Table 1

S.No	Sector	Minimum energy consumption for designated consumer (in tons of oil equivalent per year)	No. of probable Designated Consumers
1	Thermal Power Plants	30000	139
2	Fertilizer	30000	31
3	Cement	30000	142
4	Aluminum	7500	7
5	Iron & Steel	30000	86
6	Chlor-Alkali	12500	32
7	Pulp & Paper	30000	55
8	Textiles	3000	235
9	Railways	Diesel loco sheds and workshops	35

The methodology for setting SEC target for DCs must be based on the following guiding principles:

(a) The target specific energy consumption would need to be achieved in a multiyear time period. It is recommended that a 3-year period is provided for meeting these targets. For each designated consumer, the targeted improvement

in energy efficiency would be on a percentage improvement over its average specific energy consumption in the financial years 2005-06, 2006-07 and 2007-08.

(b) The methodology for specifying the percentage improvement in the specific energy consumption for a designated consumer is elaborated in Annex-II-1 of this report. In essence, the methodology is based on the approach that all designated consumers would reduce their specific energy consumption; with the currently less energy-efficient designated consumers in a sector being required to achieve a larger percentage decrease in their specific energy consumption than the more energy efficient designated consumers in the same sector. The SEC targets must be fixed after due stakeholder consultation in each designated sector.

(c) In the case of thermal power plants and fertilizer plants, the targets for specific energy consumption decrease would be set within the current tariff setting context. In case of thermal power plants, the Central Electricity Regulatory Commission (CERC) may be requested to specify the percentage reduction required in the specific energy consumption. This target would need to be achieved in a multiyear period, say 3 years. This would align the energy efficiency improvement goal with the tariff setting process of the Regulatory Commission, and avoid the existence of two parallel regulatory mechanisms, one for tariff setting, and another for energy efficiency. In the case of the fertilizer sector, the Department of Fertilizers sets the purchase price for fertilizer from each fertilizer plant based on a number of factors, including the energy efficiency of each plant. Accordingly the Department of Fertilizers may be requested to specify the percentage improvement in specific energy consumption for each fertilizer plant to be achieved in a multiyear period as part of the fertilizer purchasing price setting process. Both the CERC and the Department of Fertilizers may also be requested to formally issue the methodology employed

for specifying the percentage reduction required in the specific energy consumption.

(d) The target setting exercise requires preparation of detailed baselines for each sector, and the current specific energy consumption to be measured and verified for each designated consumer. BEE has already initiated baseline studies for all sectors, in consultation with the administrative ministries/departments/agencies and the industry associations. The specific energy consumption of all designated consumers is being collected through a web-based reporting system, called BEE-Net. The necessary information required for target setting would be completed by the end of 2009, to enable subsequent target setting.

(e) Other energy intensive industries like Petroleum Refineries/Petrochemicals/ Gas Crackers/Naptha Crackers, Sugar, Chemicals, Port Trust, Transport sector (industries and services), Hydro Power stations/ Electricity Transmission nd Distribution Companies and Commercial Buildings and Establishments may be added to the list of DCs and included in the PAT scheme in a phased manner.

The details of the methodology are at ***Annex II-1***.

3. **Promotion of Trading of ESCerts:** The trading of ESCerts requires the protocols as indicated in Annex-II-2. They are:

- ✓ Verification process for SEC of each designated consumer in the baseline year and in the target year by an accredited verification agency
- ✓ Issuance process for Energy Savings Certificates (ESCerts) to those designated consumers who exceed their target SEC reduction
- ✓ Trading Process for ESCerts
- ✓ Compliance and reconciliation process for ESCerts.

The following are the elements of the trading platform that needs to be set up:

(a) The current specific energy consumption of the designated consumers, as well as the specific energy consumption to be achieved in the target year, would be assessed on

a gate-to-gate basis. The principles for identification of plant boundaries for the measurement of energy consumption and of production are specified in Annex-II-2.

(b) The measurements would be carried out by energy auditors, selected for this purpose by the Bureau of Energy Efficiency. The selection criterion is specified in Annex-II-2.

(c) The additional energy savings, if any, achieved by designated consumers beyond the target specific energy consumption would be quantified on the basis of the report of the selected auditors and provided to them through Energy Saving Certificates (ESCerts).

(d) The management of these ESCerts is detailed in Annex-II-2, including the regulatory framework for their issuance, monitoring and verification, and reconciliation. Designated consumers who secure ESCerts could trade them with other designated consumers who are unable to meet their target-specific energy consumption by their own actions.

(e) This trading can be carried out bilaterally between any two designated consumers (within or across the designated sectors), or on special platforms for their trading which are created in the power exchanges. Details of the trading mechanism are provided in Annex-II-2 of this report.

(f) The necessary notification for the selected auditors should be issued in 2009-10 by BEE, and the measurement process for each sector should also be finalised by 2009-10.

(g) The institution to manage the ESCerts should be identified during 2009, and the protocol for ESCert management should be finalised in 2009-10.

(h) Protocols for ESCert trading at the power exchanges should also be finalised in 2009-10.

4. **Fungibility of ESCerts**: There is a possible fungibility of ESCerts with energy saving certificates (proposed Renewable Energy Certificates) being developed by the Ministry of New and Renewable Energy (MNRE). The Ministry of Power recommends

that only these certificates should be imported into the PAT mechanism to meet compliance by designated consumers. It also recommends that:

(a) MNRE may take this fungibility into consideration while formalizing the REC structure.

(b) A joint group of the agencies administering the PAT mechanism and the REC mechanism could agree to the linkage mechanism between the RECs and the ESCerts once both the mechanisms are operational.

(c) The conversion factor must be transparent based on verifiable parameters like kgoe.

5. **Financial Penalty for Non-compliance:** Provisions for notifying and for specifying energy consumption reduction targets for each designated consumers are provided in the Energy Conservation Act. The Act also provides for a inspection and adjudication mechanism, as well as for financial penalties not exceeding Rs. 10,000 for each failure, and in case of continuing failure, with an additional penalty of Rs.1000 for every day that the failure continues. The financial penalty provided in the Act amounts to Rs.3.74 lakhs per year if a designated consumer fails to comply with the specific energy consumption reduction requirement. It is felt that this is an inconsequential penalty, and will not deter any designated consumer from being non-compliant with the specific energy consumption reduction requirements. The Ministry is in the process of recommending an amendment to the Act to increase the financial penalty in this regard.

6. **Compliance by Purchasing EScerts:** The Act also does not provide for a designated consumer who is not in compliance to purchase ESCerts from another designated consumer or from another scheme permitted for compliance in terms of PAT scheme in order to be in compliance. It is recommended that DCs may be allowed to meet their obligation through purchase of ESCerts, by way of an enabling amendment to the Energy Conservation Act.

7. An apprehension was expressed by the apex industry associations that the CDM benefits would be denied to them once the PAT mechanism is implemented. The Ministry would like to reiterate that the PAT mechanism is a purely national action mandated by the National Action Plan for Climate Change and is aimed at increasing the energy efficiency in energy intensive industries/ establishments in India and has no relationship with CDM or any such international scheme to incentivise emission reduction. SEC reduction targets under the PAT mechanism do not create any international obligations and must not have any relationship with CDM or any such international scheme..

8. **Perform Achieve and Trade -Timelines:** The SEC targets would have to be achieved within a period of 3 years within each group after the energy consumption norms have been specified for an industrial unit, and institutional arrangements put in place. BEE has already initiated the exercise to specify energy consumption norms for Pulp & Paper, Cement, Chlor-Alkali, Fertilizer, Aluminum and Textiles by engaging agencies to collect the relevant plant level data. Steel and Power sector analyses are being initiated. The draft SEC targets, based on the methodology outlined, are expected to be prepared for all the above sectors by March, 2010. The trading platform will also be ready in the latter time frame.

9. **Institutional Arrangements:** The Ministry recommends the need to separate the institutional set up for setting SEC targets, issuance of ESCerts, enabling trading and accounting of ESCerts, and dispute resolution. The setting of SEC targets is a statutory role and the power is conferred by the Energy Conservation Act to Ministry of Power, under the aid and advice of BEE. The process of issuance of ESCerts, managing the trading and accounting needs to be overseen by a public sector agency, other than BEE, given that BEE is a quasi-regulatory authority and institutionally not equipped to deal with this specialized work. The Ministry recommends that the proposed Energy Efficiency Services Limited (EESL), a Joint Venture of Public Sector Undertakings under

MOP dealing exclusively with the implementation of energy efficiency, must be assigned all work related to PAT other than the regulatory part of setting ESCerts and dispute resolution. It is recommended that BEE be made the authority for dispute resolution. The institutional structure must address the following:

- Creation of demand for the commodity e.g. compliance requirement for energy savings ESCerts over a pre-specified period (**Regulatory Framework**)
- Ensuring supply of the commodity (ESCerts) (**Issuance of ESCerts**)
- Monitoring and Verification (**M&V for ESCerts**)
- Creating platform to arrive at an agreeable and transparent pricing (**Trading of ESCerts**)
- Systems to record and track the transaction (**Registry of ESCerts**)
- Mechanism for dispute resolution (**Dispute Resolution for ESCerts**)
- Capacity building and training (**Awareness for ESCerts**)

The details of the institutional structure proposed are at ***Annex II-2***.

Market Transformation for Energy Efficiency (MTEE)

Chapter-III: Market Transformation for Energy Efficiency (MTEE)

The enhanced use of energy efficient products and technologies is often constrained by their higher first cost as compared to that of less efficient products. The first cost bias needs to be overcome to initiate market transformation towards their preferential adoption. Leveraging international financing instruments for promoting energy efficiency needs to be encouraged. Project preparation must be suitably enabled to utilise bi-lateral/multilateral funds for energy efficiency which are in existence at present and that are being/ will be structured in due course. Given that CDM is an appropriate instrument, at present, which not only promotes such efficient equipments, but also helps in moderating their cost through the additional revenues due to the carbon emission savings associated with their lower energy use, efforts must be made to considerably enhance its use. However, leveraging revenues under CDM usually requires high transaction cost and therefore has not been able to impact the market for energy efficiency- given that EE/ DSM projects are typically small or medium size and the high transaction cost of CDM tends to make them unviable. Thus, even though India accounts for a high proportion of CDM projects registered (about 30%) with UNFCCC (mostly in the renewable sector), the share in CDM revenues is very low as compared to China (24% of the global CDM revenue, as against about 40% of China). The main reason is the high level of aggregation of CDM projects and the involvement of public sector in China. Therefore, similar strategy for bundling of projects to reduce transaction cost and active involvement of public sector is needed to effectively leverage CDM revenues for market transformation. The renewed thrust on DSM by the Government, both as a part of the XI five year plan as well as the National Mission for Enhanced Energy Efficiency provides an appropriate platform to synergise it with CDM. The main issues that need to be addressed to promote CDM are:

(a) Promotion of the Programme of Activities (PoA) of CDM in various sectors to reduce transaction cost with public sector leadership and involvement

(b) Identification of other sectoral opportunities in CDM that can be tapped

(c) Adoption of a national CDM Roadmap

2. **Promotion of PoA**: The recently announced (December 2005 COP/MOP 1) decision to include "programs of activities" (PoA) in CDM provides an important tool to aggregate small DSM projects under an umbrella to reduce transaction cost and dispersed small credit flows under the new approach of Market Transformation for Energy Efficiency (MTEE). BEE has undertaken a Programme of Activities (PoA) for efficient lighting in domestic sector (Bachat Lamp Yojana) which is likely to be launched shortly. Similar approaches for Municipal DSM (Mu DSM), Agriculture DSM (Ag DSM), SME sector, Commercial Buildings sector and Distribution Transformers is being taken up. Further, engagement of public sector is a key for aggregation of projects so that the transaction costs required for CDM are low. It is, therefore, incumbent to address existing barriers to widespread adoption of CDM and:

a) Require that all public Investment and over time, all public operations are assessed for CDM.
b) Promote programmatic CDM to reduce transaction costs and aggregation of small EE projects
c) Develop and Implement a National CDM strategy for energy efficiency.
d) Promote market access for the energy efficiency projects in small industries
e) Promote Price Transparency
f) Ensure clarity on legal status of CERs to avoid taxation disputes
g) Enhance capacity building and training

3. **CDM Potential in Power and Energy Efficiency Sector:** The Ministry recommends focus on five broad categories of energy efficiency projects that need to be focused, with an aim to develop PoA with an institutional leadership. This exercise must clearly address the key issues of identification of stakeholders, assigning roles and

responsibilities to these stakeholders and monitoring & verification requirements. These are:

i. **Renovation/ Retrofit:** energy efficiency projects that modify existing energy consuming equipment, processes or systems, or which modify the usage of Installations;

ii. **Replacement:** energy efficiency projects that replace existing Installations, with other Installations;

iii. **Green-field:** energy efficiency projects that install new installations that consume less electricity than other installations of the same type;

iv. **Fuel switch:** fuel switching projects; and

v. **Captive generation:** on-site electricity generation that replaces supply from the National Electricity grid.

The above form the priority options to tap opportunities in power generation, centralized and decentralized renewable energy options, energy efficiency in high energy consuming industries, commercial buildings and DSM. The following efforts are under implementation to promote cleaner technologies by leveraging CDM:

a. Removal of implementation barriers for renewables.

b. Regulatory incentives to promote cleaner technologies use in the country.

c. Energy conservation through technological up gradation of steel re rolling mills.

d. Promotion of Cogeneration

e. Super critical boilers in UMPPs

f. Promotion of public transport and fuel efficiency in the transport sector.

g. DSM initiatives in various sectors like industry, agriculture, SMEs, Municipalities, buildings, etc ·

The matrices of CDM opportunities that need to be harnessed, within the identified sectors, are as under

Power Generation	**Industry**
• Accelerated Renovation and Modernization of Old Plants • Clean coal technologies • Supercritical • IGCC based on indigenous coal • Efficient Gas (High efficiency GT based CC) • Renewables (Wind, Small Hydro, PV, Biomass)	• Efficiency improvement in existing plants (retrofit) • Introduction of Best Available Technology • Modernization of existing 4 and 5 stages to 6 stage systems (retrofit) (particularly in cement plants) • Waste heat recovery based cogeneration • Increased share of blended cement
Leveraging CDM to promote DSM	**SMEs, Buildings sector EE**
• Lighting DSM- use of efficient lighting • Municipalities and Agriculture DSM	• Appliance use efficiency • Green building

4. **Barriers to CDM in India**: To achieve market transformation by adoption of CDM, there is a need to identify and address barriers that have thus far resulted in market failures. They are:

(i) Lack of Methodologies

(ii) Lack of Incentives in the public sector

(iii) Issue of additionality and traceability

(iv) Innovative Financial Instruments to encourage CDM projects

(vi) Lack of the Designated Operational Entities (DOEs)

5. The Ministry, therefore, recommends adoption of a CDM Road Map by the government. The road map must address the issues outlined below in order to enable Indian entities to increase the global CER market share by at least 10% during the first commitment period and thereby bringing in revenue in excess of 100 million USD per year from 2010-11 onwards. They are:

a) The government's role must focus on providing an efficient and transparent regulatory framework for according host country approval, capacity building and enhancing data availability. Moreover, projects with small volume and dispersed nature (like energy efficiency) may require some concerted effort in project financing to reap the sustainability premium, as also aggressive tapping of opportunities from investors that are willing to pay a sustainable development premium such as the World Bank, GTZ, ADB etc.

b) Use of PoA in the sectors identified with an appropriate institutional leadership must be put in place to enable aggregation and lower transaction costs than in the classical project-by-project based CDM. In this regard Ministry of Power / Bureau of Energy Efficiency (BEE) along with MoEF (Ministry of Environment and Forests), could initiate programme of capacity building within the ministries of Government of India, various public utilities, and state-level agencies.

c) Sectoral focus on CDM would be a vehicle for sectors that are important for the sustainable development of India, but are less suited for conventional CDM. Here, the technical, economic, methodological, institutional, and legal basis has to be developed in parallel to the discussions for the second commitment period.

The CDM Road Map is at ***Annex-III-1***.

Energy Efficiency Financing Platform (EEFP)

Chapter-IV: Energy Efficiency Financing Platform (EEFP)

The overall energy efficiency investment market size under ESCO system of performance contract in India has been estimated by the ADB at Rs 140 bn (Rs. 14000 crores) (***Annex-IV-1***). A survey of international experience worldwide on the development of ESCO based energy efficiency market indicates the need for policy interventions, implementation of demonstration projects, promoting ESCOs, developing and standardizing sustainable contractual and legal documents and putting in place a financing mechanism as key elements. In all the markets where ESCO based energy efficiency investments have taken off, these barriers has being addressed through government interventions. BEE has undertaken measures to implement demonstration projects in Government buildings in order to stimulate the market development and by:

- Putting in place a Government supported standard methodology covering the entire project cycle from audit to performance measurement and verification.
- Design of standard performance contract.
- Design of financial mechanism for project funding.
- Project Implementation and post evaluation of impact.
- Capacity building among ESCOs and project owners.

The main issues that need to be addressed to promote financing of energy efficiency in India are:

(a) Identification of barriers for financing of energy efficiency projects

(b) Appropriate policy interventions that could overcome these barriers

(c) Standardisation of performance contract documents to ensure price transparency

(d) Capacity building of banks and financial institutions

2. **Barriers To Financing Of Energy Efficiency Projects:** Many studies have focused on the barriers that exist in India preventing financing of energy efficiency projects. These include a study commissioned by IREDA through Econeler and the World Bank Three Country Study. The main barriers identified by these studies are:

a) Financing Barriers:

Energy Service Companies (ESCOs) and building owners have insufficient access to project financing for up-front investment costs for energy efficiency retrofit projects. Some of the reasons for this are:

- The number of ESCOs is limited. Further, most of the ESCOs are service companies with balance sheets that are not strong enough to secure funding. Non-recourse finance is also not easily available given the high risk perception associated with this activity.
- Most banks require collateral of at least 100% of the loan value, which in light of the above, is difficult for ESCOs to provide.
- Most banks are yet to initiate comprehensive or long-term lending programs for energy efficiency projects. Moreover, domestic financial institutions are generally not familiar or adept at analyzing the financial aspects of energy efficiency projects, and hence even less willing to extend credit for these projects.
- Some banks are interested in the performance contracting model offered by ESCOs, but in most cases ESCOs do not have sufficient assets to provide the requite comfort to such banks.
- Focus on a minimum first cost and hence only rudimentary levels of energy efficiency are currently considered by building owners.

b) High Transactions Costs

Energy efficiency projects are relatively small and can carry high transaction costs for lenders and end-users, especially when using new and unfamiliar procedures

such as energy performance contracting.

c) Inadequate Information and Awareness

Local banks lack information about the financing aspects of energy-saving investments, the implementation experiences of others, and its pressing need for overall public good. Consumers and banks are less aware of financial options and benefits of energy savings, and have the perception that committed funds for energy efficiency projects carry very high risks.

d) Institutional barriers

Institutional barriers in terms of lack of focus on energy efficiency due to:

- The asset based lending stipulation of RBI that does not provide banks with adequate freedom to look at non-recourse lending without security
- The perceived risk of receivables as a result on yet undemonstrated efficacy of working of performance contracts
- Lack of fiscal incentives to banks under direct taxes a la infrastructure sector
- Absence of an institutional guarantee mechanism.

3 Financing Options:

The options available for the purpose of overcoming the barriers enumerated above are as follows.

i) CDM as a means of reducing financing costs

The enhanced use of energy efficient products and technologies is often constrained by their higher cost as compared to that of less efficient products. CDM could be utilized for risk mitigation and transfer of cleaner technologies in various sectors by moderating the cost of efficient products and technologies. Acceleration of CDM as a tool to promote energy efficiency is discussed in detail in Chapter-III.

ii) **Government interventions:**

In order to facilitate the entry of more players in the market to unlock the market potential, BEE has initiated several measures. They are:

- Increasing demand for energy services through Government programmes in commercial, municipal, agriculture and Small and Medium Enterprises sectors. The programme seeks to create over 1200 bankable energy efficiency retrofit projects covering the entire country.
- Enhancing credibility by empanelling 37 ESCOs selected out of a competitive bidding process after taking into account their technical and financial capabilities.
- Accreditation of ESCOs through rating agencies like CRISIL and ICRA to improve comfort level of financial institutions. 35 ESCOs have been accredited and graded in terms of their operational, financial and technical capabilities to give comfort to the facility owners and lenders.
- Creating a pool of trained manpower - certification programme for energy auditors has been going on and almost 5000 energy auditors and managers have been certified.
- Capacity building in creating a cadre of energy efficiency professionals to be given a thrust. 3 tier specializations in this field will be put in place. Capacity upgradation of States and other government agencies must also be taken up.
- Stimulating the states through their Designated Agencies and Utilities to take up ESCO based projects at the state level.

BEE has initiated an "**Energy Efficiency Financing Platform**" (**EEFP**) for promoting financing of EE projects. This financial mechanism in tandem with a robust ESCO industry could provide the necessary impetus. The EEFP seeks to encourage banks and FIs willing to take up ESCO based projects by enabling the following risk mitigation measures:

- Capacity building and awareness of the personnel in banks and FIs on performance contracting issues
- Aggregation of energy efficiency projects as a result of BEE schemes in different sectors
- Preparation of a shelf of bankable DPRs under the oversight of BEE
- Experience sharing and dissemination of national and international best practices in the field of energy efficiency financing

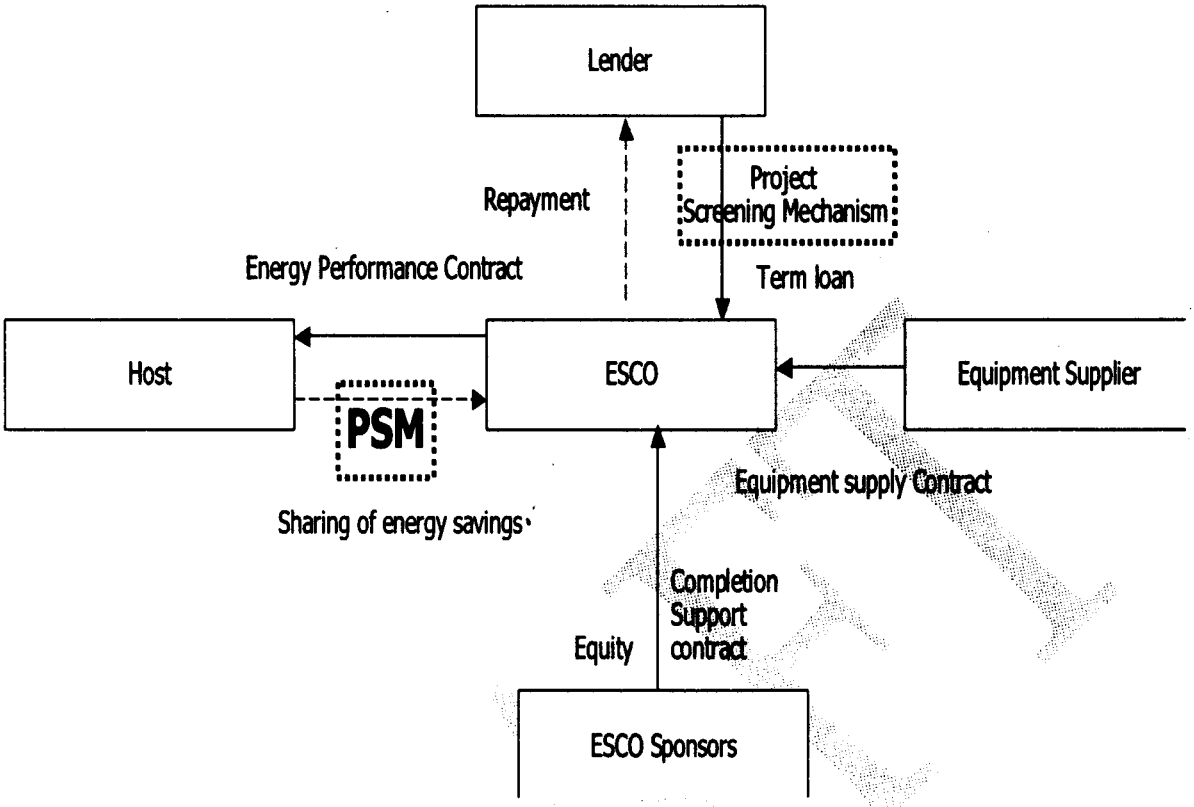
At present, PTC India Ltd. has signed an MoU with BEE. IREDA, ICICI, SBI and IDBI Bank have evinced interest in EEFP. There is a need to expeditiously expand the EEFP to encourage many more banks and FIs in financing EE projects.

4. Price Transparency:

EEFP, with many banks and FIs would help evolve the Performance Contract that captures future energy savings and performance guarantees by the vendor, baseline setting of the project, legal obligation of the utility owner and monitoring and verification with an objective to ensure price transparency. The essential components of ensuring price transparency would involve:

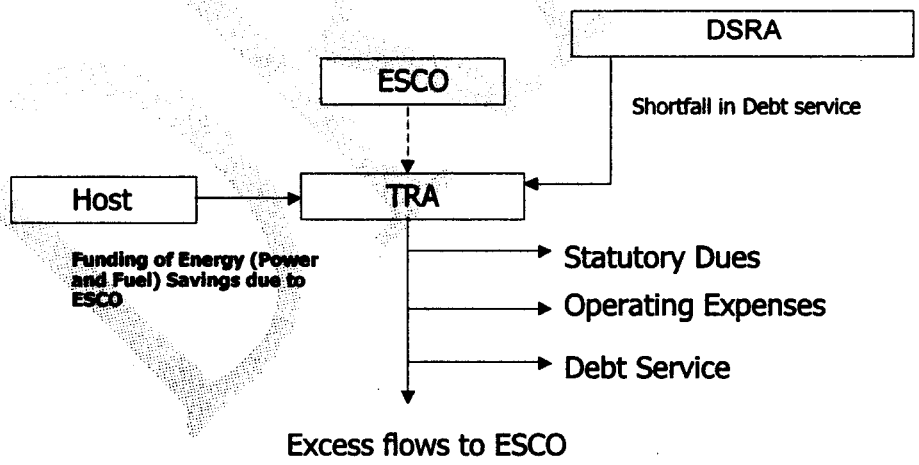
- Putting in place a standardised methodology covering the entire project cycle from audit to performance measurement and verification
- Robust baseline setting that takes into account seasonal and occupancy variations, renovations, etc.
- Design of standard performance contract
- Design of a robust payment security and financial mechanism
- Project monitoring and verification protocols

A suggested template for the same is as under:



The Payment Security Mechanism (PSM) for the above is as suggested hereunder:

Mechanism Explanation



⟶ Assignment of

a) Rights under Equipment supply contract to liquidated damage s

b) ESCO's energy efficiency assets (insurance policy)

⟶ Cash flows

4.1 Legal Documents and Parties Involved

The ESCO and the lenders to the ESCO may jointly appoint a mutually acceptable bank to act as the trustee and paying agent on behalf of the Lenders (*The Trustee Bank*). The Trustee Bank shall establish a Trust and Retention Account into which the Facility Owner will pay the energy saving payments as required under the Performance Contract. The Trustee Bank shall allocate all payments in accordance with PC and shall be bound by the terms of the contract (between the Trustee, ESCO, the lenders and the Facility Owner).

4.2 Operation of the Structure

The Facility Owner shall pay the full amount due and payable to the ESCO under the Energy Performance Contract directly into the Trust and Retention Account in accordance with the PC to take care of:

- Statutory dues of the ESCO viz. taxes, duties etc.
- Operating expenses as per agreed budget
- Payment of interest and principal
- Funding of a Debt Service Reserve Account*
- Payments to ESCO

The Debt Service Reserve Account is a liquidity support mechanism to provide comfort to lenders as it is expected that the reserve would have sufficient balance to meet a predetermined number of debt servicing installments. The DSRA is expected to be funded over the first 6 months by trapping the returns to the sponsors of the ESCO. This balance may be invested in permitted securities. If the DSRA is depleted, the sponsors of the ESCO would be required to build up the balance over the next quarter either though the cash flows of the ESCO (as per waterfall shown above) or if required through additional funds brought by the sponsors.

5. Capacity Building of Banks and Financial Institutions

The overall objectives of capacity building exercise are:

- To disseminate the information on opportunities for financing EE projects in different sectors
- To provide necessary financing guidelines and skills to appraise EEC projects
- To expose the bankers on the opportunity available for financing EE projects to their existing clients who are availing working capital and other loans
- To expose bankers to different financing models through the case studies on the financial viability of energy efficiency projects and how it would expand their own business in today's competitive environment.

5.1 The capacity building initiatives must also address specific issues of taking up energy efficiency projects in various sectors. The fact that the delivery systems for different sectors may vary, the capacity building must cover this aspect as well. The cornerstone of an energy efficiency project is Performance Contract (PC). The PC comprises of the following attributes:

- Performance contracting offers turnkey services, including feasibility analysis, design, engineering, construction management, installation, operation, maintenance, and financing;
- Performance contractors are compensated based on measured results;
- Most of the technical, financial, and operational risks are borne by the performance contractor.
- The payment under the PC is made on the basis of verified energy savings.

Although investment to improve energy efficiency are often cost effective and offer attractive rate of return, many potential investment opportunities are overlooked or given very little consideration because of a variety of reasons indicated in Chapter III earlier. Thus, the appreciation of the business models for these projects is limited.

Further, the fact that the cornerstone of the ESCO business is contingent upon performance of energy efficient equipments (which usually is relatively uncertain given the information asymmetry), the willingness of banks and financial institutions to provide financing without collateral is rather limited. Thus there is a need to inform the banks and financial institutions to the innovative business models in necessary to reduce their risk perception. Also, training on the appraisal techniques for these projects must also be taken up. The key elements of the module that is suggested must have the business models, appraisal process and case studies of successful projects.

5.2 The training module must cover at least the following elements:

(i) **Business Models**

(a) Energy Audit Model

(b) Guaranteed Savings Model

(c) Shared savings Models

(ii) **Appraisal**

(a) Promoter Appraisal

(b) Technical Appraisal

(c) Financial Appraisal

(d) Environmental Appraisal

(e) Legal Appraisal

Detailed contents that must form part of the training and capacity building in financial institutions and banks are at ***Annex IV-2.***

Framework for Energy Efficient Economic Development (FEEED)

Chapter-V: Framework for Energy Efficient Economic Development (FEEED)

There is a need to provide appropriate fiscal instruments that may supplement the efforts of the government for creation and energy efficiency market. The fiscal instruments must be designed to address the following issues:

(a) Providing comfort to lenders by provision of a risk guarantee for performance contract;

(b) Provision of a venture capital fund from the Government to provide equity for energy efficiency projects in a bid to unlock the market;

(c) Promoting leadership in the public sector to take up energy efficiency

(d) Promoting energy efficiency in public procurement based on life cycle cost analysis

(e) Promoting regulatory incentives to state utilities by the Electricity Regulatory Commissions for DSM projects; and

(f) Providing tax and duty concessions to attract investment in this sector.

2. Partial Risk Guarantee Fund (PRGF)

The partial guarantee is a risk-sharing mechanism that will provide commercial banks with partial coverage of risk exposure against loans made for energy efficiency projects to mitigate the risk perception associated with the lending for new technologies and new business models associated with energy efficiency projects. This will be in addition to the risk cover available from the Credit Guarantee Trust of India – lending institutions need to be made aware about this organisation. The guarantee will directly support financing of energy efficiency projects by:

(i) Addressing credit risk and transaction structuring barriers to energy efficiency finance,

(ii) Engaging and building capacities of commercial financial institutions to provide financing for energy efficiency projects on a commercially sustainable basis.

The PRGF will act as a first loss, subordinated recovery guarantee and will be placed in a guarantee reserve account and will be paid out to participating banks in the event of a loss or default. The amount paid out will be equal to the amount of outstanding principal times the guarantee percentage, and will not cover accrued interest or other fees owed to the bank. The lending banks will also pursue recovery procedures in the event of default, and will pay to PRGF any monies recovered after first satisfying its own receivables. A note on PRGF is at ***Annex-V-1***.

3. Venture Capital Fund for Energy Efficiency (VCFEE)

While debt capital is being secured through a host of interventions like the EEFP, the PRGF and the Credit Guarantee Trust of India, there is also a requirement for venture capital investment as equity in these projects. This will ease a significant barrier from the viewpoint of risk capital availability to the ESCOs. Further, this fund, set up with initial seed capital from Government under the EEFP, can be expanded by contributions from other agencies as well. The Ministry of Power recommends that the Government must promote a corpus of funds from its budget for setting up the VCFEE as well as the PRGF. To begin with, it is recommended that these two instruments may be used for promoting energy efficiency in government buildings through the ESCO route. In order to do so, a fund size of Rs. 170 crores has been estimated as indicated in ***Annex-V-2***. This fund can be managed by the institutional framework of EESL that is also been recommended herein. International experiences surveyed by the Ministry indicated government leadership in promoting such funds to promote markets for energy efficiency. These funds have been used for both risk capital as well as for guarantees. A summary of some of these international experiences is at ***Annex-V-3***.

4. Incentives to Central Public Sector Undertakings (CPSUs) to take up energy efficiency

The Ministry recommends the need for issuance of policy guidance to CPSUs to take up energy efficiency projects in their own facilities. This guidance could include issues like procurement of energy efficiency products by application of life cycle cost analysis, undertaking energy audits of all the existing facilities and implementing their recommendations, adoption of Energy Conservation Building Code (ECBC) launched by Ministry of Power for all new constructions, etc. To institutionalize this process, the need for including a special parameter (to be called Energy Efficiency Performance Index (EEPI) on the line of KPI) may be added to the MoU guidelines. This will result in its adoption by all CPSUs as a part of their commitment to the Government under the MoU. An expert committee comprising of representatives from Ministry of Power, BEE and Department of Public Enterprises can be formed to prepare the same. The EEPI should be included as a MoU parameter w.e.f FY 2010-11.

5. Energy Efficient Public Procurement

Public sector is a major procurer of goods and services. It is necessary to introduce energy efficiency procurement in governments to not only promote the market for such goods and services but also to provide leadership to other entities to do so. The need for amendments in the extant policy regime for introduction of energy efficient public procurement and life cycle cost analysis cannot be overemphasized. It is important for the Government to mandate energy efficient public procurement. To begin with, it could issue appropriate directives to Ministries/ Departments for mandatory procurement of 3 STAR and above equipments, conducting energy audits in buildings and implementing the recommendations to reduce energy bills, using ECBC for all new constructions, etc. It is also recommended that the General Financial Rules issued by Ministry of Finance may be amended to incorporate life cycle cost analysis as the norm for public procurement as against least cost.

6. Support and Assistance to Electricity Regulatory Commissions for stimulating Utility driven DSM

There is a need to engage with the regulators to provide incentives to utilities to take up DSM measures. At least one of the regulators, viz., the Maharashtra Electricity Regulatory Commission (MERC), has already taken steps in this regard. The Maharashtra ERC case study is at ***Annex-V-4***. Some of the measures that ERCs need to take are:

a. Develop a mechanism to enable utilities to recover the costs incurred in performing DSM related activities. The ERC may also approve the expenses in accordance with the mechanism set up for this purpose.
b. Develop guidelines for evaluating DSM options and integrating DSM options with supply side options.
c. Regulatory intervention to ensure that all utilities under its jurisdiction follow a consistent set of methods and procedures for DSM plan, design, preparation, period, load research, consumer surveys, cost-benefit assessment, technology assessments, etc.
d. Evolve suitable monitoring and verification protocols for DSM programmes.
e. Develop suitable incentive mechanisms, which will enable sharing of benefits between the consumers and the licensees.

7. Tax/ Duty Exemptions for Promotion of Energy Efficiency

The energy efficiency market in India is nascent and there is a need for government interventions to stimulate it. While efforts are being made by the Ministry of Power and BEE to increase demand for energy efficiency services and products, increase the availability of professionals like energy auditors and managers, Energy Service Companies and a financing platform, the need for providing fiscal incentives for preventing market failures cannot be overemphasized. At present, there are no tax or duty benefits that can attract the industry to this field. The accelerated depreciation for

certain products under the Income Tax Act is appropriate for manufacturing units, and does not provide a direct signal to consumers to purchase energy efficient products.

The need is to have fiscal incentives to give a fillip to this activity - and as indicated in the proposals, most of them are revenue neutral and as supplements to the larger government programme to stimulate market transformation in favour of energy efficient products and services. These incentives could be made time bound for a pre-specified period. Specific exemptions for investments in energy efficiency projects and venture capital in this sector is proposed under direct taxes, while reduction of VAT on energy efficient devices like CFLs and graded excise duties for BEE star labeled equipment and appliances is recommended. The detailed set of recommendations is at ***Annex-V-5***.

Institutional Arrangements

Chapter-VI: INSTITUTIONAL ARRANGEMENTS

The Ministry reviewed the institutional structure that is necessary for effective implementation, based not only on the recommendations of both the Working Groups but also on the need to promote implementation of the existing programmes of BEE. The Ministry of Power recommends the Mission to have a close coordination with BEE and must work under the overall regulatory, administrative and policy guidance of MOP and BEE. BEE needs to be strengthened to as the present organisational structure as well as its institutional capacity is inadequate for taking activities at the scale that is necessary. Even if the capacity of BEE is enhanced, and BEE is redirected to expand its quasi-regulatory role to add the policy and project implementation role as well, there is a possibility of a conflict of interest given that the implementation process is completely market based. The primary responsibility of BEE of providing quasi-regulatory oversight on the sector as well as policy advisories to central and state governments may come in conflict with the proposed implementation role. The Ministry, therefore, recommends that:

(a) There is a need to increase the manpower strength in BEE to oversee the implementation of the energy efficiency action plan as well as the NMEEE;

(b) Separating the quasi-regulatory role of BEE from the implementation, capacity building, market transformation and awareness creation roles, that it is presently undertaking, and setting up of Energy Efficiency Services Ltd. (EESL), as a Joint venture public entity, to address the implementation requirements.

(c) A three tier monitoring structure to ensure speedy implementation of mission.

2. **Strengthening of BEE**: The present sanctioned strength of officers in BEE is 8, including the posts of Director General and Secretary. The other 6 are posts of Energy Economists (EEs), in the rank of Directors to the Government of India. Presently 5 EEs are in position and are handling, alongwith the Secretary, 8 national programmes for energy efficiency, over 10 bi-lateral and multilateral cooperative programmes, climate

change related to energy efficiency, awareness creation, etc. The need for creating new positions for NMEEE cannot be overemphasized given that the present staff is already overstretched. Further, the staffing patter of BEE is also flawed as there are no technical posts below the EEs (The total sanctioned strength is 18 of which 9 are non-technical staff, 8 officers and 1 Finance and Accounts officer). The following additional posts are recommended to adequately strengthen BEE to enable it to discharge the expanded mandate:

S.No	Post *Rank*	Sanctioned Strength	Working Strength	Recommended
1.	Director General *Addl Secretary*	1	1	1
2.	Deputy Director General (DDG) *Joint Secretary*	Nil	Nil	2
3.	Secretary *Director*	1	1	1
4.	Energy Economist *Director*	6	5	10
5.	Asst. Energy Economist (AEE) *Deputy Secretary*	Nil	Nil	10
6.	Private Secretary *Under Secretary*	1	1	3
7.	PR/ Media officer *Under Secretary*	Nil	Nil	1
8.	Finance and Accounts Officer	1	1	2

	Under Secretary			
9.	Accountant/ Administrative Assistant *Section Officer*	2	2	4
10.	Stenographers	5	5	10
11.	Driver	1	1	3
	Total	18	17	47

2.1 **Functional Justification for Additional Posts**: Most of the additional posts are being sought at the officer level; 2 posts of DDG (at JS level), 4 posts at EE level and 10 posts at AEE level. The posts of DDG are required to oversee the implementation of NMEEE. This is because of the fact that the mission involves many different stakeholders like Central and State Governments, Ministries, Industries, Financial Institutions, etc. For instance, in the PAT scheme, there is a need of active coordination with 5 different Ministries of the Government of India (Power, Fertilizer, Industry, Railways, and Textiles), apart from the industry, exchanges, energy auditors, etc. In the financing part, similarly, engagement with Ministry of Finance, RBI, Banks and FIs, ESCOs, Government Departments, etc. needs to be undertaken. BEE being the nodal agency for implementation requires senior positions at the level of Joint Secretary take up this job. Further, the fact that these are relatively new initiatives that have not been implemented earlier in India makes it incumbent to have a dialogue with the stakeholders at a sufficiently senior level for faster decision making. Given that NMEEE has two distinct areas of operations, namely PAT mechanism and financing of energy efficiency, the two posts of DDG are necessary to effectively manage these initiatives. The DDGs will be:

(a) The nodal officers for the two parts of the NMEEE;

(b) Responsible for day to day activities relating to the NMEE under their respective jurisdiction;

(c) Responsible for coordination with the different stakeholders that are integral part of the NMEEE.

(d) Responsible for ensuring fiscal prudence of public expenditure related to the NMEEE.

2.2 **Creation of EESL as an Implementation Entity for energy efficiency**: The Ministry is of the considered opinion that it is necessary for the government to provide the impetus by creating a separate organization as indicated earlier in the draft outline of the NMEEE. The need for setting up of a corporate entity (Energy Efficiency Services Ltd. (EESL)) in the public sector that can function on commercial lines under the overall administrative, policy and regulatory oversight of Ministry of Power and BEE cannot be timelier. It could:

(a) Lead in implementing energy efficiency projects on performance contracting mode with ESCOs. This is important to demonstrate the efficacy of the business model both to owners as well as to financial institutions.

(b) Create of partial risk guarantee fund to provide the necessary risk mitigation to ESCOs and take EEFP forward

(c) Secure trained manpower given lack of posts and the low government salary structure. At present the additional requirement is either being outsourced or engineers being taken on short term contracts. In both the cases, quality manpower is not getting available to BEE to discharge the implementation role.

(d) Leverage multilateral and bi-lateral initiatives to promote energy efficiency in the area of financing like provision of risk guarantee fund, where ADB, World Bank, JBIC and GEF have shown considerable interest

(e) Enter into partnerships, JVs with other implementing partners like ESCOs, industry, etc. to promote energy efficiency.

(f) Help leverage the expertise of BEE to provide consultancy services to private and public sector in the areas of energy efficiency, CDM, etc.

(g) Provide institutional support for overseeing the Perform Achieve and Trade mechanism.

2.3 The Ministry has, in-principle, agreed to the formation of EESL. The business plan has been formulated which indicates an initial investment of about Rs. 190 crores and an IRR of 22%. A summary of the business plan is at ***Annex-VI-1.***

3. **Monitoring of NMEEE**: A three tier monitoring structure is proposed for NMEEE to ensure that the timelines indicated in Chapter VIII are adhered to. The same is as under:

(a) The MOP has set up a multi-disciplinary Steering Committee to prepare the detailed implementation plan. The Steering Committee, chaired by Secretary, Ministry of Power, having representatives from all the 5 related Ministries, CII/ FICCI, Industry Associations, NGOs, NSDL, Power Exchanges, CPSUs, etc. and Director general as the Convener, may be the apex body to monitor the implementation plan on a quarterly basis.

(b) Director General, BEE to review the progress of implementation with the relevant agencies on a monthly basis.

(c) The Deputy Director Generals in BEE, being the nodal officers incharge of the two parts of the mission, will undertake a weekly review with the technical officers of all concerned.

Financial Requirements

Chapter-VII: Financial Requirement

Additional funding is required for the activities mentioned in the National Mission for Enhanced Energy Efficiency (NMEEE), over and above the funding resources available with BEE. The funds are required for the following activities necessary for operationalising the four new initiatives outlined in NMEEE. They are:

(a) Mandatory baseline survey for all Designated Consumers.

(b) Setting up of a trading platform for PAT Mechanism.

(c) Monitoring and verification of sample DCs for ensuring the credibility of PAT Mechanism.

(d) Administrative expenses as a result of the additional work and positions sought for BEE.

(e) Provision of Partial Risk Guarantee fund and Venture Capital fund for enhancing energy efficiency.

(f) Creation of Energy Efficiency Services Limited (EESL) as a separate public sector implementing entity for energy efficiency.

2. The requirement of fund could be categorized as under, taking into consideration the nature being recurring or non-recurring:

(i) **Non-Recurring:** Plan funds are required as one time expenditures for activities indicated at (a), (b) and (e) above. These are expenditure for initiation of the activities and cannot be borne by any other entity. For initiation of the PAT scheme, there is a need for arranging baseline surveys in each designated consumer by agencies accredited by BEE to ensure the accuracy of the baseline as well as its credibility, given that the baseline forms the basis of the entire trading activity. There are at present about 762 identified designated consumers in 9 notified sectors. Experience indicates that the cost for undertaking energy audit can be divided into three broad categories based on their relative complexities. They are

S. No.	Industries	Total Number	Unit Cost of Energy Audit (Rs)	Total Cost of Energy Audit (Rs)
1.	Thermal Power Plants, Fertilizer Sector	170	10 Lakhs	17 Crores
2.	Cement, Chlor-Alkali and Iron & Steel Sector	260	6 Lakhs	15.60 Crores
3.	Other Sectors	332	4 Lakhs	13.28 Crores
4.	**Total**	762		45.88 Crores

Thus a onetime expenditure to create credible baseline for each designated consumer will be required. This activity needs to be completed by March, 2010 to initiate the PAT scheme.

To create a seamless trading platform, there is a need to commission a detailed study for creation of trading platform, firming up trading protocols, depository protocols, and accounting procedures. Based on the information provided by the recently set up Power Exchange, the estimated amount required for this activity is around Rs.5 crores. The total onetime expenditure for initiation of the scheme is estimated to be Rs. 50.88 crores for the year 2009-10. EESL can be the agency that can be asked to undertake this activity.

The Ministry strongly recommends provision of funds from the Government budget for setting up of Partial Risk Guarantee fund and Venture Capital fund for energy efficiency. The Annex-V-2 proposes a requirement of Rs. 170 crores for the above, over a period of three years commencing with 2009-10. The fund can be managed by EESL.

(ii) **Recurring:** Activities indicated in (c) and (d) require an additional revenue stream to BEE for providing compliance checks in form of energy audit of about 10% of designated consumers selected randomly, to ensure reliability of the ESCerts claimed by

the DCs. Based on the estimates as indicated in Para (i) above, the yearly outgo would be Rs.4.6 crores.

The additional 29 posts required as indicated in para 2 of the Chapter VI will require an additional annual expenditure of Rs.3 crores.

Therefore the total additional out go is expected to be Rs.7.5 crores annually that will require additional source of funding. Given that the Government decided on providing a corpus fund to BEE in 2003 to take care of its administrative expenditure, the same model is proposed here as well. The additional requirement of Rs.7.5 crores annually could be easily met by enhancing the corpus by 75 crores to Rs. 125 crores.

(iii) **Financial requirement for EESL:** As per the decisions taken in the meeting held in Ministry of Power on 29th October 2008, EESL will be created by four CPSUs namely PFC, REC, PGCIL and NTPC with an equity investment of around Rs.190 crores. The Company would serve the National need for a public sector entity exclusively dealing with implementation of energy efficiency activities.

3. The total funds required from the budget of government of India is Rs. 295 crores as indicated hereunder:

Rs. crores

Item	2009-10	2010-11	2011-12	Total
PRGF& VCFEE	120.27	24.6	24.6	169.47
PAT Scheme	50.88	-	-	50.88
Augmentation of BEE corpus	75.00	-	-	75.00
Total	246.15	24.6	24.6	295.35

The equity of Rs. 190 crores for EESL is to be contributed by the CPSUs of MOP. **The total requirement projected under the NMEEE is Rs. 485 crores. This could help attract private sector investment in energy efficiency market which is estimated at Rs. 14,000 crores.**

Timelines

Chapter-VIII: Timelines

1. **PAT scheme**: BEE has already initiated the exercise to specify energy consumption norms for Pulp & Paper, Cement, Chlor-Alkali, Fertilizer, Aluminum and Textiles by engaging agencies to collect the relevant plant level data. Steel and Power sector analyses are being initiated. The draft SEC targets are expected to be prepared for all the above sectors by March, 2009. The baseline study and the trading platform must be established by March, 2010.

2. **Market Transformation for Energy Efficiency (MTEE):** The National CDM Road Map must be published by the Government by March, 2009 after due consultations. In the case of Municipal sector, the PoA is to be prepared by March, 2009; Agriculture sector and Distribution Transformers by September, 2009 and Buildings by December, 2009.

3. **Energy Efficiency Financing Platform (EEFP):** This is an ongoing activity therefore no time frame is suggested.

4. **Framework for Energy Efficient Economic Development (FEEED):** Tax and duty concessions suggested may be taken up by the Government in the next annual budget. The provision of additional fund of Rs. 295 crores must be provided to BEE from the year 2009-10.

5. **Capacity building and training of banks and FIs**: The training module of the banks must be prepared by March, 2009. The training must commence with banks and FIs in FY 2009-10 for those on the EEFP.

6. **Institutional Support**: EESL must be considered for incorporation by March, 2009 so as to enable implementation of the activities from FY 2009-10.

Annexes

Chapter-I

Annex I-1

No.2/6/2008-IC

Government of India

Ministry of Power

***

Shram Shakti Bhawan, Rafi Marg,

New Delhi, the 19th November, 2008.

OFFICE MEMORANDUM

Subject: Constitution of a Steering Committee on National Mission on Enhanced Energy Efficiency (NMEEE) under the National Action Plan on Climate Change - Regarding.

A Steering Committee, consisting of following members, was constituted under the Chairmanship of Secretary, Ministry of Power to prepare the Mission Document on National Mission for Enhanced Energy Efficiency with the following composition:

(i) Chairman, CEA
(ii) Additional Secretary (IC), Ministry of Power
(iii) Principal Secretary (Energy), Tamil Nadu, Gujarat & Haryana
(iv) Chairman, PFC
(v) Chairman, REC
(vi) Chairman, NTPC
(vii) Shri A. K. Sachan, Member, Assam State Electricity Commission
(viii) Representative of CII
(ix) Representative of PRAYAS, Pune
(x) Representative of TERI, New Delhi
(xi) Representative of PCRA, New Delhi
(xii) Prof. Ambuj Sagar, IIT, Delhi
(xiii) Secretary, CERC, New Delhi
(xiv) Representative of Planning Commission
(xv) Representative of MoEF
(xvi) DG, BEE - Convener
(xvii) Representative of DIPP

3. With the approval of the competent authority it has been decided to co-opt the following as members of the Steering Committee:

(i) Representative of Ministry of Coal
(ii) Representative of Ministry of Petroleum & Natural Gas
(iii) Representative of Department of Road Transport and Highways
(iv) Representative of Department of Heavy Industries
(v) Representative of National Manufacturing Competitive Council
(vi) Chairman of the Working Groups I, II & III constituted under the Steering Committee.

(A. A. Tazir)

Deputy Secretary (IC)

Telfax: 23715595

Annex-I-2

Consolidated Comments of Prayas Energy Group on Plans of National Mission on Enhancing Energy Efficiency (NMEEE)

November 27, 2008

Introduction

Prayas Energy Group (PEG) is pleased to be part of the process for the development of NMEEE, and has provided comments at various meetings and in writing. In addition, we organized a roundtable on November 14, 2008 in Mumbai for discussion and sharing of ideas that focused on larger issues about how to rapidly improve the efficiency of energy use in India. The roundtable had two objectives: (1) To identify innovative policy options for rapidly expanding energy efficiency in India; and (2) To suggest additions or modifications to the initiatives being considered under NMEEE. In addition, we reviewed inputs on the summary note on NMEEE that was posted for comment on the BEE website. Our comments and recommendations in this document are a consolidation of the observations and recommendations of these individuals and organizations and our own thoughts on NMEEE. In developing these comments, we have benefited greatly from the comments of these various individuals and organizations who participated in the roundtable and those who sent in comments, and we are grateful to them. A list of the individuals is provided as an Annexure to this document.

Overall Issues

Need for Time-Lines

While the NMEEE Plan is quite comprehensive in scope, in many places it is not clear when certain activities will be carried out. Given the urgency due to issues of energy security, climate change and the need to rapidly re-shape the development path of the country, it is important that NMEEE have clear time-lines and plans of action for implementation of various measures to improve energy efficiency (EE).

Overall Monitoring of NMEEE

Another area that deserves attention is the need for overall monitoring of the various initiatives so that goals are met and/or mid-course corrections can be made to ensure success. In order to facilitate such monitoring we suggest that a sub-group within NMEEE carry out quarterly monitoring of timelines or schedules for the initiatives. Assessment of the impact of NMEEE is just as important; therefore, we also recommend that a sub-committee be formed to monitor savings through a well-designed procedure.

Need for an Implementing Agency

Some participants pointed out that per the EC Act, BEE is not the agency responsible for implementing the EC Act but instead is an advisory body. GoI and the State governments are the implementing bodies. They argued that because success of NMEEE hinges on the presence of a strong implementing agency, problems due to lack of an implementing agency needed to be addressed. Alternatively, it was suggested that MoP should designate BEE as the implementing agency for EE, on behalf of GoI.

Coordination with Other Missions

There is considerable overlap between NMEEE and other missions of the National Action Plan on Climate Change (NAPCC). Some issues are handled exclusively by one mission and not another while other issues are covered by more than one mission. For example, biomass is not covered in NMEEE but is referred to, to some extent, in the National Mission on Sustainable Habitat (NMSH). Promotion of urban public transport is not covered by NMEEE but is covered under NMSH. However, it seems that freight and inter-city transportation is not covered by any of the missions of the NAPCC. Residential and Commercial energy efficiency is covered both by NMEEE and NMSH. Furthermore, while there is no direct overlap between NMEEE and the National Solar Mission (NSM), clearly coordination will be required particularly regarding the Technology Strategy for the Power Sector (TSPS) initiative of NMEEE.

Thus there is a clear need for coordination between the different missions in order to avoid duplication of effort or working at cross-purposes. In addition, attention should also be directed to areas not covered by any of the missions such as freight and inter-city transport, and domestic use of petroleum products. We suggest the establishment of a mechanism of regular interactions between relevant missions to ensure effective coverage of issues and cross-pollination of ideas.

EESL - Business Plan

We agree with the need to set up EESL to implement energy efficiency programs and transform efficiency markets. Further, we commend the selection of a name such as EESL which clearly signals the separation between the quasi-regulatory body (BEE) and the implementation agency. However, we are concerned that as proposed, EESL will be operating both as an ESCo and as the monitoring and implementing agency for the various initiatives of NMEEE and BEE, thus creating a potential for a conflict of interest. Therefore, we recommend that after three years, the monitoring and implementing functions of EESL be separated into another company separate from the ESCo, and that such a provision should be written into the constitution of EESL.

Perform, Achieve and Trade (PAT) Mechanism

We think the use of plant-specific energy intensity is superior to other metrics that have been suggested in discussion of sectoral approaches to improving energy efficiency.

Furthermore, we find that top management is often unaware of the energy use of the plants because many of them often come from financial backgrounds and therefore are more focused and attuned to strictly financial issues. PAT would create awareness of how a company's performance on energy use compares with its competitors throughout the country. Energy efficiency will vary with changes in product mix. For example, for a cement plant the energy intensity will increase if the granularity of the particles is decreased (finer particles). Similarly for textile mills, not just the material used but even the number of twists of yarn per inch will affect the energy intensity. Therefore, the effects of product mix need to be taken into account in the PAT mechanism. Otherwise, PAT would be a mechanism to promote products that are less energy intensive but not necessarily to processes that are more energy efficient. We suggest that the reporting requirements for the designated consumers include requirements to report the product mix so that the plant owner is rewarded for real improvements in efficiency and not apparent improvements due to changes in the product mix.

Furthermore, it would be very useful if in addition to the inefficiency of the overall process, managers also got information about the inefficiency of each sub-process. This would make it easier for the management to target EE improvement efforts. Other countries have local centers of excellence which cater to industries predominant in those respective geographic areas. These centers provide the detailed info for assisting companies in targeting their EE improvement efforts. Similar organizations in India should be identified and created where they do not exist, and funds should be allocated for this purpose.

M&V for the PAT mechanism is going to be critical to the success of the initiative. BEE should get inputs from the designated consumers and their associations so that the M&V protocols are developed collaboratively. We support BEE's recommendation that M&V should be done by accredited agencies. Further as BEE is considering, in order to make the monitoring easier, the data reported by the designated consumers should be sent electronically. This will make it easier to check for anomalies and to check trends in the data. Mandatory real-time metering of electricity and other such monitoring should be considered as far as possible.

In order to discourage cheating, BEE should list upfront the penalties for providing false information. As the paper based on the experience from the US programs asserts, "Vigorous enforcement of violators sends a message to the entire regulated community that non-compliance will not be tolerated." Therefore, the penalties should be high and linked to inflation so that their impact is not reduced over time. Fortunately, many of the 600 designated consumers are likely to be PSUs. So, the likelihood of false reporting, market manipulation etc. is low.

It is very likely that PAT implemented as is will result in a mismatch between supply and demand of ESCerts. One of the commenters has suggested a possible solution wherein the market for trading would open a year before the target date. This would allow price discovery and allow consumers to take additional action for savings thus

increasing the supply of ESCerts. In any case, the market for ESCerts is likely to be thin and thus there could be great price volatility. A ceiling and floor price with a ratio of say 1:10 could be used to contain the volatility.

It is not clear if PAT will be used for the power sector. We think that PAT is not required in the power sector since prices etc. are regulated, and EE can be promoted simply by the regulator tightening the norms for performance that are part of the tariff-setting process.

The suggestion to combine renewable energy (RE) certificates with EE certificates should be evaluated cautiously because RE and EE are different products and there are several unresolved issues in combining them in a single trading mechanism.

Market Transformation for Energy Efficiency (MTEE)

Regulatory Commissions

Regulators can play a crucial role for energy efficiency and in implementing NMEEE. While sections 61(c), (d), (e) of the EAct read with section 86(1)(b) can be interpreted to enable regulators to pursue DSM, some ERCs may still be reluctant to push DSM because they may feel that they do not have an explicit mandate to do so. Therefore, MoP should issue a policy directive clarifying that DSM is indeed part of the ERCs' mandate. In turn, the ERCs can require utilities to implement DSM on priority.

Other actions could be taken to promote energy efficiency throughout the country. For example, for inclusion in capex plans, ERCs should mandate utilities to do all procurement on the basis of life cycle cost analysis. Alternatively, procurement should only be allowed on the basis of a minimum star-rating (say 3 Star) to improve EE.

In addition, tariffs should be used to encourage energy efficiency programs. The government should issue a policy directive appropriately interpreting Section 61 and 62 of the EAct to clarify that ERCs can use tariffs to promote EE. This may give room to utilities to design better incentives and penalties through tariffs.

Utility DSM

Utilities may be reluctant to get into DSM because it is unfamiliar territory and utilities are highly risk averse. In order to reduce this risk, there should be one centrally funded demonstration DSM project in every state to encourage utilities to take up DSM. Success in these demonstration projects will create the momentum for implementation of DSM projects by the utilities themselves.

Standards and Labels (S&L)

Based on comments from participants at the roundtable, there seems to be a preference for mandatory minimum requirements on standards and labels (S&L). Voluntary standards may have worked for some appliances, but they are perceived to have not

worked for other appliances with many manufacturers sitting on the fence. Mandatory motor efficiency standards in US have pushed efficiency for motors much more than in India and Japan which have used voluntary standards. (According to one of the participants at the roundtable, EFF1 standard > 80% penetration in US with two levels above EFF1, while in India it was less than 5% EFF1).

Apart from imposing standards, there is also a need to push manufacturers to produce efficient equipment. This can be done by mandating all public procurement to be for products that meet at least say, a 3 star rating. Further, we suggest that those government agencies not meeting the minimum star rating in their procurement be required to justify their decisions based on life-cycle costs. All organizations requiring an audit by CAG or other such government organizations should be required to do this.

There should be an automatic mechanism to update the star label of a product category. Once the percentage of the highest efficiency star rating product sold - out of all new appliances of this category sold - reaches a pre-determined threshold, the labels should be automatically revised. Alternatively, the labels should be revised after a certain pre-determined period, say 2-3 years.

Procedures should be developed to monitor the benefits and impacts and appropriateness of S&Ls so that modifications can be made as required. This will involve monitoring of the changes being brought about by S&Ls in the respective markets.

For the development of EE options that may be expensive and may not happen on their own, an approach similar to the "golden carrot" approach can be followed. Thus expensive EE options could be supported through utilities' contributions.

Awareness and Education

During the roundtable, some of the participants pointed out that issues about the environment have been integrated in educational curricula but issues related to energy have not been integrated. This needs to be done. Furthermore, contradictory statements about environmental issues in the textbooks should be removed (e.g. natural resources are abundantly available and free of costs). BEE should commission a study to identify all such statements in text books in all states.

In addition, a network of professional colleges should be established to carry out education, research and development on EE.

Important Action Points

In conclusion, we list some of the important action points that will enhance energy savings under NMEEE:

- Products to be procured by government bodies must meet at least, say a 3 Star rating. Any agency not meeting the minimum rating must justify its procurement decision on life-cycle cost analysis (LCCA).
- ERCs should ensure that procurement of equipment by utilities for inclusion in their capex plans is done on LCCA
- Based on sections 61(c), (d), (e) and section 86(1)(b) of the EAct, MoP should give a directive to ERCs that
    - ERCs should require adoption of cost-effective DSM by utilities
    - Tariffs can be used for encouraging EE
- BEE should move quickly towards mandatory standards and labels
- There should be automatic updating of standards and labels.

ANNEX-II-3

Working Group-I: Composition and Terms of Reference

Composition

S. No.	Working Group Members	Name of Representatives Nominated
1	Additional Secretary (AK), Ministry of Power **-CHAIRMAN OF THE COMMITTEE**	Shri Anil Kumar, Additional Secretary,
2	Representative of Min. of Steel	Shri A.C.R. Das, Industrial Advisor
3	Representative of Dept. of IPP	Shri N. N. Prasad, Joint Secretary
4	Representative of Min. of Railways	Smt Manju Gupta
5	Representative of Min. of Textiles	Shri J. K. Sharma, Joint Secretary
6	Representative of Min. of Fertilizers	Shri A.K. Parashar, Economic Advisor
7	Representative of CII/FICCI	Dr. Vivek Pandit, Additional Director, FICCI, Shri R. Raghuraman, Advisor Energy, CII
8	Representative of NSDL	Sh Nitin Joshi
9	Representative of Power Exchange	Smt Rupa Singh
10	Representative of DNV	C. Kumaraswamy
11	Representative of MoEF	Shri R. R. Rashmi, Joint Secretary
12	Representative of MNRE	Shri A.K. Varshney, Director
13	DG, Bureau of Energy Efficiency **-Convener**	Dr Ajay Mathur
14	JS (EC), Ministry of Power	Shri Devender Singh

15	JS (Th.), Ministry of Power	Shri V. P. Joy
16	Representative of MSEB, Mumbai	Shri V.M. Baswante, Chief Engineer, MSEDCL
17	Secretary (Power), Govt. of Haryana	
18	Prof. Ambuj Sagar, IIT, Delhi	Prof. Ambuj Sagar, IIT-D,
19	Representative of TERI	Shri Girish Sethi, Director
20	MoPNG	Ms. Aditi Ray, Economic Adviser
21	Joint Secretary (Refineries), MoPNG	Shri Dependra Pathak, Director,

Terms of Reference:

(i) Methodology for setting Specific Energy Consumption (SEC) norm for each designated consumer in the baseline year and in the target year.

(ii) Verification process for SEC of each designated consumer in the baseline year and in the target year by an accredited verification agency

(iii) Issuance process for Energy Savings Certificates (ESCerts) to those designated consumers who exceed their target SEC reduction

(iv) Trading Process for ESCerts

(v) Compliance and reconciliation process for ESCerts.

(vi) Cross sectoral use of ESCerts and their synergy with Renewable Energy Certificates.

Working Group-II: Composition and Terms of Reference

Composition:

1. Sh. S. Behuria, CMD, IOCL, Chairman
2. Sh. Devender Singh, Joint Secretary, MOP- Convener
3. Shri Sunil Verma -Chairman, Member (E&C) Central Electricity Authority
4. Shri Rajesh Verma, Joint Secretary & Financial Adviser (Power)
5. Shri A.K. Jain, Executive Director, Power Finance Corporation
6. Ms. Roopa Devi Singh, Chief Executive Officer, Power Exchange India Ltd.
7. Shri Shantanu Nadpurohit, M/s. Honeywell Automation India Ltd.,

8. Shri Rakesh Kumar, EVP, PTC
9. Dr. Chandra Shekar Sinha,, M/s. J.P. Morgan
10. Ms. Rita Roy Choudhary, Team Leader, FICCI
11. Shri Barun Barpujari, GM, IOCL
12. Shri Saurabh Kumar, Secretary, BEE

13. Shri Rajesh Sethi, Director, MOEF
14. Representative of Andhra Pradesh State Electricity Board
15. Representative of Secretary (Power), Government of Kerala
16. Sh. Rakesh Kumar, EVP, PTC, India Ltd.
17. Ms. Anita Gupta, IEEMA
18. Sh. K.K. Sharma, CE, Central Public Works Department
19. Shri S K Sarangi, GM, IOCL
20. Mr. Manu Maudgal, BEE-GTZ

21. Shri Bal Mukund, Director, REC
22. Mr. Girish Sant, PRAYAS, Energy Group
23. Dr. A. Damodaran, Professor, IIM- Bangalore
24. Representative of Department of Public Enterprises
25. Mr.S.P. Goel, PCRA
26. Mr. Sanjay Seth, EE, BEE

Terms of Reference:

- To recommend measures to facilitate financing to energy efficiency projects.
- To suggest fiscal incentives that could scale up financing of energy efficiency projects
- Creation of mechanisms that would help finance demand side management programmes in all sectors by capturing future energy savings (**EEFP**). Recommend fiscal instruments to promote energy efficiency and design a revolving fund to promote carbon finance (**FEEED**)
- To recommend measures to enhance price transparency in EE projects
- To prepare National CDM Roadmap addressing the issue of Legal Status of CERs
- To recommend measures to enhance public sector involvement and aggregation of CDM projects.
- Recommend measures for enhancing capacity of banks and FIs.

ANNEX-II-1

METHODOLOGY FOR SPECIFYING SPECIFIC ENERGY CONSUMPTION

From the point of view of successful implementation and sustainable operation of PAT scheme, development of methodology for specifying Specific Energy Consumption is of immense importance. In this Section of the Report, issues associated with this aspect of the PAT and final recommendations of the Sub Group -1 which have been accepted by the Working Group have been discussed in detail.

2. Energy efficiency in Designated Category Consumers

Industry accounts for 25% of the national Gross Domestic Product (GDP), and 44.4% of commercial energy use in India. Since 2000, industrial GDP has been growing at 8.6% per annum, and energy use in industry has been growing at 5.8% per annum. The lower rate of growth of industrial energy use, as compared to the growth rate of industrial GDP can be attributed to many reasons. It has been observed that in recent years, industry has been going in for state of the art technologies, which are more energy efficient as well as there have been numerous in-house efforts made by industries to become more energy efficient.

In almost every sector of the industry, the new and large plants are amongst the most energy efficient in the world. However, these energy-efficient plants coexist with older, smaller and less efficient plants in the same sector and the least efficient plants use two to six times more energy to manufacture a ton of the product as compared to the most efficient plant. Figure 1(a) and (b) show the wide variation in the energy used to produce a kilogram of cement clinker and a ton of paper, respectively.

Figure 1(a): Cement Sector

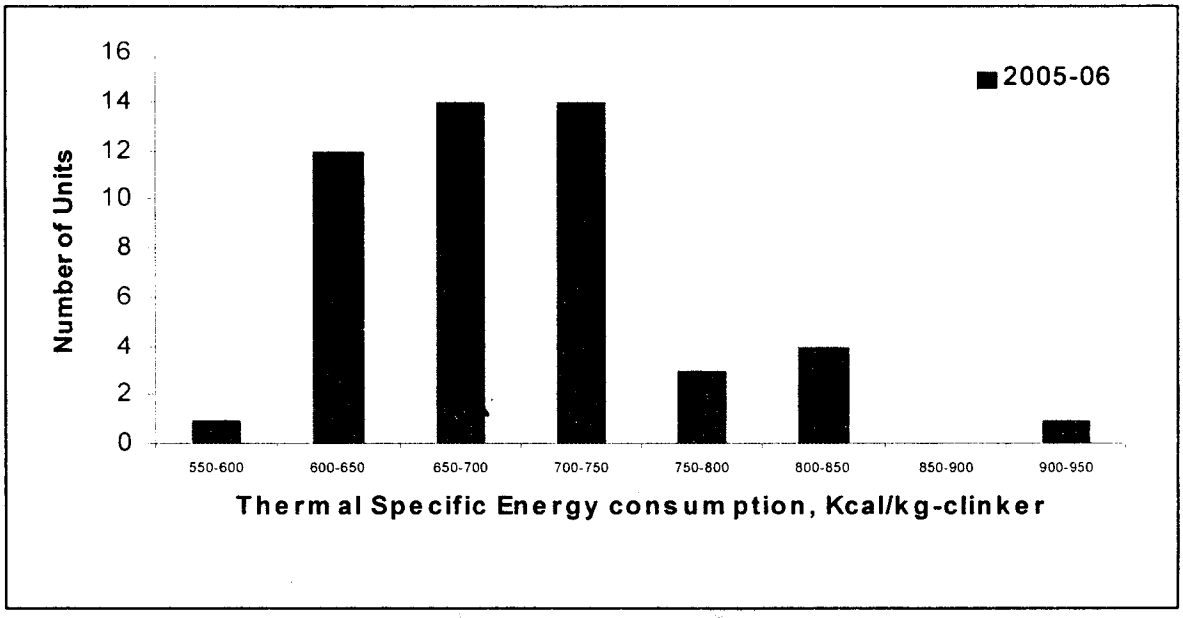
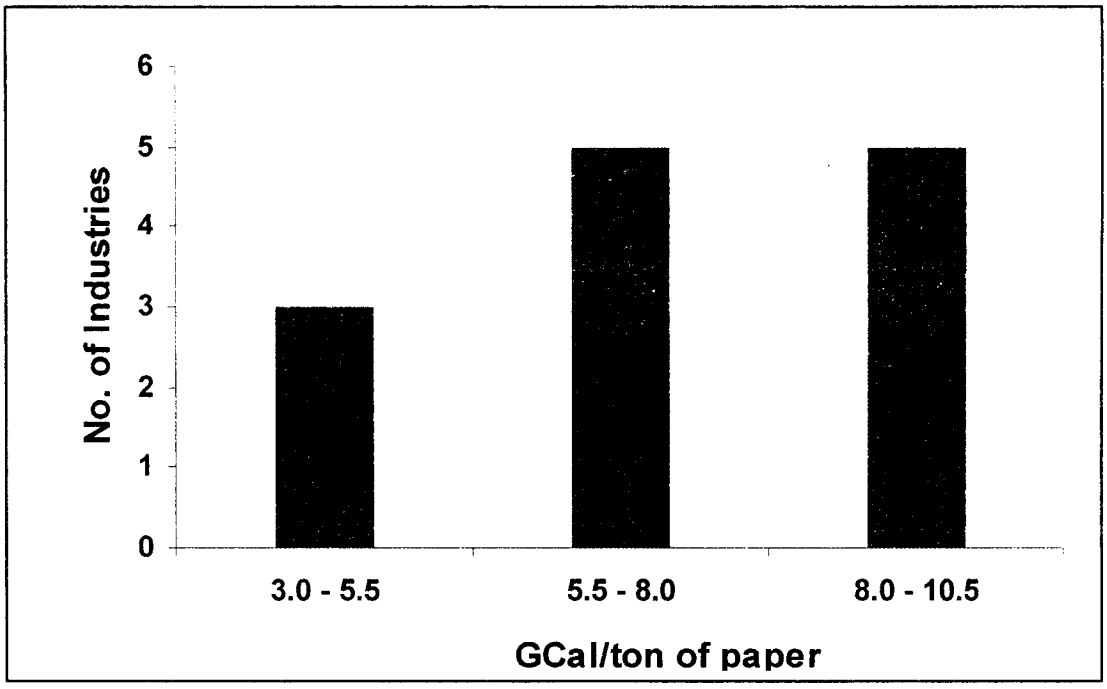


Figure 1 (b): Pulp and Paper Sector



The wide bandwidth of specific energy consumption (SEC) within an industrial sector is indicative of the large energy-savings potential in the sector. The wide bandwidth is also a reflection of the differences in the energy-saving possibilities amongst plants because of their varying vintage, production capacity, raw material quality, and

product mix. It also makes it difficult to specify a single benchmark SEC for a sector as a whole since it would either be impossible to achieve for the older plants if set at the level of newer plants, or would be trivial if set at the level of the older plants.

This assessment also applies to the thermal power sector, whose energy consumption is about 65% of the total commercial energy consumption of the industrial sector, and which also exhibits a wide bandwidth of energy efficiencies.

3. Target setting for Energy Efficiency Enhancement

The broad bandwidth of SEC within a sector, and the inability of all plants to achieve a sectoral benchmark SEC, suggests that SEC improvement norms need to be set for range of plant. These SEC improvement targets can be based on their energy-savings potential. In general, the higher is the energy efficiency (i.e., the lower is the SEC), the lower is the energy-savings potential. Consequently, a mandatory SEC improvement target in terms of percentage improvement, will be specified in relation to the existing SEC, over a range of plants.

However, some plants in the range can achieve better energy efficiency improvement than their specified SEC improvement target, just as some plants may not be able to do so. Consequently, to maximize energy savings across a sector in the most cost-effective manner, plants will be encouraged to achieve more energy savings, and exceed their specified SEC target, and the additional energy savings can be traded, on a voluntary basis, with other plants which find it difficult, or too costly, to meet their specified SEC target.

This approach would provide a mandate to each plant to achieve a specified SEC reduction within a specified time period, and an incentive to exceed this energy savings target so as to trade the additional savings (achieved over and above the specified savings) with those plants which are unable to meet their specified savings. Based on the international experience, the possible industry response to SEC targets can be categorized in four basic responses:

(a) Controlling their processes to achieve their SEC target exactly;
(b) "Under achieving" and buying ESCerts to take care of the balance;
(c) "Over achieving" and selling their excess ESCerts; or
(d) "Over achieving" and banking ESCerts for use in future years.

The reason that companies may buy or sell ESCerts is that their facilities may have different SEC achievement costs. Companies with higher costs will be able to save money by under achieving and buying ESCerts from those with lower costs, which may make money by over achieving and selling. However, it would be necessary for MOP/BEE to engage with the industry at each stage of the implementation of the PAT scheme so that realistic targets are set which balance the above four aspects.

4. Definition of the Specific Energy Consumption

Various options are available for defining Specific Energy Consumption. It is possible to determine the quantity of energy input on the basis of various sources of energy input into the plant and various products and quantities manufactured. The specific energy consumption could be then defined as **million kilo calories per ton of the product** or as suitable depending on the industry sector and the product. For electrical power consumption, the baseline could be defined as **Kilowatt hour per tonne of the product.** Another way of defining the baseline could be **Million Tonne Oil Equivalent (MTOE) per tonne of the product.** For an effective PAT system, it is essential to have a robust definition and estimation of baseline.

Conversion of different forms of energy input to the identified definition would be required, irrespective of the definition we adopt. However, MTOE offers distinct advantage, as conversion factors for conversion to MTOE have been well defined. Therefore, it is recommended that MTOE may be adopted for defining Specific Energy Consumption.

5. Baseline of the Plant

Determination of the robust baseline is as important as having proper definition of Specific Energy Consumption. While defining the baseline, it would also be essential to determine the capacity utilization of the plant and other factors which would affect the specific energy consumption. Different Weightages could be assigned to such factors depending upon the onsite conditions and the technology, the vintage and the raw material used along with the utilization factor and also an important parameter which would be referenced is that of the quality of raw material used in the manufacturing process.

Initially it was suggested that specific energy consumption data for financial year 2007-08 may be considered as baseline for PAT scheme. However, it was noted that financial year 2007-08 was exceptionally good for many industries due to booming economy. As a result, the Specific Energy Consumption may be the best for the industry but unlikely to be achievable when the economy is not growing as well as in the earlier years. At the same time, some industries opined that higher output was achieved during this period using higher specific energy consumption as marginal cost of production increases beyond a certain limit. Further, some industries may not have performed during one particular year. As a result, may industries felt that it may not be a good idea to use only single year data for definition of the baseline. Instead average of the two best years out of last three years may be used as baseline for the plant.

Further, while establishing the baseline, it would be prudent to tabulate the variables which could have a major influence on the energy efficiency of the plant. It will be necessary to define the methodology for accounting the impact of these variables on SEC in any particular year.

6. Targets to be defined

In India, industries are operating over a wide range of specific energy consumption. While some plants in a sector are operating very efficiently with their specific energy consumption being comparable to the best in the world, a few others have much higher specific energy consumption. There is a wide gap between the best and the minimum values. This gap is defined as the **bandwidth.** Under the PAT mechanism, it is proposed to divide this bandwidth into 3 or 4 groups / ranges depending on the length of the bandwidth. Besides, for each range, separate achievement targets would be set.

This is due to the fact that industries which have the lowest specific energy consumption are more efficient and would have less potential for improvement in energy efficiency as compared to those industries which have higher specific energy consumption and have larger potential for implementation of energy efficiency options. The industries lying in the more efficient range would have a much lower reduction target, for example, 1% or 2% and the industries which have higher specific energy consumption would have a reduction target of 5-8%, whereas industries lying in the middle range would have targets in between.

7. Efforts required to meet the target

The target for each range of SEC in a particular sector would be different. The basic principle behind setting of the target would be that the efforts required to meet the target within the sector and also across the sectors are similar. One of the main goals of 'target setting' would be that the marginal cost of meeting the target is similar across units and across the sectors. This is essential from the point of view that the energy certificates issued in lieu of exceeding or not achieving the targets would lead to a condition wherein the total number of certificates generated through exceeding the target is equal to the total number of certificates issued for achieving the targets. Until and unless this condition is fulfilled, trading scheme will not be favoured by the industries. For example, if the number of certificates issued in lieu of exceeding the target is less than the number of certificates needed by non-complaint designated consumers for achieving the target, then it would be more of a seller's market, and the cost of the certificates to be traded would be commensurate with the efforts made by the industries in exceeding the target. Similarly, if the target are so set that the number of certificates needed for meeting the targets by designated consumers who are not in compliance are less than the number of certificates issued to designated consumers who exceed their targets, then it would be more of buyer's market, and the industries would lose the initiative to meet their targets and over perform. Therefore, a logical and balanced target setting is very essential for the success of the PAT mechanism.

8. Target setting for each range

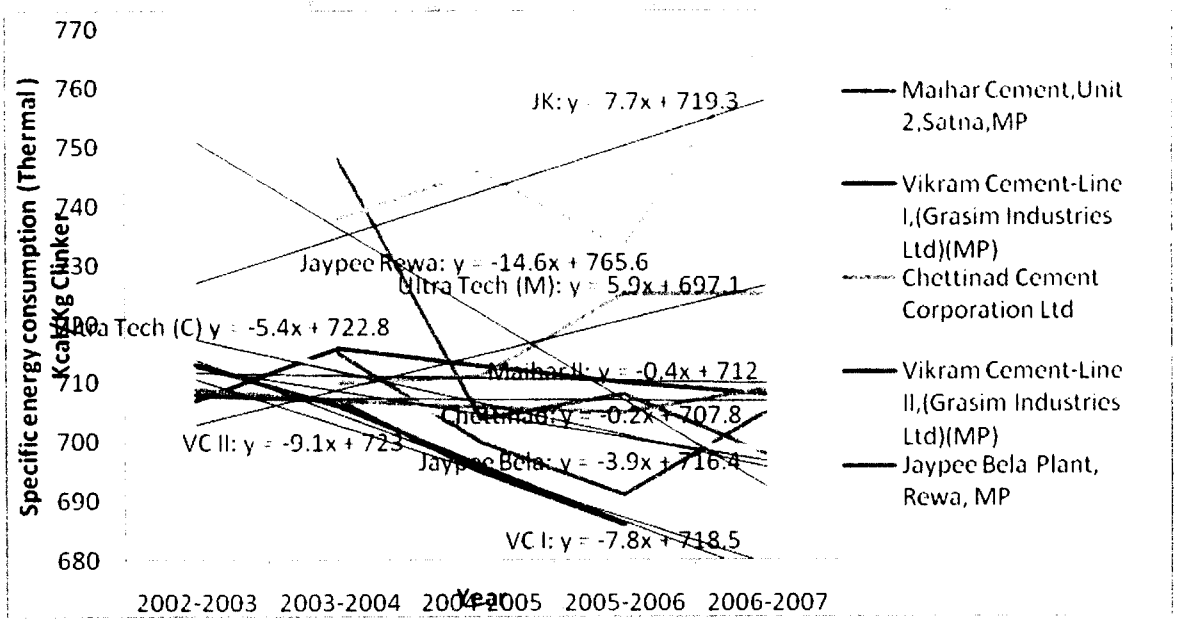
The methodology of target setting for each of the sub-sectors and industry sector may not be uniform. The following three methods are proposed for target setting and can be applied for different industrial sectors:

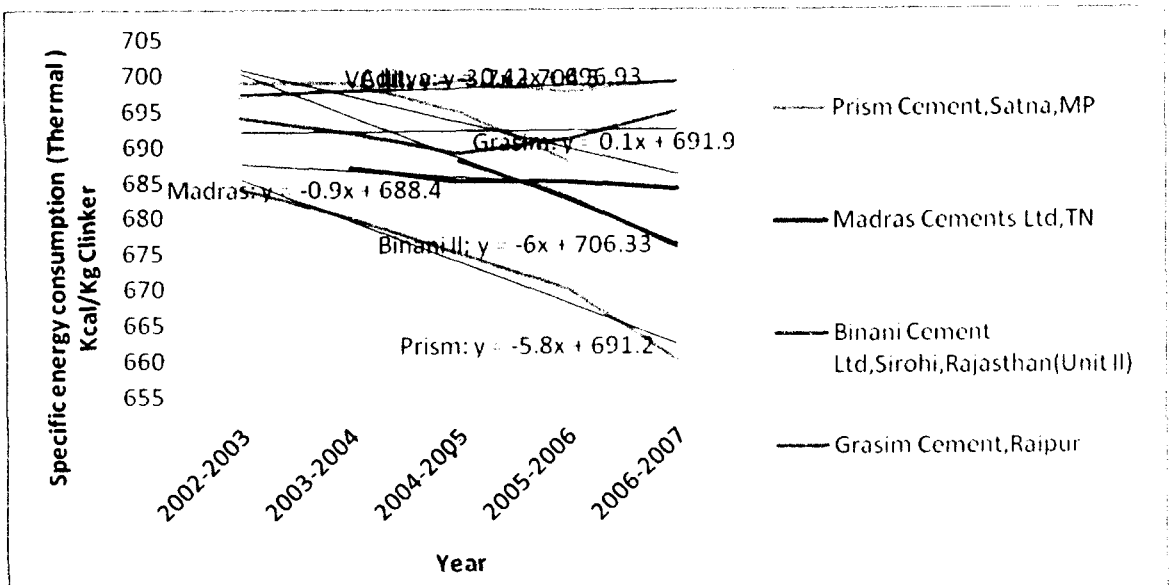
a. Average performance values

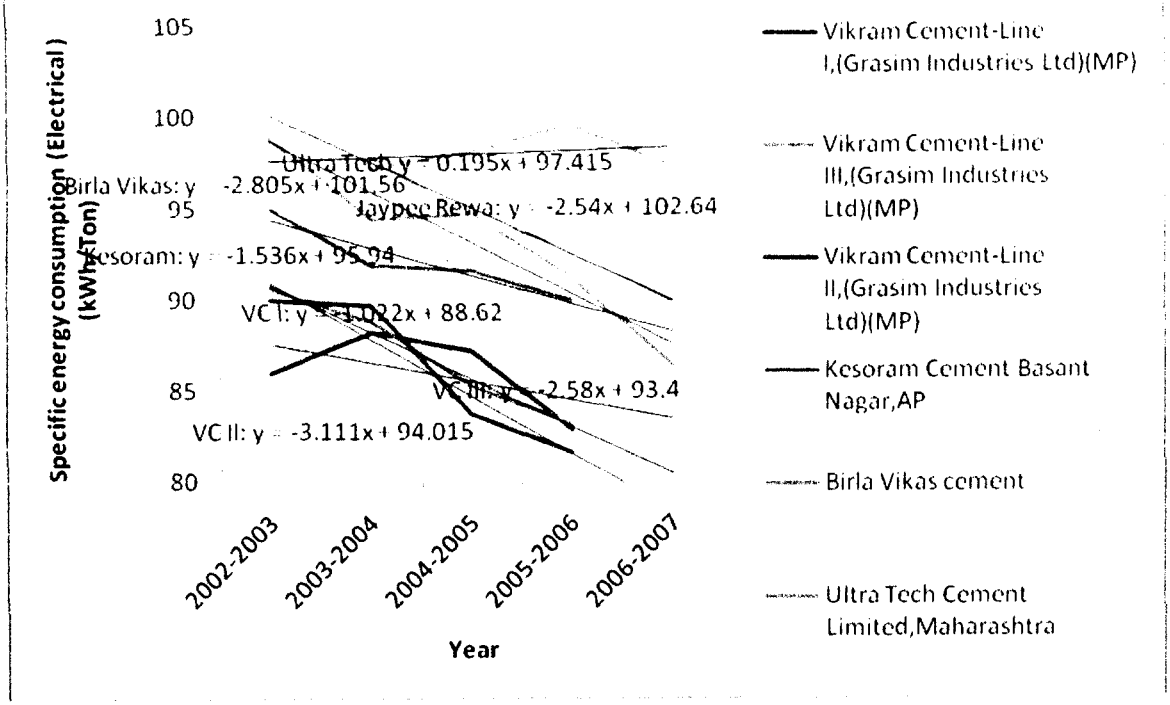
If the bandwidth of a group or sub-group is small, then the average value of the bandwidth can be considered to be 'target'. For example, for the aluminium sector, the bandwidth is between 14000-16000 kWh/Metric Ton of aluminium manufactured. Therefore, for this sector, the target could be 15000 kWh/Ton of aluminium, which in turn, would mean achieving energy efficiency by 3-4% across the sector. While arriving at average values, weighted averages should be used and not simple averages. Appropriate conversion factors may be used to calculate MTOE values.

b. Target on the basis of rate of current improvement

It has been observed that the industries in some sectors are improving their energy efficiency every year. However, the rate of improvement in these sectors is slow. One can set-up the target, by determining the rate of improvement of energy efficiency across the sector and keeping the target a few percentage points above the average rate of improvement. In this case, data for the past period has to be analyzed and the rate of improvement needs to be determined. The target can only be fixed thereafter. The following graphs depict the rate of improvement in energy efficiency of representative industries in the cement sector.

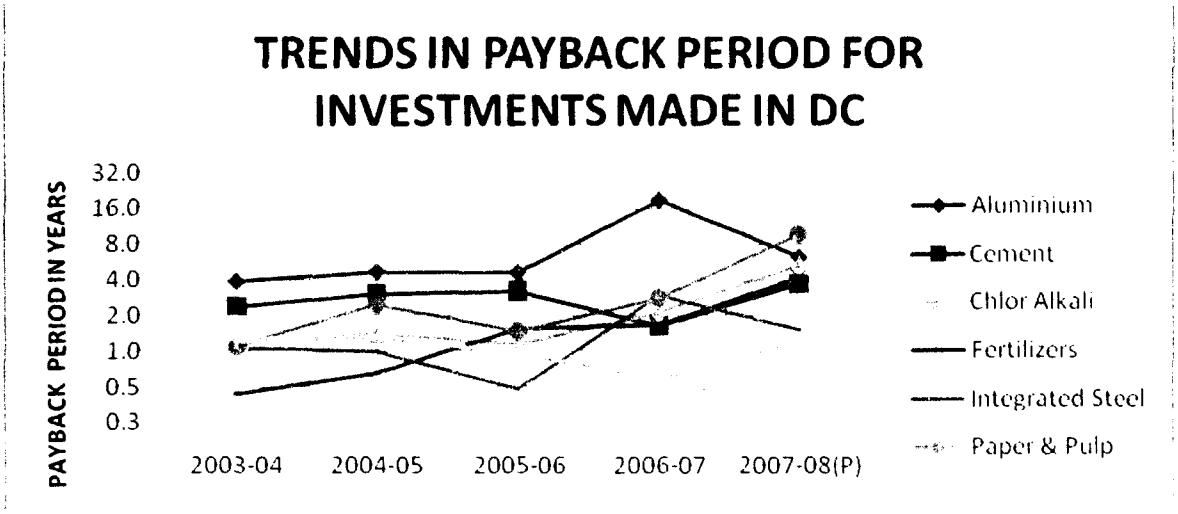



Specific energy consumption (Thermal) Kcal/Kg Clinker
705
700
695
690
685
680
675
670
665
660
655
Grasim: y = 0.1x + 691.9
Madras: y = -0.9x + 688.4
Binani II: y = -6x + 706.33
Prism: y = -5.8x + 691.2
2002-2003
2003-2004
2004-2005
2005-2006
2006-2007
Year
Prism Cement,Satna,MP
Madras Cements Ltd,TN
Binani Cement Ltd,Sirohi,Rajasthan(Unit II)
Grasim Cement,Raipur


Specific energy consumption (Electrical) (kWh/Ton)
105
100
95
90
85
80
Ultra Tech: y = 0.195x + 97.415
Birla Vikas: y = -2.805x + 101.56
Jaypee Rewa: y = -2.54x + 102.64
Kesoram: y = -1.536x + 95.94
VC I: y = -1.022x + 88.62
VC III: y = -2.58x + 93.4
VC II: y = -3.111x + 94.015
2002-2003
2003-2004
2004-2005
2005-2006
2006-2007
Year
Vikram Cement-Line I,(Grasim Industries Ltd)(MP)
Vikram Cement-Line III,(Grasim Industries Ltd)(MP)
Vikram Cement-Line II,(Grasim Industries Ltd)(MP)
Kesoram Cement Basant Nagar,AP
Birla Vikas cement
Ultra Tech Cement Limited,Maharashtra

c. Target on the basis of payback period across the sector

For such an approach, the data from the past years' National Energy Conservation Award needs to be analyzed in detail. The idea is to determine the payback periods of the Energy Conservation projects implemented by the participating units. Such a graph on the basis of previous 4 years data has been plotted as given below:-



It can be seen that across the sectors, the payback period for implemented projects is between 1-2 years. The data for the year 2007-08 is a projected value on the basis of the projects envisaged by different industries for implementation during 2007-08. Therefore the target should be fixed for each particular sector such that the payback period for the implementation of the energy efficiency projects is 2 years at the maximum.

9. Setting up system boundaries, sub sectors in the sector

One of the primary tasks would be to define the system boundary of an industry. Since the industry is competing with its own baseline, it is essential that the system boundary is the same both for baseline values and the evaluation of achievements after the targets are set.

The Energy Conservation Act 2001 stipulates industries consuming more than the minimum energy consumption in MTOE as designated consumers. The following table gives the minimum energy consumption for industries in that sector to be a designated consumer:-

S. NO	SECTOR	MINIMUM ENERGY CONSUMPTION FOR DESIGNATED CONSUMER IN MTOE
1	CEMENT	30000
2	PULP AND PAPER	30000
3	FERTILIZER	30000
4	CHLOR ALKALI	12500
5	ALUMINUM	7500
6	TEXTILE	3000
7	POWER PLANTS	30000
8	IRON AND STEEL	30000

It is essential that the system boundary established for PAT should be similar to that for the industries which have been defined as designated consumers. In view of variation in the raw material used, the product mix, the technology and the vintage of the plant etc. within the same sector, it is difficult to come up with a uniform and standardized benchmark value. It is, therefore, essential that within a sector, there may be small sub-sectors defined and for each of these sub-sectors, a separate system boundary and a separate target is set.

Each plant in any sector is unique in nature and generally there is no similarity between two plants. It is therefore essential to define the principles of establishing the system boundaries before the start of PAT mechanism for a sector in general and then later on for individual industries as a part of establishing their base line values. The guiding principles of establishing system boundaries are enumerated herein:

i) Establish a broad process flow chart with inputs and outputs for the complete operations in an industry
ii) List imports and export in terms of material and energy for the processes and the subgroups as defined in the preceding sections.
iii) Care should be taken while fixing system boundaries for utilities in any industry as generally utilities are common for all the sections / sub groups of an industry.
iv) The periodicity of measurement of parameters for uniform continuous operations can be 1 week (for the same product line) , however if there is even a slightest change in any of the product or raw material or process conditions average weighted consumption of energy would be taken. It would also be

important to define the range of the capacity utilization of the plant for the above measured parameters.

v) For some industry sectors where there is a wide variation in the product mix, whereas an intermediate product is fairly uniform, in such cases the system boundaries should exclude such processes and the measurements should be based on per unit of intermediate product.

Based on the above principles, a detailed study needs to be undertaken in each of the sectors to define and demarcate the system boundaries for each of the subgroups defined earlier.

10. Defining range within bandwidth

In order to define a range, it is first essential to determine the total bandwidth of the sector as a whole and then the values for the sub-groups created within the sector. On the basis of the difference between the minimum and maximum specific energy consumption in each of the sub-groups defined above, 2-3 ranges would be made for each sub-group.

Further, targets would be estimated for each of the sub-sectors depending on the number of industries which are lying in each of the range. However, range would also be dependent on the type of technology, scale of operations and other characteristic features of the industry.

Detailed studies would be conducted in representative designated consumers for each sector in order to come up with the data, which is required for defining the range of the sub-sector and also for the sector before ranges are worked out. In absence of good quality data, it would be difficult to come up with the bandwidth or range within the bandwidths.

The Energy Conservation Act 2001 has made it mandatory for the designated consumers to report their energy consumption in a specified format to Bureau of Energy Efficiency. A strong monitoring and verification system is also needed to come up with the bandwidth, ranges and targets for each sector and sub-sectors. The format and manner of reporting by the designated consumers has been issued for comments through a Gazette Notification.

11. SYSTEMS AND PROCESSES FOR PAT

For successful implementation of PAT scheme, robust systems and processes for issuance and reconciliation of Energy Savings Certificates will have to be developed. This section describes the issues and makes recommendations on the key issues.

11.1 Monitoring and Verification

BEE has circulated a draft regulation called the "Bureau of Energy Efficiency (the manner and the intervals of time for the conduct of energy audit) Regulations, 2007",

which would form the basis of the Monitoring and Verification (M&V) process. These regulations shall come into force on the date of their final publication in the Gazette of India.

11.2 Principles for Designated Energy Auditors (DENAs)

DENAs shall apply the following principles in performing validation and verification and in preparing validation and verification reports.

11.2.1 Consistency

The principle of consistency shall not prevent a DENA from applying the most recent decisions and guidance provided by the BEE. DENA will achieve consistency by:

b) Applying uniform criteria to the requirements of the applicable approved methodology throughout the crediting period(s);
c) Applying uniform criteria among project activities with similar characteristics such as a similar application of the approved methodology, use of technology, time period or region;
d) Applying uniform criteria to expert judgements, over time and among projects.

11.2.2 Transparency

Information in the validation and verification reports shall be presented in an open, clear, factual, neutral and coherent manner based on documentary evidence. Transparency requires DENAs to:

a) Clearly and explicitly state and document all assumptions;
b) Clearly reference background material;
c) Clearly identify changes made to documentation.

11.2.3 Impartiality, independence and safeguarding against conflicts of interest

It is expected that DENAs shall remain independent of the project activity being validated or verified. They shall also remain free from bias and any real or potential conflict of interest. Further, it is expected that DENAs shall work in a credible, independent, non-discriminatory and transparent manner. The structure of the DENA shall safeguard the impartiality of its operations. If the DENA is part of a larger organization, the DENA shall clearly define the links with other parts of the organization to demonstrate that no conflicts of interest exist. DENAs shall remain free of any commercial, financial or other processes that influence its judgement or endanger trust in its independence and integrity.

a) DENAs shall base their findings and conclusions upon objective evidence and shall conduct all activities in connection with the validation and verification processes in accordance with the rules and procedures of BEE.

b) In their reports, DENAs shall truthfully and accurately state their validation or verification activities, findings and conclusions.

11.2.4 Confidentiality

In accordance with the PAT requirements, DENAs shall safeguard the confidentiality of all information obtained or created during validation or verification.

11.3 PAT Validation

The purpose of validation is to ensure a thorough, independent assessment of proposed project activities submitted for compliance as a PAT project activity against the applicable PAT requirements. The DENA shall report the results of its assessment in a validation report. The DENA shall submit this validation report, along with the supporting documents, to the BEE as part of the request for compliance as a PAT project activity. The DENA shall submit a positive validation opinion only if the proposed project activity complies with all PAT requirements.

11.3.1 Validation approach

i. The PAT is a rules-based mechanism. Therefore, it shall be the DENA's responsibility to ensure that, in accordance with PAT requirements, these rules are complied with for any project activities requesting compliance as a PAT project activity.

ii. The DENA shall note that the compliance of a project activity as a PAT project activity is considered automatic if the DENA submits a positive validation opinion to the BEE, unless a review is requested by BEE within a specified time limit to be decided by the BEE.

iii. During validation, the DENA shall assess whether the project design of the proposed PAT project activity meets the PAT requirements. For this, the DENA shall, using objective evidence, assess the completeness, conservativeness and accuracy of the assumptions and/or claims made in the PAT assessment document (PAD). The evidence used in this assessment shall not be limited to that provided by the project DC.

iv. In assessing evidence, the DENA shall not omit evidence that is likely to alter the validation opinion. In the assessment of evidence, the DENA shall use the following two acceptable approaches:
   a) The DENA shall ensure that the project activity fully complies with the relevant requirements set out in the PAT modalities and procedures, the applicability conditions of the selected methodology and guidance issued by the BEE before submitting a request for compliance.
   b) For the assessment of quantitative data used by the project DC to estimate the SEC likely to result from the project activity, the DENA may apply a risk based approach.

v. In carrying out its validation work, the DENA shall ensure that the project activity complies with the requirements of the PAT modalities and procedures.

11.3.2 Validation methods

The DENA shall apply standard auditing techniques to assess the correctness of the information provided by the project DC, including but not limited to:

i. Document review, involving:
   a) Review of data and information to verify the correctness, credibility and interpretation of presented information;
   b) Cross checks between information provided in the PAD and, if comparable information is available from sources other than that used in the PAD, information from those other sources and independent background investigations;

ii. Follow-up actions (e.g., on site visit and telephone or email interviews), involving:
   a) Interviews with relevant stakeholders like personnel responsible for project design and implementation;
   b) Cross-check of information provided by interviewed personnel (i.e. by checking sources or other interviews) to ensure that no relevant information has been omitted from the validation;

iii. Comparison of the project activity with projects or technologies with similar or comparable characteristics;

iv. Review of the correctness of formulae and calculations based on the approved methodology;

11.3.3 Stakeholder consultation process

a) The DENA shall make the PAD of the project activity under consideration public.
b) During the validation of the project activity, the DENA shall take into account the comments received and the validation report shall demonstrate how the DENA took due account of the comments during the validation process.
c) If comments are not sufficiently substantiated or indicate that the project activity does not comply with the PAT requirements, then the DENA shall request further clarification. However, the DENA is not required to enter into a dialogue with Parties, stakeholders or NGOs that comment on the PAT requirements. If no additional information or substantiation is provided in response to a request for clarification, the DENA shall proceed to assess the comments as originally provided.

11.3.4 PAT Verification

The purpose of verification is to provide a periodic independent review and ex-post determination by the DENA of the monitored SECs that have resulted from the project activity during a defined verification period.

i. Based on the applicable PAT requirements, this assessment shall:

a. Ensure that the project activity has been implemented and operated as per the PAD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
b. Ensure that the monitoring report and other supporting documents provided are complete and verifiable and in accordance with applicable PAT requirements;
c. Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology;
d. Evaluate the SEC reduction data recorded and stored as per the monitoring methodology and express a conclusion confirming whether the individual or the aggregation of errors, omissions and/or misrepresentations in the reported data do not affect the SEC achieved by the project activity by more than the threshold

➢ **Verification Process**

i. The DENA shall assess and verify that the implementation of the project activity and the steps taken to report Specific Energy Consumption (SEC) compliance with the PAT criteria and relevant guidance are as provided by the BEE.
ii. This assessment shall involve a review of relevant documentation, as well as an on-site assessment. [Should the DENA decide that a site visit is not possible or appropriate, it shall provide a justification for its decision].
iii. The DENA's verification of the project documentation provided by the project DC shall be based upon both quantitative and qualitative information on SEC. Quantitative information comprises the reported numbers in the monitoring report submitted to the DENA. Qualitative information comprises information on internal management controls, calculation procedures, procedures for transfer, frequency of SEC reports, and review and internal audit of calculations or data transfers.
iv. In addition to the monitoring documentation provided by the project DC, the DENA shall review:

a) The PAD, including the monitoring plan and the corresponding validation report;
b) Previous verification reports, if any;
c) The applied monitoring methodology;
d) Relevant decisions, clarifications and guidance from the BEE;
e) Any other information and references relevant to the project activity results on SEC (e.g. data on electricity generation or laboratory analysis).

v. In addition to reviewing the monitoring documentation, the DENA shall confirm that the project DC have addressed the compliance requests identified during validation.

11.3.5 Accreditation

The various legal issues to be considered are:

The DENA shall be a legal entity (either a domestic legal entity and or an international organization) and provide documentation of this status;

1. The DENA shall hold a legal status in accordance with applicable national law so that it can function legally, enter into contracts, make decisions independently and may be sued for failure to perform as agreed in the contract.
2. The requirements with reference to various situations that could arise regarding the organizational structure and legal status of the DENA are specified as below:

a. Accreditation shall be granted to a legal entity irrespective of whether the entire organization or a part of it performs the validation/verification functions.

3. PAT audit team is identified by the DENA in its organizational structure and as indicated in its completed application for accreditation form.
4. If the validation and/or verification/certification i.e. DENA functions are carried out only by a part of the legal entity desirous of becoming a DENA, then the BEE shall examine all other activities of the legal entity that affect its PAT operations, in particular, for potential conflicts of interest, independence and impartiality. (This includes, only those premises of the legal entity that have been assessed by the BEE to assume full responsibility (ies) for decision-making regarding validation, verification and certification, including full responsibility (ies) for management review, contract review, signing of the PAT related contractual arrangements, validation reports, verification/certification reports, requests for compliance/issuance and other relevant documents as well as resources allocation under PAT.)

11.3.6 Selection of team for Verification/ Validation purpose

i. Based on this review, the DENA shall have a system for determining the competencies it needs in its audit team, based on the contract review, and for the validation/verification opinions and decisions.
ii. The validation/ verification team shall be appointed and composed of a team leader and other validation/verification team members and independent technical experts, as necessary. The team shall have the competences as specified under the chapter of human resources and competence commensurate with technical areas and designated sector and other technical, regulatory and geographical requirements pertaining to the PAT project activity.
iii. The PAT related validation/verification functions are likely to require multi-disciplinary experiences and covering, technical, energy, location specific, legal, and financial expertise.
iv. The DENA shall have undertaken the checks on the personnel selected as team leader and/or team member(s) to be independent of the PAT project activity they are assigned to validate or verify and certify in line with the impartiality requirements of the PAT scheme.

v. The DENA shall have formal rules and/or contractual conditions to ensure that each team member of validation/verification team and technical experts, acts in an impartial and independent manner.
vi. Each team member should inform the DENA, prior to accepting the assignment, about any known existing, former or envisaged link to the project activity.

11.3.7 Allocation of human resource for validation/ verification functions

i. The DENA shall have a documented system for determining the human resources needed to carry out a complete and effective validation/verification functions. The human resources (man-days) determined and allocated by the DENA for each validation and/or verification/certification project activity along with the justification for the determination, should be recorded.
ii. In determining the human resources, the DENA should consider and document, among other things, the following aspects:
iii. Complexity of the PAT project activity;
iv. Risks associated with the project activity;
v. Technological and regulatory aspects;
vi. Size and location of the facility.
vii. Type and amount of field work necessary for the validation/verification process.

11.3.8 Planning and preparation of verification/ validation functions

i. The DENA shall have a documented system for preparing the plan for validation/verification functions. The plan should identify all the tasks required to be carried out in each type of project activity, human resource requirements (man-days) and identification of any specific designated sector and geographical aspects.
ii. The tasks given to each member of the validation/verification team should be clearly defined and communicated to the client (the contracted project DC).
iii. The names of the validation/verification team members and their background information should also be provided to the project DC sufficiently in advance to give them time, if considered appropriate, to object to the appointment of any particular member(s), with sufficient justification and for the DENA to reconstitute the team in response to any valid objection.
iv. The validation/verification team should be provided with the appropriate working documents.

11.3.9 Validation/ or verification/ certification

The DENA shall establish documented procedures to integrate all aspects of the validation and/or verification/certification functions. All essential requirements for the DENA for carrying out its validation and/or verification/certification functions along with means of validation and/or verification/certification and reporting requirements are detailed by BEE.

i. Technical review and decision-making

a. The DENA shall have a documented procedure for conducting independent technical review of the opinion generated by the validation/verification team. The decision on the assessed project activity shall be undertaken independently of the validation/verification team. Technical reviewer and the decision maker can be the same person as long as the competence criteria for technical review and decision making are met.

b. The DENA should also have a documented procedure for dealing with situations in which they deem a submitted project to be not acceptable as a PAT project activity.

ANNEX II-2

INSTITUTIONAL ARRANGEMENTS FOR PAT

There are many instances of emission trading that have evolved world over. The basic principle of these schemes is to take necessary measures to create and institutionalize a functioning market place to enable seamless transactions, through appropriately designed regulatory and policy mechanisms as under:

- Creation of demand for the commodity e.g. compliance requirement for energy savings ESCerts over a pre-specified period (**Regulatory Framework**)
- Ensuring supply of the commodity (ESCerts) (**Issuance of ESCerts**)
- Monitoring and Verification (**M&V for ESCerts**)
- Creating platform to arrive at an agreeable and transparent pricing (**Trading of ESCerts**)
- Systems to record and track the transaction (**Registry of ESCerts**)
- Mechanism for dispute resolution (**Dispute Resolution for ESCerts**)
- Capacity building and training (**Awareness for ESCerts**)

These elements are detailed hereunder along with the recommended institutional elements. International experience of addressing the fundamental issues for making market based schemes work is at para 6 below.

2. Regulatory Framework for SEC's

The PAT scheme is a market based approach. It is more flexible and cost effective than regulation alone. There are two distinct elements of a PAT scheme—the target for SEC based on the bandwidth that exists for a particular designated consumer, and the ability to trade an achievement that is better than the SEC norm set for a DC.

The process of setting SEC target for each DC must ensure adequate incentive to the DC to achieve the target at the lowest possible cost. The MOP, on the recommendation of BEE shall define SEC that each DC is required to achieve over a specified period of time under the Energy Conservation Act. All stakeholders, including industry associations, FICCI, CII, etc. must be consulted for setting of the norms. The penalty for non-achievement of SEC target under section 26 of the Act must serve as one of the factors for the DC to initiate action to achieve the SEC target.

However, as the international experience suggests, the level of penalty must be commensurate with the cost of achievement of SEC target so as to ensure equalization of Marginal Achievement Cost. Taking note of this, it is recommended that appropriate measures may be considered in this regard to deter DCs from non-compliance.

Fiscal incentives, over and above this are also necessary, at least in the beginning to stimulate the market. These incentives, however, need to be for a pre-defined period which the Government should state ex-ante.

It is recommended that MOP, in consultation with BEE shall set SEC norms for each DC under the provisions of the EC Act. BEE shall take all necessary steps to suggest/recommend appropriate fiscal incentives for ESCerts, capacity building and training of DCs and awareness creation.

3. Issuance of ESCerts

In order to ensure seamless and cost effective transaction, it is necessary that the ESCerts are issued electronically. BEE has already developed an e-filing platform (BEEnet) for reporting of energy consumption data by DCs every year to the State Designated Agencies (SDAs) and BEE, in compliance to the requirements of the EC Act.

The process of issuance of ESCerts, after due verification by an independent agency, must be done by a credible independent agency. This responsibility may be entrusted to the Energy Efficiency Services Ltd. (EESL), a new company suggested in the NMEEE by MOP. EESL shall ensure quality in the entire process. It shall put in place an institutional mechanism by leveraging BEEnet so that:

- Standardized electronic data reports are submitted periodically with regard to SEC targets so that data are reported in a standardized electronic format.
- Software can be written to ensure quality of the data, and aid in analysis, thereby reducing errors, facilitating end-of-year compliance determinations, and saving significant amounts of time and money.
- Conduct of field audits, targeted audits using a documented set of criteria, and audits on randomly selected sources.
- Mitigation of conflicts of interest by having the same (or similar) electronic signature and certification statement from an authorized source representative.
- Independent, competent, third party organization to verify and submit SEC data to EESL by entering into legally binding contracts with them.

3. M&V for ESCerts

It is recommended that monitoring and verification must be a transparent, independent and credible exercise which must have the oversight of BEE. For this robust monitoring and verification must be put in place to institutionalise:

- Energy use and production verification protocol for each DC by BEE
- Verification agencies which could be accredited energy auditors under the EC Act to assume responsibility for verification.
- Designated consumers may be allowed to utilise the services of any verification agency accredited by BEE for this purpose.
- Sample-based check testing of verification by another accredited verification agency is also recommended to ensure quality, credibility and transparency of the exercise.

4. Roles and Responsibilities of entities in Trading of ESCerts

Designated Consumers, the trading platforms (Stock Exchanges, Power and Commodity Exchanges) and Transfer Agents/ Depositories will play an important role in ensuring trading of ESCerts.

The exchanges would create an efficient and transparent market for trading by taking measures to safeguard market integrity and enhance transparency in operations. The exchanges will also maintain data of traded prices, traded volumes and trends. The Transfer Agents/ Depositories shall hold the ESCerts in electronic form and provide client services in relation to ESCerts.

Those Designated Consumers (DC) who exceed their targets will make available ESCerts (in case they don't wish to bank these for future trading) for trading purposes. To ensure liquidity and demand for ESCerts, there should be encouragement for its bulk buying and bundling. Linkages with CDM may also be explored. Trading in futures in ESCerts may not be allowed till the PAT scheme has been in operation for two years within which period it should have stabilised.

The trading platform should act as the accountant for the trading systems, by establishing a registry in which the participants are required to report their transactions. Details of the transaction such as size of the transaction, names of the buyers and sellers should be submitted to the registry. This procedure can be made easier by creating a unique serial number for each ESCert.

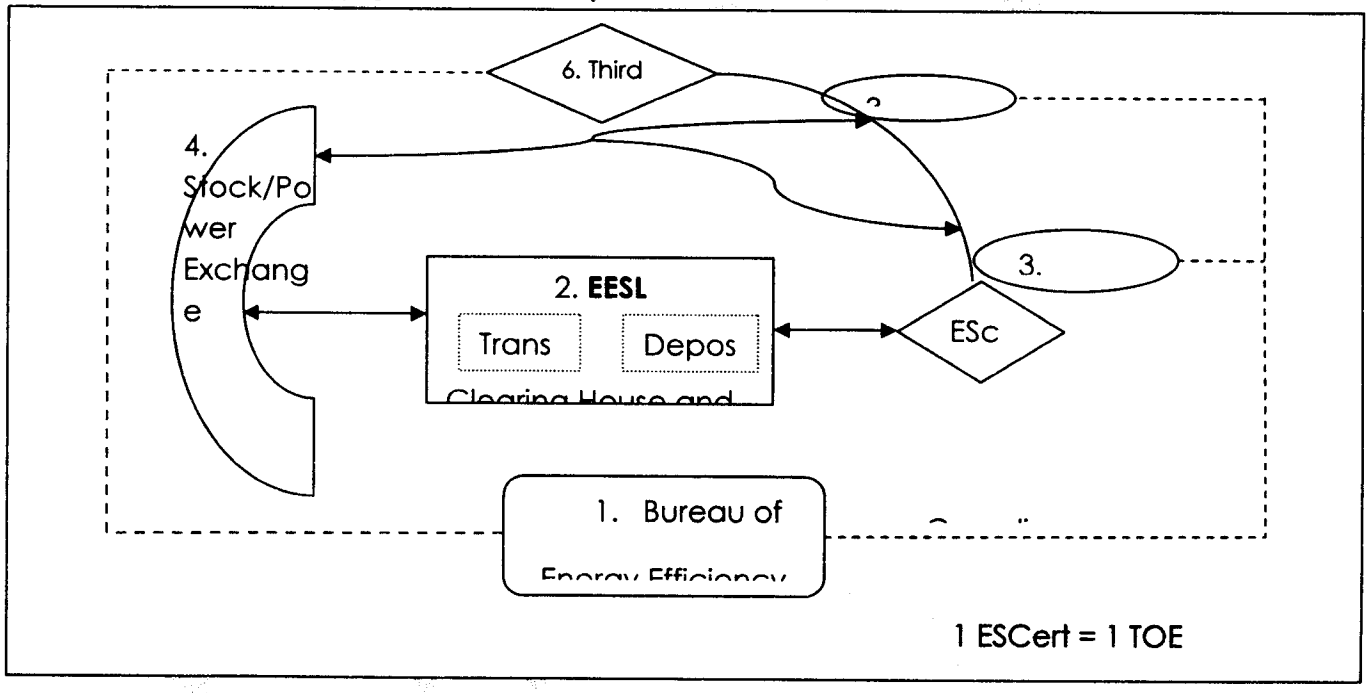
Accreditation of energy audit firms by BEE is suggested in this regard. Brokerage and consulting firms complete the picture by providing services to the market participants, including markets in derivative commodities, and by increasing transparency by providing information (including price information) about the markets. A broad stakeholder consultation is recommended that will not only focus on the elements of scheme implementation but also on the roles and responsibilities of all the participating entities. Capacity building and training of these agencies is necessary in the successful implementation of the scheme.

The roles and responsibilities of various stakeholders in implementation of PAT are as under:

S. No	Institution	Role	Responsibility	Authority	Current Indian Examples
1	Policy Governor and Compliance Driver	Compliance assurance through incentives and automatic penalties	Reduce conflict of Interest; Accredit independent 3rd party Energy auditors	Sets Compliance benchmarks; Resolve disputes through collaborative approach with petition process	Bureau of Energy Efficiency (BEE)
2	Market Governor	Ensure publicly available data	Maintain centralized data administration; strong quality assurance	level playing field; Issue of ESC	Energy Efficiency Services Ltd (EESL) **(proposed)**
3.	Industry	Undertake energy efficiency measures; Appoint accredited 3rd party energy auditors	Maintain compliance with set energy efficiency benchmark	--	Designated Consumers etc
4	Stock/Power Exchange	Maintain data of traded prices, traded volumes and trends.	Create efficient and transparent market for trading	safeguard market integrity and enhance transparency in operations	NCDEX, MCX, Power Exchange India
5	Transfer Agents /	Hold the ESC under	Provides services	--	KARVY, CAMS,

	Depositories	each industry in electronic form.	related to transactions in ESC.		NSDL, CDSL
6	Third Party energy Auditors	--	Audit industry energy savings	Recommendation for the issue of ESCerts	All Designated Operational Entities like TUV , DNV etc

Institutional Structure



6. International Experience

A survey of international experience has been undertaken by WG-I and the learning have been duly incorporated in the recommendations. The activity wise detail in this regard is as under:

MRV Element	Lessons
1) compliance assurance through incentives and automatic penalties;	-Vigorous enforcement is must. Vigorous enforcement of violators sends a message to the entire regulated community that noncompliance

	will not be tolerated. -The statutory penalty is significantly higher than the value of an allowance.
(2) strong quality assurance (QA);	Standardized electronic data reports submitted quarterly • allow for the tracking of the quality of the emissions data throughout the year, as well as the status of emissions compared with the allowances held. • Concomitant benefits are the ability to check for problems at least once per quarter allows more timely corrections by the source before end-of-year reconciliation and often allows a source to avoid significant penalties. Good QA includes • strong equipment performance standards, • competency of testing personnel, • electronic audits, • field audits, targeted audits using a documented set of criteria, and audits on randomly selected sources.
(3) collaborative approach with a petition process	• Consultation by regulators to help achieve buy-in from the regulated community. • Consultation highlights the difficulties and issues of industry had when trying to comply with the potential regulatory requirements.
(4) standardized electronic reporting;	Data are reported in a standardized electronic format, computer software can be written to efficiently analyze and quality assure the data, thereby reducing or eliminating errors, facilitating end-of-year compliance determinations, and saving significant amounts of time and money.
(5) compliance flexibility	-Selecting an appropriate level of SEC is of critical importance. On the one hand, if the cutoff point is too low (i.e., too exclusive), it would not be cost-effective for the regulated sources and would greatly increase the burden on the regulatory

	agencies to implement and maintain the program. -On the other hand, if the cutoff point is too high (i.e., too inclusive), this would create inequities in the trading market, because a significant percentage of emissions would be overestimated.
(6) complete SEC data record required;	To ensure that SEC reduction goals are met, the PAT program should require and provide due incentives from all regulated sources
(7) centralized administration;	PAT program will benefit greatly from centralized administration. However, even when program administration is decentralized, many of the benefits of centralization can still be obtained if • one of several implementing agencies develops data quality checking software and seeks to reach agreement with all of the other implementing agencies to use it; • during regulation development, each implementing agency solicits comment from: companies having sources in multiple jurisdictions, other implementing agencies, and the inter-jurisdictional public, in an effort to better harmonize disparate regulations; • the implementing agencies have regular meetings and/or teleconferences to better harmonize regulation interpretations, petition responses, and audit and enforcement procedures and penalties; and • each implementing agency makes public all of the data reported to it; perhaps a common Web site could be created for this purpose.
(8) level playing field	The level playing field concept is important to PAT program, because it helps maintain credibility and confidence in the ESCerts trading market.
(9) publicly available data;	-Publicly available, high-quality data are essential for market pricing to work efficiently and for achieving emission reductions at the lowest possible cost.

	-Publicly available data allow brokerage firms, testing organizations, academic institutions, and other third parties to access and analyze the data. -These analyses help keep the program healthy and provide impetus for future program improvements and impact assessments.
(10) performance- based approach; and	-Performance standards for SEC norm monitoring equipment should be reasonable and achievable. -For newer technologies, implementing agencies could undertake independent field testing to determine realistic initial and long-term performance standards. -The ability of a performance-based approach to force improvements in monitoring technology should be encouraged.
(11) reducing conflicts of interest.	To mitigate conflicts of interest the following measures would be applied. • the same (or similar) electronic signature and certification statement from an authorized source representative could be required to accompany each emissions report. • It may also be possible for an independent, competent, third party organization to verify and submit SEC data to an implementing agency if the third party can be held legally accountable along with the owner or operator of the source.

Annex III-1

National CDM Road Map

Background: India stands committed to the world for taking firm steps in reducing the overall carbon emissions through the internationally acceptable principle of common but differentiated responsibility. This is because per capita consumption of energy in India is amongst the lowest in the world at 530 kg of oil equivalent (kgoe) per person of primary energy in 2004 compared to 1240 in China and the world average of 1770. To deliver a sustained economic growth rate of 8 to 9% through 2031-32 and to meet life time energy needs of all citizens, India needs, at the very least to increase its primary energy supply by 3 to 4 times and electricity generation capacity about 6 times. However, India has announced integration of efficient use of energy as an avowed policy tool to balance the needs of a growing economy and it's committed to overall reduction of emissions. It has set itself a goal of never breaching the world average emissions during the course of the growth trajectory. Integrated Energy Policy announced in 2006 articulates this stand and the strategy for unlocking the estimated potential of reducing 25% of energy by efficiency measures. Out of this, Demand Side Management (DSM) interventions alone are estimated to result in a reduction of energy use by as much as 15%.

2. Greenhouse gas (GHG) emissions from India account for about 3% of the global stock of GHGs in the atmosphere. Estimates suggest that in spite of India's increasing GHG emissions, the share of India's emissions in the global total till 2050 is expected to remain in the 3-4% range. Consequently, large decreases in the GHG emissions from India, and the costs incurred to achieve these decreases, are not going to significantly change the global stock of GHGs. In other words, the impacts of climate change, globally and on India, are going to be independent of India's mitigation efforts.

3. India's energy intensity is decreasing at about 1.5% per year, and the current energy intensity (at about 0.17 kgoe/$-GDP-PPP) is the same as that of Germany, and amongst the lowest five in the world. Currently, India's per-capita GHG emissions are only 23% of global average, 4% of the US, 12% of EU, 15% of Japan. In the aggregate, India, with 17% of the world population has only 4% of global GHG emissions. The decrease in India's energy intensity is expected to continue because of: (a) the increasing energy efficiency in the industrial sector because of global competitiveness; and (b) the increasing share of the lower energy-intensive services sector in the Indian economy.

4. There are two limiting factors to the rate of energy intensity decline:

   a. The very low levels of energy consumption in Indian households, and the urgent need to enhance energy-based services such as lighting and cooking,

so as to enhance the quality of life of Indians, especially the poor. The moderate energy intensity of the Indian economy, as a whole, is largely because of the low household energy consumption in the country.

b. The costs of new, energy-efficient technologies, and the impacts of these costs on the Indian economy in the power, manufacturing, appliances and lighting sectors, etc. certainly has the potential to accelerate the decline in the energy intensity, but would result in higher costs for consumers.

5. While the household as well as commercial energy consumption will increase *parri-passu* with development, energy sector mitigation options need to be integrated in the overall policy design. The avowed goal of the government to provide sustainable energy at affordable rates can be integrated with the availability and affordability of cleaner technologies to minimize the impact of emissions that are part of the development process. The following issues need to be considered before adopting any measure in the Indian context:

·Cost of mitigation

·Feasibility of the option

·Environmental and other benefits

·Consonance with the overall development priorities of the country.

6. India seeks a global regime that provides for:

- global support for adaptation in developing countries,
- developed countries take the lead in achieving globally meaningful GHG emissions reductions, and
- GHG emissions reductions by developing countries are supported by financing, technology and capacity building under the accepted principle of Common But Differentiated Responsibilities (CBDR).
- International financial instruments, including CDM to to stimulate adoption of cleaner technologies at affordable prices.
- Re-engineering of CDM process to make it more transparent, fair and reducing the time taken for registration of projects.

7. India has taken up, as a responsible nation, efforts to decouple of economic growth and energy use by a number of policy and legislative initiatives, including the:

- **Environment Protection Act**, Forest Protection Rules, and afforestation initiatives, as a result of which deforestation has almost completely stopped, and afforestation is adding forest cover to about 0.25% of India's land area every year;
- **Energy Conservation Act**, which has initiated a market transformation towards more energy-efficient buildings and appliances through the Energy Conservation Building Code for new, large commercial buildings, and energy labeling of appliances, and promoted acceleration of industrial energy efficiency by initiating a process of establishing energy-consumption norms for large energy consumers;
- **Electricity Act**, which has created a regulatory mechanism for enhanced energy efficiency of electricity generation and distribution through the creation of independent state electricity regulatory commissions who are linking tariffs to increasingly stringent energy-efficiency norms.
- **The National Action Plan on Climate Change (NAPCC)** to strike a balance in the need to maintain a high growth rate for increasing living standards of the vast majority of people and reducing their vulnerability to the impacts of climate change. The 8 national missions, including the present one, are vehicles of achieving the objective.

The impact of these measures, all adopted to promote development goals, has been a reduction in the rate of increase of India's energy consumption and, also of GHG emissions. India's energy intensity is now the same as that of Germany (at about 0.18 kgoe/$ GDP-PPP), and only Japan, UK, Brazil and Denmark have lower energy intensities.

8. The priority options, therefore, are to promote efficient technologies in power generation, centralized and decentralized renewable energy options, energy efficiency in high energy consuming industries, commercial buildings and DSM. Projects that improve the quality of life of the very poor from the environmental standpoint and promote state-of the art, environmentally sound technology are generally being sought. The following efforts are under implementation to promote cleaner technologies:

· Removal of implementation barriers of biomass-based power generation as well as other renewables. Regulatory incentives to promote its use in the country.

· Energy conservation through technological up gradation in Industrial sector including SMEs.

· Promotion of Super critical technologies for power generation- about 15% of capacity to use efficient technology by 2012.

· Promotion of public transport and fuel efficiency in the transport sector.

· DSM initiatives in various sectors like industry, agriculture, SMEs, Municipalities, buildings, etc ·

Energy Efficiency and CDM

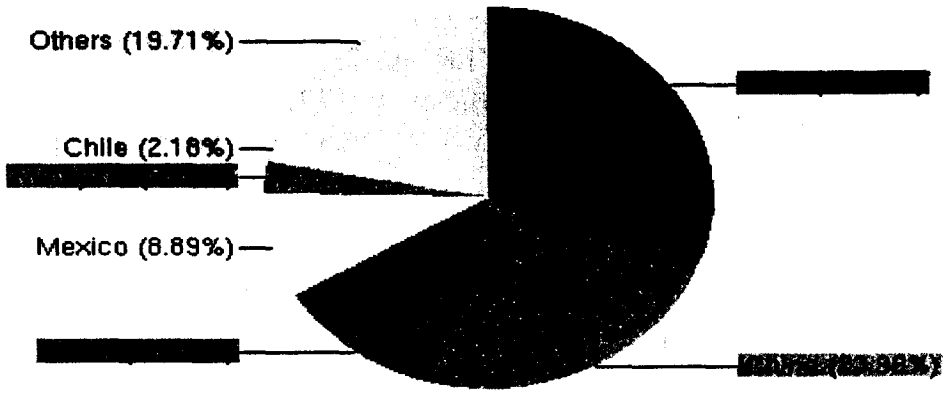
9. CDM revenues are expected to increase, particularly from FY 2006-07 onwards at least till 2012. According to the UNFCCC[1] statistics, the expected CERs by 2012, based on the current pipeline of projects, is 2.7 billion. Currently CERs are being traded at a cost of € 10 per CER thereby a market of € 27 billion worldwide. The present share of India is around 10% in the global CER market- given that there is a thrust by the Government and Bureau of Energy Efficiency (BEE), the market share must increase to reach about 20%. Aggregated Energy Efficiency projects through the programmatic approach holds the key to this growth.

10. CDM, that recognizes the common but differentiated responsibility towards climate change mitigation, is an important tool for risk mitigation and transfer of cleaner technologies in the developing world. While industrial as well as renewable energy sectors have seen an increase in cleaner technology penetration, the volume share of Energy Efficiency (EE), in terms of emission reduction credits traded in the carbon market, currently stands at less than 10 percent. Of the 285 EE projects (as of July 2007) in the CDM pipeline, more than 90 percent are in heavy industries such as iron and steel, cement, and chemicals. Emission reduction activities in these areas are often dispersed, have high transaction costs, and have relatively low individual credit flows. DSM that could result in high impact for reducing consumption in sectors like municipalities, households, buildings, and small enterprises are barely represented in the CDM. The potential volume of these emission reduction opportunities is so high that their aggregation represents an important GHG mitigation strategy, with associated sustainable development benefits as well. The recently announced (December 2005 COP/MOP 1) decision to include "programs of activities" (PoA) in CDM, and the ensuing guidance thereafter provides an important tool to aggregate small DSM projects under an umbrella to reduce transaction cost and dispersed small credit flows under the new approach of Programmatic CDM.

11. The barriers to the implementation of end-use EE practices and technologies (DSM) are well known, and range from the absence of enabling policies, to lack of information, to financing issues, to lack of credible enforcement mechanism, to lack of energy efficiency delivery mechanism. As an innovative mechanism for spurring investment, the CDM can help alleviate some of the financial barriers to EE. Further, India accounts for the largest numbers of CDM projects though most of them are small. Therefore, it represents only about 24% of the CDM revenue share as against China's 40%. The chart indicates the projects registered by different countries at present.

[1] For more please refer to www.unfccc.org

Registered project activities by host party. Total: 1,192



http://cdm.unfccc.int (c) 03.11.2008 17:53

Percentage of the CDM Projects by country

Projected CDM projects vis-à-vis CER potential across sectors

Type	number		CERs/yr (000)		2012 CERs (000)		CERs issued (000)	
Hydro	1098	26%	114278	20%	471825	17%	7436	4%
Biomass energy	632	15%	38325	7%	200089	7%	10835	5%
Wind	588	14%	46006	8%	220299	8%	7026	3%
EE own generation	375	9%	58105	10%	272523	10%	8414	4%
Landfill gas	302	7%	47456	8%	256959	9%	5249	3%
Biogas	267	6%	12740	2%	61578	2%	1041	1%
Agriculture	226	5%	8485	1%	51531	2%	3504	2%
EE industry	172	4%	6523	1%	32916	1%	642	0%
Fossil fuel switch	135	3%	43951	8%	204275	7%	1385	1%
N2O	65	2%	48456	8%	258450	9%	41781	20%
Coal bed/mine methane	61	1%	27843	5%	130644	5%	638	0%
EE Supply side	46	1%	11269	2%	34933	1%	161	0%
Cement	38	1%	6806	1%	41342	1%	1003	0%
Fugitive	29	1%	10690	2%	63733	2%	5153	3%
Afforestation & Reforestation	34	1%	1740	0%	10987	0%	0	0%
Solar	24	1%	685	0%	2990	0%	0	0%
HFCs	22	1%	83048	15%	493898	17%	109595	54%
Geothermal	13	0%	2457	0%	13761	0%	318	0%
EE Households	12	0%	895	0%	3739	0%	0	0%
EE Service	10	0%	151	0%	672	0%	0	0%
PFCs	8	0%	1121	0%	4785	0%	0	0%
Transport	8	0%	728	0%	4002	0%	129	0%
Energy distrib.	4	0%	130	0%	1045	0%	0	0%
Tidal	1	0%	315	0%	1104	0%	0	0%
CO2 capture	1	0%	7	0%	29	0%	0	0%
Total	4151	100%	572211	100%	2636107	100%	204310	100%
HFCs, PFCs & N2O reduction	95	2%	132625	23%	757133	27%	151376	74%
Renewables	2603	63%	214606	38%	971646	34%	26656	13%
CH4 reduction & Cement & Coal mine/bed	657	16%	101288	18%	544238	19%	15547	7,6%
Supply-side EE	425	10%	69505	12%	308500	11%	8575	4,2%
Fuel switch	135	3,3%	43951	7,68%	204275	7,2%	1385	0,7%
Demand-side EE	194	4,7%	7569	1,32%	37327	1,3%	642	0,3%
Afforestation & Reforestation	34	0,8%	1740	0,3%	10987	0,4%	0	0,0%
Transport	8	0,2%	728	0,1%	4002	0,1%	129	0,1%

The statistics reveal immense potential that is largely untapped in the field of energy efficiency and that is why the need for a renewed focus is recommended.

Sectoral CDM Opportunities

12. Some of the sectoral CDM opportunities that exist in the country are as listed below

➢ **Power Generation**

- Accelerated Renovation and Modernization of Old Plants
- Clean coal technologies
- Supercritical
- IGCC based on indigenous coal
- Efficient Gas (High efficiency GT based CC)
- Renewables (Wind, Small Hydro, PV, Biomass)
- Distribution loss reduction automation systems

➢ **Industry**

• Efficiency improvement in existing plants (retrofit)

• Introduction of Best Available Technology

• Modernization of existing 4 and 5 stages to 6 stage systems (retrofit) (particularly in cement plants)

• Waste heat recovery based cogeneration

• Increased share of blended cement

➢ **Leveraging CDM to promote DSM**
- Lighting DSM- use of efficient lighting
- Municipalities and Agriculture DSM
- SMEs, Buildings sector EE

Programmatic approach to CDM that bundles small projects thereby reducing transaction costs and risks is recommended with the public sector taking the lead. BEE has taken up such projects in lighting, municipalities, distribution and agriculture sectors. There is a need to expand this effort by other public and private sectors in the various sectoral opportunities outlines above. In order to do so, many barriers that plague the nascent carbon market in India need also to be addressed.

Barriers to the carbon markets in India

13. **Lack of Methodologies:** If CDM is to realize its entire potential in the country, it is clear that the methodologies have to be applicable to all the energy intensive sectors rather than their current limited application on a project –by -project basis. While PoA is an attractive proposition, need is to facilitate the broadening of the methodologies and specific component to the sectoral level.

14. **Lack of Incentives in the public sector:** There is a lack of incentives for the public sector to undertake CDM projects, in particular because it is not always clear whether the CDM revenues will accrue to the project or entity that successfully implemented the project. Other factors contributing to the lack of involvement of the public sector include:

- Lack of awareness in management of the public sector
- Lack of capacity in undertaking CDM projects
- Uncertainty of sharing of revenues
- Procedural constraints

A nodal CDM unit is created in the all public sector agencies engaged in the sectors identified. They must commit funds for undertaking capacity building and

development of CDM projects. Action plans need to be prepared on a yearly or a five yearly basis and they need to be regularly reviewed.

15. **Issue of additionality and traceability:** In the case of most EE efforts, the traditional investment analysis is usually not appropriate to demonstrate additionality due to the fact that most EE efforts are in principle cost-effective and have relatively short pay-back periods. However, EE often does not occur because of the lack of an enabling policy framework, the high initial capital cost, and the usual observed reluctance to base investment decisions on life-cycle cost analysis. Since the investment analysis creates the impression of lack of additionality, the barrier analysis is a more appropriate analysis for additionality. In terms of additionality in the CDM, the split incentive is one of the most challenging barriers to EE implementation.

16. **Innovative Financial Instruments to promote CDM:** The reluctance of the commercial Indian banks in lending funds for the energy efficiency measures has been a major barrier in development of the CDM projects in the country. This is a result of the absence of carbon markets, lack of clarity of their legal status and inadequate awareness amongst financial institutions. Further, lack of sufficient price related information, inadequate negotiating capabilities and poor access to the international markets are also reasons that have limited the financial sector. Given the volatile nature of the carbon markets there is a need to have more transparency in pricing the CERs and an efficient system for the dissemination of information regarding market fundamentals that could better inform potential sellers regarding risk hedging strategies .

17. **Lack of the Designated Operational Entities (DOEs):** Due to significant entry barriers, particular with regard to the liability insurance requirement and the need for a track record in auditing across several sectors there are no indigenous DOEs from India although around 7 of the international firms have a presence in the Indian markets .

18. **Legal Status of CER:** Government must take necessary steps to define legal status of CERs, which are in the nature of intangible assets so that there are no uncertainties for potential investors.

Recommendations for promoting CDM for low carbon growth

19. India is likely to capture 10% of the global carbon market during the first commitment period. The country's volume of CER (certified emission reduction) exports in 2010 may range between 3.7 and 26.4 MTCO2eq (million tonnes of carbon dioxide equivalent), bringing in revenue in the range of 5–100 million USD per year.

20. The government's role in this context is to continue providing an efficient and transparent regulatory framework for according host country approval. It should also undertake some facilitation in the form of capacity building and enhancing data

availability. Moreover, projects with small volume and dispersed nature (like energy efficiency) may require some concerted effort in project financing to reap the sustainability premium, as also aggressive tapping of opportunities from investors that are willing to pay a sustainable development premium such as the World Bank's, GTZ, ADB etc.

21. Programme of Activities (PoA) would be a mechanism that enables the implementation of sectoral policies or regulations by providing financial and other resources in exchange for the resulting CERs. PoA allows a larger volume with lower transaction costs than in the classical project-by-project based CDM. In this regard Ministry of Power / Bureau of Energy Efficiency (BEE) along with MoEF (Ministry of Environment and Forests), could initiate programme of capacity building within the ministries of Government of India, various public utilities, and state-level agencies. The technical, economic, methodological, institutional, and legal basis has to be developed in parallel to the discussions for the second commitment period for PoA. Further, there are various issues relating to additionality, coordinating agency, boundary conditions, legal liability of DOEs, etc. that need to be taken up by MOEF with CDM Executive Board.

25. **Short and Medium Term Strategy:** There is a need to promote EE by leveraging CDM. Private sector participation needs to be promoted by reducing transaction costs. PoA approach is a strong tool in this direction. Further, there is a need for government intervention to monitoring and verification, given that it is not only key to this activity but is also expensive in most of the cases. The following is a menu of options that need to be taken up in promoting EE.

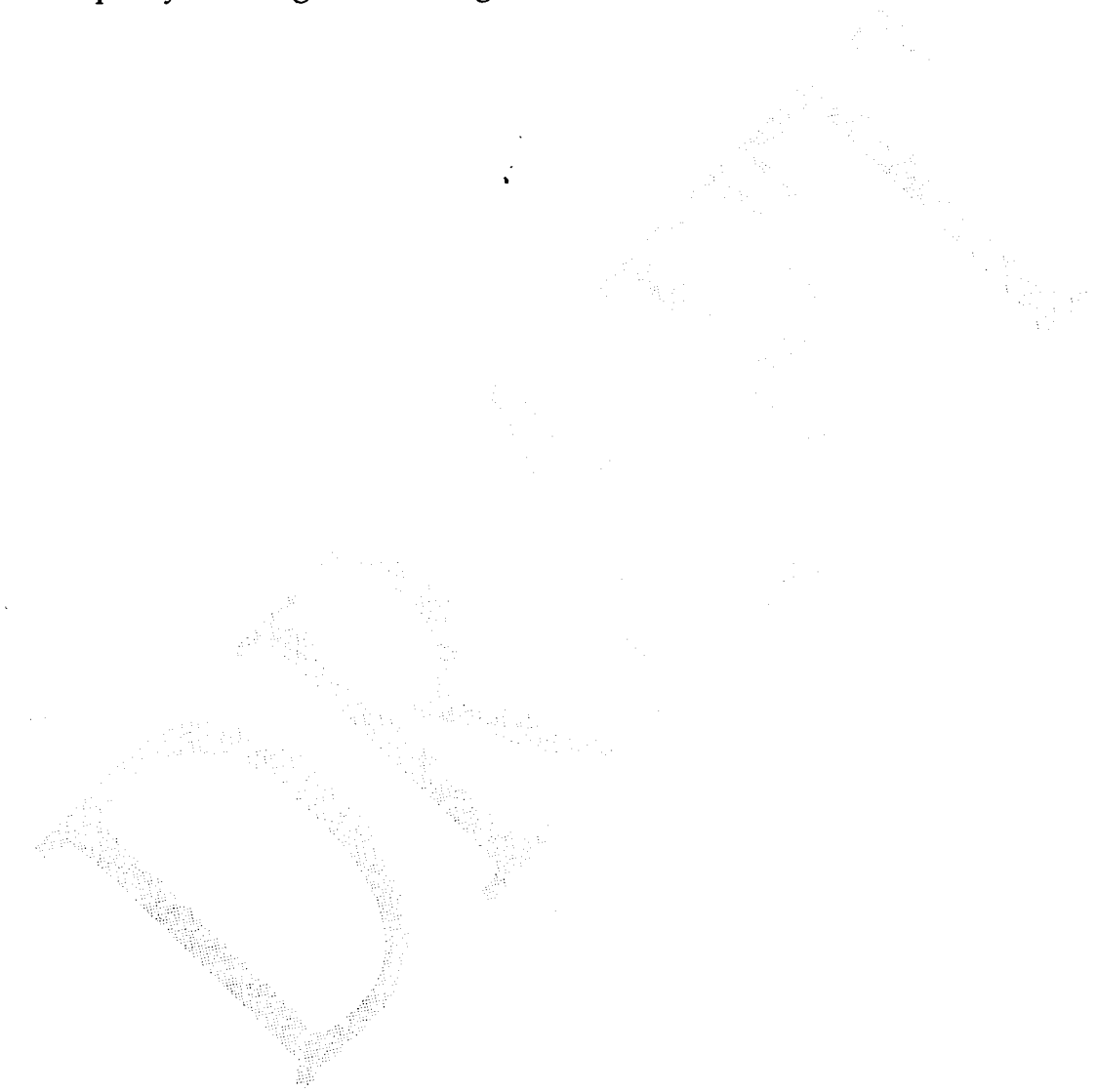
EE measure	Additionality		Traceability	M & V
	Financial	Barrier		
Technology program: Replacement by efficient products such as efficient lighting, ballasts, air conditioner, refrigerator in domestic sector	Medium	High	Medium to high if strong enforcement of S & L is present and **there is a need to introduce incentive programme**	Costs are high- Government intervention recommended
Public procurement of office efficient goods such as computers, air	Low	Medium to high	Medium. **S & L introduction and enforcement would improve traceability.**	Costs are high- Government intervention recommended

conditioner, lighting, copiers etc.				
Adoption of efficient distribution transformers and reduction of T & D in distribution network in Utilities	Medium	Medium to high	Medium to high if strong enforcement of S & L is present and **incentive programme could improve traceability.**	Costs very high- Government intervention recommended
DSM programme for agricultural municipal sector	High	High	Medium to high if strong enforcement of S & L is present	Costs moderate - private sector initiative recommended. Government must provide other risk mitigation measures to design an attractive programme.
Implementation of ECBC	Low	Medium	Medium if strong enforcement of ECBC is present.	Can be verified by simulation software. **Methodology need to be developed.** Private initiative recommended

26. **Long Term**

As India intends massive investments in the infrastructure, urban development and industrialization, while striving to ensure access to energy for an additional 400 million people a targeted strategy to improve market infrastructure and increase access to the CDM revenues

- Require that all public Investment and over time, all public operations are assessed for carbon finance potential.
- Promote PoA to reduce transaction costs and aggregation of small EE projects
- Promote market access for the small industries, EE projects
- Promote Price Transparency
- Clarity on legal status of CERs to avoid taxation disputes
- Capacity building and training



Annex-IV-1

Overview of Energy Efficiency Investment Market

S N	Market Type	Investment Potential, bn Rs	Energy Savings (KWh)	Energy Savings (MW)	Pay Period* (Years)	Back
1	Industrial	121.00	49.00 billion	7000		0.5
	Generic Energy Efficiency	42.00		3400		
	Process Energy Efficiency	,79.00	23.70 billion	3600		
			25.30 billion			
2	Commercial	5.70	1.71 billion	553		0.7
	Government Owned					
	Offices	3.40	0.76 billion	360		1.0
	Hospitals	0.85	0.87 billion	140		0.2
	Private Owned					
	Hotels	1.44	0.18 billion	53		
3	Municipal	13.00	3.70 billion	1688		0.9
4	Totals	140.00	54.40 billion	9240		0.6

* *Assuming average commercial electricity cost of Rs. 5 per KWh.*

Annex IV-2

CAPACITY BUILDING & TRAINING OF FINANCIAL INSTITUTIONS

There is need to enhance capacity of banks and financial institutions by imparting training to bank officials on opportunities for financing energy efficiency projects in different sectors of the economy. The capacity building is intended to help bankers in understanding the importance and viability of financing energy efficiency projects, type and size of projects and ways and means to tap huge potential in this area. The overall objectives of the exercise are:

- To disseminate the information on opportunities for financing EE projects in different sectors
- To provide necessary financing guidelines and skills to appraise EEC projects
- To expose the bankers on the opportunity available for financing EE projects to their existing clients who are availing working capital and other loans
- To expose bankers to different financing models through the case studies on the financial viability of energy efficiency projects and how it would expand their own business in today's competitive environment.

2. The capacity building initiatives must also address specific issues of taking up energy efficiency projects in various sectors. The fact that the delivery systems for different sectors may vary, the capacity building must cover this aspect as well. The cornerstone of an energy efficiency project is Performance Contract (PC). The PC comprises of the following attributes:

- Performance contracting offers turnkey services, including feasibility analysis, design, engineering, construction management, installation, operation, maintenance, and financing;
- Performance contractors are compensated based on measured results;
- Most of the technical, financial, and operational risks are borne by the performance contractor.
- The payment under the PC is made on the basis of verified energy savings.

3. Although investment to improve energy efficiency are often cost effective and offer attractive rate of return, many potential investment opportunities are overlooked or given very little consideration because of a variety of reasons indicated in Chapter III earlier. Thus, the appreciation of the business models for these projects is limited. Further, the fact that the cornerstone of the ESCO business is contingent upon performance of energy efficient equipments (which usually is relatively uncertain given

the information asymmetry) , the willingness of banks and financial institutions to provide financing without a collateral is rather limited. Thus there is a need to inform the banks and financial institutions to the innovative business models in necessary to reduce their risk perception. Also, training on the appraisal techniques for these projects must also be taken up. The key elements of the module that is suggested must have both the business models, appraisal process and case studies of successful projects.

4. There are different business models for implementing EE Projects by ESCOs that have worked elsewhere in the world successfully. They are:

4.1 Energy Audit Model: Most EE Projects are carried out for retrofitting of existing facilities by the project proponents themselves based on recommendations contained in the audit reports. The EE Project is a normal capital expenditure eligible for funding under regular lending programmes.

4.2 Guaranteed Savings Model: Under a guaranteed savings model, the customer finances the project in return for a guarantee from the ESCO that the project's energy savings will cover the customer's debt service. Thus, the customer assumes the obligation to repay the debt to a third party financier, which is often a commercial bank or a leasing company. If the project savings fall short of the amount needed for debt service, the ESCO pays the difference. If the savings exceed the guarantee amount, the customer and the ESCO usually share the excess savings. The size of the share and the method of calculation vary widely, depending on the degree of risk assumed and the extent of services provided by the ESCO. It is important to note that in a typical guaranteed savings project, the ESCO has no contractual relationship with the bank or leasing company. The ESCO guarantees to the customer, and is a guarantee of performance (that the project will result in enough cost savings to repay the loan assumed to finance it), not a guarantee of payment. As a consequence, the bank or leasing company confines its risk analysis to the customer's general credit standing. The financial institution may consider the performance guarantee as a form of credit enhancement.

4.3 Shared Savings Model: Under a shared savings model the ESCO finances the project, usually by borrowing money from one or more third parties. In the case of shared savings, the ESCO assumes not only the performance risk, but the financial risk as well (including the underlying customer credit risk). The customer assumes no financial obligation other than to pay a percentage of the actual savings to the ESCO over a specified period of time. This obligation is not considered debt and does not appear on the customer's balance sheet. The portion of savings paid to the ESCO is always higher for shared savings than the guaranteed savings projects, reflecting the ESCO's significantly greater risk and expense for borrowing money. Since the ESCO is a service company, it typically has few assets that it can offer as a security to a lender. To

add to this, the ESCO assumes the risk of non-performance of the measures as well as the credit risk of the customer. This makes borrowings by ESCOs expensive. As a commercial entity, the ESCO has no option but to recover this cost from its customers, and this results in lower share of the savings going to the customer.

The capacity building exercise must educate the banks and financial institutions to understand these different models. The training module must also cover the appraisal techniques that the banks and FIs need to adopt. They are:

4.4 Promoter Appraisal: The background, creditworthiness and track record of the promoters/promoter company/ companies and their past dealings with institutions/banks should be ascertained. A proper evaluation of the promoter is an important part of the overall appraisal of a project. Since every bank has its own unique company appraisal mechanism, it is recommended that the individual banks use their respective company appraisal mechanism when appraising the promoter.

4.5 **Technical Appraisal:** The objective of a technical feasibility analysis is to assess the potential energy savings from a capital investment in plant or machinery or in operating or working practices. Lenders would need to answer the following issues while conducting the technical evaluation of an EE project:

- Reliability and compatibility of technology under Indian operating conditions
- Comparison with other available technologies and the obsolescence risks
- Transparency of suppliers of technology of not pushing their own wares in the guise of ESCO Projects
- Will it deliver the promised results
- Mode of selection of Energy Auditors, technologies and equipment suppliers through competitive bidding (usually not common in the case of ESCO-led EE Projects)
- Reasonability and competitiveness of the costing of EE Projects.
- Should they fund the soft costs, i.e. the non-equipment costs of the EE Projects
- What are the performance benchmarks
- Is there too much dependence on an ESCO, which may not meet the highest standards of creditworthiness
- Assessment of technical feasibility of EE Projects with regard to the baseline data, M&V protocols and minimum performance levels

4.6 **Financial Appraisal:** Financial appraisal should also be carried out on a life-cycle cost basis. When comparing competing technologies those with the lowest initial cost is not necessarily the preferred option if the accumulated running costs are greater. As an example, the initial cost of buying, installing and commissioning an

electric motor is typically 10% of the total cost over its lifetime when the electricity and maintenance costs are included. Purchasing an energy efficient motor, even if the initial cost is higher than a conventional one, has typically a very short payback time. Investment in capital intensive supply options such as renewable energy sources typically has a very long pay-back. Investment incurs not only capital costs, but also others such as installation (the price quoted may apply only for the equipment delivered to the factory gates or the building entrance), training, project management and performance monitoring. When carrying out a financial appraisal of an energy efficiency capital cost project it is important that all likely costs and savings are quantified. In some cases the capital cost of the equipment and the revenue savings in lower energy consumption are the only significant factor; in many others, however, this is not the case and significant errors can be made through simple assumptions. For example:

- improvements in building comfort can increase its value;
- new energy efficient plant can increase the throughput eg. reduction of breakage in firing kilns;
- reduction in maintenance costs;
- improved throughput in factories and offices if comfort and lighting conditions are improved;
- reduction in waste disposal costs
- reduction in impact on environment

All investments are subject to uncertainty. The installed cost of the plant may be different from what was initially estimated (usually more, rarely less!), the price of fuels may vary, the cost of raw materials may change. It is essential to carry out a simple assessment of the key parameters, **which may change and carry out sensitivity.**

4.7 **Environmental Appraisal:** The environmental appraisal assesses the pollution level of the given facility post EE project implementation, and compares the same with the pre-implementation level of the EE project. In cases, where pollution level increases post EE implementation requisite environmental clearances may be required. The Ministry of Environment & Forests (MoEF) are the apex body in the administrative structure of the Central Government for the planning, co-ordination and overseeing of the implementation of environmental programs. The MoEF notification recommends the three step process for assessing the environmental risks of an EE project.

□ ***Pollution assessment stage***

The energy auditor should provide a declaration in the energy audit report on how the EE project would affect the pollution level at the facility.

□ ***Evaluating whether an environmental clearance is required***

In cases where pollution level post implementation is expected to exceed the current level, environmental clearances from state/Central Government may be required.

□ ***Process of obtaining environmental clearances***

At state level, the process of obtaining an environmental clearance from State Pollution Control Board may be state specific. However, at Central level/MoEF, it would involve conducting an Environmental Impact Assessment; submit an application enclosing this report along with environment management plan and details of public hearing, if applicable to the MoEF.

4.8 Legal Appraisal: Prior to disbursal of loan the bank should ensure that all necessary legal documentation is completed. Since every bank has its own unique set of legal documentation requirements for loan disbursal, individual banks are free to use their respective legal documentation requirements for loan disbursal for an EE project too. An indicative checklist of statutory approvals and legal documentation required prior to loan disbursal for an EE project is given below:

- Statutory approvals pertaining to Environmental clearances
- Legal documentation like Sanction letter or Letter of Intent, Loan agreement,
- Due diligence of security package etc
- Due diligence of agreement with equipment supplier like terms of supply, performance guarantee, penalty if the equipment does not work etc
- Due diligence of performance contract, if any, provided by the ESCO for a project to be carried out for company/facility. This will include amount of energy savings guaranteed each year, conditions (baseline) under which these savings would be achieved and penalty/incentives if guaranteed savings are not/over achieved.

5. The Evaluation Matrix provides a checklist of parameters to be assessed when appraising a proposal for financing an energy efficiency project. The Evaluation Matrix has been divided into 2 parts:

- ✓ Evaluation of an Energy Efficiency Project
- ✓ Evaluation of an ESCO (project-specific financing)

I. Evaluation of an Energy Efficiency Project

The Evaluation Matrix for appraising an Energy Efficiency project is divided into the following five parts:

- Promoter Appraisal
- Technical Appraisal
- Financial Appraisal
- Environmental Appraisal
- Legal Appraisal

A. PROMOTER APPRAISAL

	Appraisal Criteria
Management and Organizational Set up	. Shareholding pattern of the firm Details of Board of . Directors Number of full-time directors and their . responsibilities Qualification, experience of the Chief . executive Qualification, experience and competence of . the functional executives
Financial Assessment of the Company	· Past Performance (last 3 years) ◆Growth: Sales and · profitability Profitability: Operating profit margin, Net · Profit Margin, ROCE Liquidity: Current ratio · Efficiency: Fixed assets turnover, Debtors Turnover, · Inventory Turnover and Creditor Turnover Leverage: · Debt/ Equity ratio Coverage: Interest coverage, DSCR
Promoter Background	. Family background, qualifications and previous . industrial experience Sources of income Income tax . returns/certificates for the past three years Wealth tax . returns for the past three years Details of personal . properties/assets of promoters/guarantors to be obtained

The parameters for technical, financial, environmental and legal appraisal of an EE project as given below should be covered either in the Energy Audit or the Project Report submitted to the bank.

B. TECHNICAL APPRAISAL

Process	Appraisal Criteria	Energy Audit Report	Project Report
Energy Auditor	***Creditability of the audit or consultant report?*** Has an independent energy auditor/ consultant identified the project? Has the energy auditor received accreditation from Bureau of Energy Efficiency? or Is he/ she empanelled with IREDA, PCRA, PFC, etc or Bank? What has been the track record of the energy auditor/ consultant?	√	
	• Track record of the energy auditor/ consultant based on factors like:		
	• What is the number of energy audits completed in the last 3 years?	√	
	• Whether the energy auditor has conducted any energy audit in the particular industry in question in the last 2 years? If yes, how many?	√	
	• In which five facilities/ companies has the energy auditor conducted audit in the last one year?		
Estimating Energy Saving	• ***Establishing baseline energy consumption*** Baseline consumption (as per format provided in Energy Audit report)	√	
	• How does the AS IS performance metrics compare to industry benchmarks for similar systems? ***Estimating energy savings***	√	
	• What do the energy savings consist of? Are these; savings in energy cost, fuel cost, labour cost, consumables and maintenance cost.	√	
	• Are the savings resulting from higher capacity utilisation of the equipment or inefficiency of the existing equipment?	√	
	• What is the age of the unit/ plant,	√	

	where the energy saving has been recommended? (if the plant/ equipment is too old, estimated energy savings may not be realisable? • How does the energy consumption post EE project implementation compare with industry standards, if available? • Does the implementation of the EE project result in higher manpower costs, or increased energy consumption in some other part of the facility, and has that been taken into account when computing the energy savings? • Would the EE project implementation result in shut down of the facility? If yes, what would be the potential loss, and has that been taken into account when computing the energy savings?	√ √ √	

Technology Evaluation	***Technology selection:*** • Is the technology proven or tested? If not, whether successful anywhere else? and can that success be replicated in Indian context and conditions? • Does the technology/ process/ equipment technically fit with the facility's existing technology/ process/ plant & machinery? If not, what aspects of the technology/ process do not fit, and what measures is the company planning to take in this regard? • Is there any industry benchmark data available from a reliable source, on the level of energy consumption post deployment of this new technology/ process? (Check with BEE or industry-specific national or regional bodies)	√ √ √	

	Equipment Suppliers • List of equipment and machinery to be installed with cost and manufacturing specifications.? • Capacity of the equipment, and whether it as per requirement? • List of recommended equipment suppliers/ vendors	√ √ √	 √
Proposed Project Implementation	***Skills and Experience of the Project Implementation Team*** • Who is implementing the project? -In-house: Company implementing the project -Contracted to EPC or ESCO .Skills and experience of the project implementation team • Track record/ experience of the Company/EPC/ESCO depending upon whosoever is implementing the project. Provide a list of relevant projects completed in the last two years. ***Selection of Suppliers:*** • Have the suppliers been selected? If yes, provide list of selected suppliers, including equipment to be supplied by the supplier, price of the equipment and delivery schedule .Reputation of the suppliers - Whether the supplier is a large national or regional distributor/ supplier or a local supplier? • Terms for supply and installation of the equipment by the suppliers? .Is there any performance guarantees from the equipment suppliers? ***Implementation Time Period*** • Time period required to implement the EE project • Penalties in case project implementation is delayed		√ √ √ √ √ √

FINANCIAL APPRAISAL (to be part of Project Report submitted to bank)

Key Financial Parameters	**Base Case**	**Worst Case**
Internal Rate of Return		
DSCR		
Debt/ Equity		
Asset Coverage Ratio		
Other Financial Parameters	**Base Case**	**Worst Case**
Payback		
Interest Coverage Ratio		
Net Cash Accruals/ Total Debt		

D. ENVIRONMENTAL APPRAISAL (to be part of Energy Audit Report submitted to bank)

Pollution Declaration

Clearly state whether the pollution level post EE project implementation is estimated to be higher or same or lower than the existing pollution level at the facility.

E. LEGAL APPRAISAL (at the time of loan disbursal)

Appraisal Criteria	Appraisal Check List
Statutory Approvals	• Environmental Clearance from the State Pollution Control Board, if applicable .Environmental Clearance from MOEF, if applicable
Legal Documentation	***Sanction Letter or EOI*** • Unconditionally accepted Sanction Letter of EOI as per individual bank's standard format. Check Memorandum of Association (MOA) of company to ensure that company has necessary borrowing powers and, an auditors certificate to that effect should be obtained. ***Loan Agreement*** • Duly accepted loan agreement as per individual bank's standard format ***Due diligence of security package*** • In case where the loan is to be secured by mortgage of property, the title to the property has to be examined. • In case where the loan is proposed to be secured by an unconditional and irrevocable Bank Guarantee a commitment from the concerned party that it is agreeable to furnish the guarantee is to be obtained. • In case the 'Personal Guarantee' of the promoter director is insisted upon as a collateral security, it is to be ensured that the director has a sound financial background. This has to be done by analyzing the following information:

Appraisal Criteria	Appraisal Check List
	-copies of Income Tax and Wealth Tax returns for the last 3 years -list of unencumbered immovable properties owned with their approximate market value -list of guarantees furnished jointly and severally in the past -details of the guarantee invoked -whether invoked guarantees were honoured name and address of the bankers In case the 'Corporate Guarantee' of a sister concern is insisted upon as a collateral security the same due diligence as mentioned above is to be done. Also the Memorandum of Association of the sister concern has to be examined to ensure that the company is authorized to issue such guarantees Form 8 & 13 relating to the deed of . hypothecation should be registered with the Registrar of . Companies within 30 days of date of execution of the . deed. Valuations certificate of fixed assets should be . obtained, wherever applicable Prima facie verification of . title deed by Legal Department NOC from existing . charge holder for creation of final security
Due diligence of agreement with supplier	. Terms for supply of the equipment (payment terms, . schedule of supply) Terms for Installation and . commissioning of the equipment by the supplier . (applicable only if the supplier is contracted to install and commission the equipment) Terms of the performance guarantee, if any provided by the supplier Penalties, if the equipment does not perform as per guaranteed performance
Due diligence of performance contract, if any provided by the ESCO	. Amount of Energy Savings guaranteed per year Penalty/ . incentive if guaranteed are not/ over achieved . Conditions under which savings are expected to be achieved

II. Evaluation of an ESCO (project-specific financing)

The evaluation process to be followed for appraisal of an ESCO seeking project specific financing would cover the following:

. A detailed appraisal of the EE project (covered in Section I of the evaluation matrix) and

. Appraisal of the ESCO

ESCO Appraisal

The ESCO appraisal consists of the following two evaluations:

. Basic ESCO Assessment based on information provided by ESCO

. Client References Checks of the ESCO

Â BASIC ESCO ASSESSMENT (PART I)

1. Track record		
1a.	Is this a new or existing firm?	(new/ existing) (yes/no; if yes: number) (as per below format)
1b.	*If Existing* Whether the ESCO has completed any energy efficiency project in the specific industry or sector? If yes, how many? List of EE projects completed in the last 2 years	

List of key EE projects completed in the specific industry in the last 2 years Names of promoters

I.	Company/ Facility name where the project was executed
a.	Date of project commencement/ completion
b.	ESCO man-days
c.	Industry
d.	Brief description of energy saving project
e.	Total Project Cost .Investment by facility owner .Investment by ESCO, if any .Loan (name of the bank or financial institution)
f	Total Savings to the facility owner
g	Terms of Payment to ESCO
	Project Results .Key Performance indicators .Power & Fuel Bill – Pre & Post ESCO Project .Specific Energy Consumption – kWh/ unit of product/ MT of fuel/ MT of project (Pre- & Post) .Cost of Implementation – Projected Vs Actual .Savings – Baseline Vs M&V Results

II. Firm Structure		
1.	Names of the promoters of	

	the ESCO?	
2.	Type of firm	(proprietorship, partnership, private limited or public limited)
3.	Number of Full Time Staff Numbers	

S.N.	Promoter Name	Equity Stake (%)
1.		
2.		

III. Qualifications & Experience		
1.	Qualifications of key personnel assigned to the project *(as per table below)*	

Key Personnel in the project

Names of Key People			
Position			
Total length of experience			
Number of years in current position			
Qualifications			
Training			
List of projects completed in the last two years, including his/her role in the project Designing & Constructing EE Projects Maintenance Experience Skill Transfer			
Availability for the project			

IV.	Financial Information	
1.	Equity base and structure, Networth of ESCO/ Promoters	
2.	If existing firm, please provide last 3 years Profit & Loss and Balance Sheet.	
3.	Financial Projections (P&L and BS) till the term of the loan.	
4.	Current bankers to the firm: Facility availed Current outstandings Security provided	
5.	Current order book	

2. Client References (Part II) - part of the project report submitted to the bank

At least '3' client references, with at least from that particular industry are required. The client reference checks would be in the following format:

Feedback Form

Client Name : Industry :Project completed by ESCO :Date of project commencement :

Date of project completion :

Project Cost :

- Services offered by the ESCO :

Â How does the achieved energy savings compare with the estimated energy savings indicated in the energy audit report (pre-implementation)?

- Achieved savings higher than estimated
- Achieved savings as per expected / estimated
- Achieved savings below than estimated

Comment: If 'c', please provide reason why the projected energy savings were not achieved.

Â Was there any cost escalation in the project?

- No cost escalation
- Project cost incurred were higher than projected on account of:

- Incorrect estimation of project cost by the ESCO?
- External factors like increase in prices of equipment or any other costs?
- Combined affect of the above two factors

Comment: If 'b', by how much were the project costs incurred higher than projected? Reason for higher projects costs. Specific areas where the project cost incurred was higher than estimated.

Â Was the project completed on schedule?

- Completed before schedule
- Completed as per schedule Delayed

Comment: If 'c', please provide reasons for delay, and by how much time the project was delayed.

- Achieved savings higher than estimated
- Achieved savings as per expected/ estimated
- Achieved savings below than estimated

Comment: If 'c', please provide reason why the projected energy savings were not realized.

Annex-V-1

Partial Risk Guarantee Fund

Risk Mitigation for Market Development - Provision of Partial guarantee: The partial guarantee is a risk-sharing mechanism that will provide commercial banks with partial coverage of risk exposure against loans made for energy efficiency projects.

2. The guarantee will directly support financing of EE projects by:

(iii) Addressing credit risk and transaction structuring barriers to EE finance,
(iv) Engaging and building capacities of commercial financial institutions to provide financing for EE projects on a commercially sustainable basis.

3. The PRGF will act as a first loss, subordinated recovery guarantee and will be placed in a guarantee reserve account and will be paid out to participating banks in the event of a loss or default. The amount paid out will be equal to the amount of outstanding principal times the guarantee percentage, and will not cover accrued interest or other fees owed to the bank. The lending banks will also pursue recovery procedures in the event of default, and will pay to PGFE any monies recovered after first satisfying its own receivables.

4. PGFE will act as guarantor and will enter into agreements with commercial banks who will originate transactions. PGFE may enter into Guarantee Framework Agreements (GFA) with participating banks. The GFA will govern the relationship between the parties and specify, *inter alia:* eligibility conditions; liability limits under the GFA; approval procedures and liability limits under the different approval procedures; and loan appraisal and post-closing reporting procedures. It is recommended that some guarantee capacities be maintained uncommitted to allow new bank relationships to be developed and thus expand program market coverage and impacts.

5. Key terms of the guarantee program include the following:

- Guarantee percentage: Upto 50% of principal
- Maximum guarantee term: 5 years;
- Maximum single transaction guarantee limit: *To be decided by the PGFE Committee*
- Guarantee fee pricing: one-time up-front fees based on guarantee liability - range of 0.5% to 1.0%
- Recovery: PGFE subordinate to lending bank;

Annex-V-2

PRGF and VCFEE for Government Buildings

As indicated in Annex-IV-1, the Government building's and municipal energy efficiency market size is estimated to be Rs. 340 crores and Rs. 1300 crores respectively. The payback period of investment in these projects is estimated to be less than one year. On a debt:equity ratio of 70:30, the required debt and equity investment is Rs.1148 crores and Rs. 492 crores respectively. The risk guarantee fund and the venture capital fund must attempt coverage of about 50% of the market in the remaining 3 years of the XI plan. This would stimulate coverage of the remaining Government buildings, municipalities and other projects thereafter. As indicated in the Annex mentioned above, the revolving partial risk guarantee will cover only 50% of the lending risk. Thus, in the first year, the fund requirement to cover the risk of the projects will be around Rs. 95.67 crores. As the payback period is less than one year, the same risk guarantee fund can be utilized for provide the risk cover in the following years as well. The risk guarantee fund can be utilized for other energy efficiency projects as well.

The requirement of venture capital fund, to the extent of 30% of equity requirements, will also be limited to the 50% coverage indicated above. This would require a fund of the size of Rs. 73.8 crores over a three year period spread evenly.

The financial allocation required, taking into account the above two instruments, will be Rs. 169.47 (or say Rs. 170 crores). The year wise requirement of fund will be as under:

Rs. crores

Fund	2009-10	2010-11	2011-12	Total
PRGF	95.67	-	-	95.67
VCFEE	24.6	24.6	24.6	73.8
Total	120.27	24.6	24.6	169.47

Annex-V-3

Energy Efficiency and Conservation Funds - Selected Examples

The following is a brief summary of global examples of energy efficiency and conservation funds. All information has been extracted from the public domain via the internet. Funds are generally of two types: revolving loan funds or grant funds, or a combination of the two. Some funds operate a competitive process for allocating funds, whereas others operate on a first come - first served basis. Typically, applications for funding need to meet certain criteria and demonstrate an acceptable financial and/or economic rate of return. All of the funds have a public sector focus with due consideration in some to the private sector.

Fund Name:	Central Energy Efficiency Fund
Country:	**Scotland**
Date Established:	2004
Funding Source(s) and Size:	The Central Energy Efficiency Fund (CEEF) is a revolving loan fund under which £20 million was provided by the Scottish Executive over two years to implement energy efficiency measures, which will reduce carbon emissions across the public sector in . Within CEEF, £15 million is allocated to the 32 local authorities in , £4 million to the NHS trusts and £1 million to Scottish Water. The scheme has since been extended to provide £4 million to Higher Education.
Structure and Objectives:	Revolving loan fund. Objective is to reduce public sector energy costs.

Fund Name:	The Energy Efficiency Fund
Country:	**Bulgaria**
Date Established:	2005

Funding Source(s) and Size:	The equity capital of the EEF to the amount of $10 million has been allocated by the UN Global Environmental Facility with support from the World Bank. The Government of Bulgaria participates with funds from the state budget to the amount of Euro 1.5 million, and the Austrian Government made a donation to the amount of Euro 1.5 million. Other donations are being negotiated as well and are expected to almost double the initial capital stock of the EEF.
Structure and Objectives:	The Energy Efficiency Fund was established by virtue of the Energy Efficiency Act, which was approved in 2004. The EEF will grant credits and credit guarantees for energy efficiency investment projects. The projects should be developed in compliance with the priorities laid down in the national long and short-term energy efficiency programs approved by the Council of Ministers. External fund managers have been appointed to manage the fund - a consortia consisting of Econoler International. Center for Energy Efficiency EnEffect and Elana.

Fund Name:	The Energy Revolving Fund
Country:	**USA**
Date Established:	2007
Funding Source(s) and Size:	The Missouri Department of Natural Resources Energy Center has indicated that $5 -7 million will be available from its own budget for public sector energy efficiency initiatives.
Structure and Objectives:	Revolving loan facility to be used to finance or part-finance public sector Missouri public schools, universities, colleges, cities, counties and publicly owned hospitals and water treatment plants) energy efficiency and renewable energy initiatives and projects.

Fund Name:	Fund for Rational Use of Energy
Country:	**Korea**
Date Established:	1995
Funding Source(s):	The Korean government has provided long-term and low interest rate loans from the so-termed "Fund for the Rational Use of Energy" along with tax incentives, for energy efficiency and conservation investments. Korea Energy Management Corporation (KEMCO) is responsible for its management and monitoring.

Annex-V-4

Regulatory Initiatives - Maharashtra ERC Case Study

Regulatory Framework for ERCs to promote efficiency: Though the Electricity Act, 2003 does not have an omnibus clause for promotion of Demand Side Management (DSM) there are several provisions in the Act which provide the ERCs with the statutory authority to direct the licensees to do so. Some of them are:

(a) Preamble to the Act

- *".... to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies...."*

(b) Section 23 (Direction to Licensees)

a. *If the Appropriate Commission is of the opinion that it is necessary or expedient so to do for maintaining the efficient supply, securing the equitable distribution of electricity and promoting competition, it may, by order, provide for regulating supply, distribution, consumption or use thereof.*

(c) Section 30 (Transmission within a State)

a. *The State Commission shall facilitate and promote transmission, wheeling and inter-connection arrangements within its territorial jurisdiction for the transmission and supply of electricity by economical and efficient utilisation of the electricity.*

(d) Section 38 2(c) (CTU and functions)

a. *to ensure development of an efficient, co-ordinated and economical system of inter-State transmission lines for smooth flow of electricity from generating stations to the load centres*

(e) Section 42 (1) (Duties of Distribution Licensees and OA)

to develop and maintain an efficient, co-ordinated and economical distribution system in his area of supply and to supply electricity

2. The National Electricity Policy announced by the Government of India, however, takes due note of the potential of DSM. It states:

- *5.9.1 "There is a significant potential of energy savings through energy efficiency and demand side management measures. In order to minimize the overall requirement, energy conservation and demand side management (DSM) is being accorded high priority"*

- *5.9.4 "In the field of energy conservation initial approach would be voluntary and self-regulating with emphasis on labeling of appliances. Gradually as awareness increases, a more regulatory approach of setting standards would be followed"*

- *5.9.5 "In the agriculture sector, the pump sets and the water delivery system engineered for high efficiency would be promoted. In the industrial sector, energy efficient technologies should be used and energy audits carried out to indicate scope for energy conservation measures. Energy efficient lighting technologies should also be adopted in industries, commercial and domestic establishments.*

- *5.9.6 "In order to reduce the requirements for capacity additions, the difference between electrical power demand during peak periods and off-peak periods would have to be reduced. Suitable load management techniques should be adopted for this purpose. Differential tariff structure for peak and off peak supply and metering arrangements (Time of Day metering) should be conducive to load management objectives. Regulatory Commissions should ensure adherence to energy efficiency standards by utilities*

- *5.9.7 "For effective implementation of energy conservation measures, role of Energy Service Companies would be enlarged*

- *5.9.9 A national campaign for bringing about awareness about energy conservation would be essential to achieve efficient consumption of electricity*

3. Since its inception in August 1999, the Maharashtra Electricity Regulatory Commission (MERC) has undertaken several initiatives to encourage efficient consumption. Some of these initiatives are:

- Time of Day tariffs for several categories

- Power Factor incentives/penalties

- Additional Supply Charge

- Utilities asked to reduce costly power purchase cost by 2% through DSM
- Higher tariffs for certain categories of consumers

Some of the initiatives taken by MERC and their impact is as under:

4. DSM Directives by MERC and Result

- MSEB Tariff Order of March 2005
  - MSEB to submit detailed DSM plan within one month
  - *MSEB did not submit any DSM plan to MERC- however, in subsequent years they have done so.*
- April/May 2005
  - BEST, REL and TPC to undertake DSM programmes
  - All DSM related costs allowed as pass through in ARR for all licensees/distribution utilities
  - *Very little action immediately after this directive- REL and TPC have taken up several projects in Mumbai for DSM.*
- Tariff Order of April 2007
  - Long Term power procurement plan to have proposals on energy conservation (EC) and energy efficiency (EE)
  - Directed to take up Load research on a sustained basis and as an integral part of operations
  - Directed to take up DSM initiatives on a sustained basis as an integral part of operations
  - Reiterated that all the DSM related costs will be allowed as pass through in ARR

5. Load management directives to curb demand in view of worsening power shortages

- May 2005 Order for BEST, TPC, MSEDCL & REL

- Load management charge of Rs. 1 per kWh if consumption above prescribed limit; and load management rebate of Rs. 0.5 per kWh if consumption below prescribed limit (For consumers > 500 units per month)

- Net amount collected as load management charge to be used for promotion and implementation of EE, EC DSM

- *Collected about Rs. 70 Crore. This is being used to run DSM activities to date : All Activities to date funded out of this amount*

- Tariff Order of October 2006: REL & TPC: Steep Rise in load management Charge and load management incentive

  - Consumer protests as consumers faced hardships as their bills in some instances more than doubled.

  - Review petitions filed by industries and consumer associations:

    - Did not have sufficient time to prepare for the directive, it came as a shock

    - Lack of knowledge and awareness about why, where and how to reduce consumption

  - In response to Review Petitions, Load Management Charge Order withdrawn in December 2006

  - Utilities were asked to design and run a comprehensive consumer awareness campaign (conducted in Mar-Jun 2007)

Actions by Utilities:

- REL project on street lights

  - Energy saving = 4.56 MU/year, demand saving = 1.1MW), Rs.4.46 cr

- REL: preparation of DSM plan, undertaking load research,

  - 30 energy audits and DSM bidding for 8th khar Rd feeder, Rs.1.05 cr

- REL project for LED based traffic signals:

- Savings Achieved: Energy = 68-90%; Demand = 75-83%

- BEST Pilots for promotion of electronic ballasts and promotion of EC in high-rise building water pumping systems Rs.0.33 cr
- Feeder / Distribution transformer based DSM projects on 3 feeders through DSM bidding mechanism
- TPC project for EC in lighting Use of T-5 fluorescent tubes + electronic ballasts to replace for T-8 fluorescent lamps and conventional ballasts, Rs.0.18 cr
- Nashik and Mumbai CFL projects by MSEDCL and REL
- Established a DSM Cell within MERC: April 2006
- Pending DSM Plan preparation, worked with utilities to plan and implement on "ad-hoc" basis, EE pilot/demonstration projects
- Commissioned a study to develop and institutionalise 'DSM Resource Acquisition' mechanism
- Provided for DSM expenditure through approval of DSM Budgets so that resources are available for DSM activities during 2008-09
- Systematic introduction of DSM in utilities:
  - DSM Cells being established with dedicated resources and staff
  - DSM plan preparation and load research being undertaken - consultants appointed by REL and TATA Power
- While systematic plans being developed, moves to take-up "quick-win" DSM in following areas:
  - Domestic appliances (refrigerators & air-conditioners by REL)
  - Feeder based agriculture DSM in separated agri feeders (MSEDCL)
  - Feeder based rural domestic sector DSM in single phase or separated rural domestic feeders (MSEDCL)
  - Municipal DSM in pumps and street lighting (MSEDCL, REL, TPC)

- DSM in office buildings (MUMBAI Utilities - Difference in load betn Sunday & other days -1000 MW, most load is AC, lighting & pumping)
- DSM in Industrial estates (cluster based DSM) such as MIDC estates

7. DSM Budgets for Utilities for 2008-09 for over Rs. 30 crores approved by MERC as a part of ARR.

Annex-V-5

Proposals for Tax/ Duty Exemptions for Promotion of Energy Efficiency
DIRECT TAXES

I. Exemption under Chapter VI A of the Income Tax Act for Profits and Gains from Performance Contracting by Energy Service Companies (ESCOs) for implementing energy efficiency measures (new subsection under Section 80).

Present Provision/ Duty Structure:

At present there is no such provision. However, similar exemptions are available for infrastructure sector (80-IA), renewable energy (80-JJA), etc.

Modification Proposed:

New sub section under section 80 of the I.T. Act, 1961 to be added as under:

Deduction in respect of profits and gains from business of Performance Contracting by Energy Service Companies (ESCOs).

80___. Where the gross total income of an assessed, being an Energy Service Company, includes any profits and gains derived from the business of performance contracting in implementing energy efficiency measure, there shall be allowed, in computing the total income of the assessee, a deduction of an amount equal to the whole of such profits and gains for a period of five consecutive assessment years beginning with the assessment year relevant to the previous year in which such business commences.

Provided that the Energy Service Company is a person registered with the Bureau of Energy Efficiency, a Statutory Body under Ministry of Power created under section 3 of the Energy Conservation Act, 2001 (52 of 2001) as an ESCO for implementing energy efficiency measures based on performance contracting.

Provided further that the claim of the ESCO shall be accompanied by a certificate of implementation of performance contract for implementing energy efficiency from the Bureau of Energy Efficiency.

Likely Impact on Revenue:

The numbers of ESCOs in India are limited and therefore the present business of performance contracting is nascent. This, along with other policy measures, is expected to provide a favourable environment for investments in energy efficiency on a PPP model. Revenue impact is negligible.

Likely Impact on Power Sector:

The assessed potential, as per an ADB study in 2004, of performance contracting based energy efficiency improvements in various sectors is estimated to yield an yearly saving of 54.4 billion units and an avoided capacity addition of 9240 MW (and a saved investment of over Rs.92,000 crores in generation, transmission and distribution).

II. Exemption under Chapter II of the Income Tax Act for Profits and Gains for Venture Capital funds for investments in energy efficiency projects

Present Provision/ Duty Structure:

Section 10 (23FB), as amended w.e.f 1.4.2008, exempts the entire income of a venture capital fund from investments made in the areas like nanotechnology, biofuels, IT, hotels, infrastructure, etc.

Modification Proposed:

In addition to the areas that have been added under section 10 (23FB) (c) (ii) w.e.f 1.4.2007, investments in energy efficiency projects by venture capital funds may also be added as a separate clause (c) (iii) in the above section.

23FB)any income of a venture capital company or venture capital fund set up to raise funds for investment in a venture capital undertaking.

Explanation: For the purposes of this clause,

(*a*) Venture capital company means such company

(*i*) which has been granted a certificate of registration under the Securities and Exchange Board of India Act, 1992 (15 of 1992), and regulations made thereunder;

(*ii*) which fulfils the conditions as may be specified, with the approval of the Central Government, by the Securities and Exchange Board of India, by notification in the Official Gazette, in this behalf;

(*b*) Venture capital fund means such fund

[(*i*) operating under a trust deed registered under the provisions of the Registration Act, 1908 (16 of 1908) or operating as a venture capital scheme made by the Unit Trust of India established under the Unit Trust of India Act, 1963 (52 of 1963);]

(*ii*) which has been granted a certificate of registration under the Securities and Exchange Board of India Act, 1992 (15 of 1992), and regulations made thereunder;

(*iii*) which fulfils the conditions as may be specified, with the approval of the Central Government, by the Securities and Exchange Board of India, by notification in the Official Gazette, in this behalf; and

(c)venture capital undertaking means such domestic company whose shares are not listed in a recognised stock exchange in India and which is engaged in the business of

(A) nanotechnology;

(B) information technology relating to hardware and software development;

(C) seed research and development;

(D) bio-technology;

(E) research and development of new chemical entities in the pharmaceutical sector;

(F) production of bio-fuels;

(G) building and operating composite hotel-cum-convention centre with seating capacity of more than three thousand; or

(H) developing or operating and maintaining or developing, operating and maintaining any infrastructure facility as defined in the Explanation to clause (i) of sub-section (4) of section 80-IA; or

(*ii*)dairy or poultry industry;

(iii) Investment in ESCO based performance contracting energy efficiency projects

Reasons

Policy incentive to drive the ESCO market in India.

Likely Impact on Revenue:

The interest in this activity is for venture capital firm is limited at this stage. This will provide incentive to the venture capital funds invest in energy efficiency measures that will be in the larger interest of the nation. The likely impact on revenue will be marginal.

IV. Reduction of VAT on CFLs

Present Provision/ Duty Structure:

Most states levy VAT at 12% on CFLs

Modification Proposed:

Reduction of VAT on CFLs to 4%.

Reasons (including price of CFLs)

The present price of CFL is around Rs. 100 per piece and the rate of VAT levied by most of the states is around 12.5%. VAT levied by some of the states is at Annex-B. There is a need to reduce the VAT to 4% on CFL to reduce the price by around Rs. 8-10 per lamp to make it more attractive for consumers. It could become a demand booster and the salability of the product would increase. At present, the difference between ordinary lamps or GLS lamps and the CFL lamp is a multiple of around 10-11 and this would bring it down to 8-9 which is closer to the international multiple of about 7-8. There will be a loss of revenue for the states as far as collection of VAT is concerned. Given the fact that around 100 million CFLs are being sold in India at present, the combined loss to the states will be around Rs. 80 crores. The small loss of revenue will be more than offset by the fact that proliferation of CFLs in lighting use can reduce demand for electricity. This is particularly true given the fact that the lighting load accounts for around 20% of electricity consumption and coincides with the evening peak demand. Further, the energy reduction per CFL (18-20W) vis-à-vis an incandescent bulb (100W), given the same lumen intensity, could reduce energy consumption of 117 units per year on a 4 hour usage. With 400 million light points still on bulbs, the potential is assessed at a minimum level of saving equivalent to 10,000 MW additional capacity addition or Rs. 40,000 crores of investment. This was also resolved by the Conference of Chief Ministers chaired by the Prime Minister of 28th May, 2007.

Likely Impact on Revenue:

Rs. 80 crores of foregone VAT revenues

V. Tax incentives for Energy Efficient equipments/ appliances:

Present Provision/ Duty Structure:

Graded taxation based on energy consumption of equipment does not exist.

Modification Proposed:

It is recommended that all energy efficient end use equipments, particularly that are covered under the Standards and Labeling programme of Ministry of Power may also be provided fiscal incentives in form of a progressive VAT/ Excise duty regime in three different tax rates as indicated below:

S.No	Energy Efficiency Rating	VAT rate
1	1 & 2 STAR labeled equipments	8%
2	3 & 4 STAR labeled equipments	4%
3	5 STAR labeled equipments	Nil

Reasons

The estimated energy savings annually could be as high as 18billion units by use of these efficient end use equipments and appliances from the year 2012.

Likely Impact on Revenue:

The likely loss in revenue will be more than offset by the energy consumption reduction as well as the volumes of energy efficient products that will become available in the market. This will also supplement the efforts of the Government to incentivise energy efficient end use equipments through the Standards and Labeling Programme.

Graded Excise Duty for Energy Efficient equipments/ appliances

Present Provision/ Duty Structure:

The present duty structure on airconditioners, refrigerators, motors and pumps is 16%. It is neutral top energy consumption by these equipments.

Modification Proposed:

It is recommended that all energy efficient end use equipments, particularly that are covered under the Standards and Labeling programme of Ministry of Power may also be provided fiscal incentives in form of a progressive Excise duty structure regime in three different rates as indicated below to promote manufacture and sale of energy efficient equipments.

Further, under section 4A of the Central Excise Act, 1944, the Department of Revenue has issued notification no. 2/2006-Central Excise (NT) dated 1.3.2006 which has allowed abatement as a percentage of retail price for calculation of excise duty. For ACs (upto 3 tons), the allowed abatement is 30% (S.No. 67) and for Refrigerators is 40% (S.No. 68). A graded increased abatement allowance on retail price is also recommended for energy efficient equipments.

S.No	Energy Efficiency Rating	ED rate	Abatement as a % of retail price
1	1 & 2 STAR labeled equipments	8%	30%
2	3 & 4 STAR labeled equipments	4%	40%
3	5 STAR labeled equipments	Nil	50%

Reasons

The cost of energy efficient equipments is usually higher than that of the rest. In the case of ACs, on an average, each additional energy star rating increases the cost by about Rs. 2,000. This is a barrier for the consumers as most of the purchase decisions are made on first costs as against life cycle cost. The proposed structure will, for an AC (5 STAR), reduce the cost by about Rs. 3,000. Similar will be the case for other equipments/ appliances which are being covered under the labeling programme of BEE. The estimated energy savings annually could be as high as 18 billion units by use of these efficient end use equipments and appliances from the year 2012.

Annex-VI-1

EESL- Business Plan (Summary)

India faces formidable challenge in meeting its energy needs and in providing adequate energy of desired quality in various forms in a sustainable manner and at competitive prices. Target is to achieve 8% to 10% economic growth rate over the next 25 years.

To support the expected economic and energy growth in India, energy efficiency can play a key role. There is a great incentive for energy efficiency projects from a societal point of view, since the cost of generating new energy is 3 times the cost of saving energy.

The outlook for EE is very positive in India. The major segment for potential EE projects are industries having share of 48% of energy consumption and 25% potential for energy saving. The commercial sector consumes 20% of energy with 50% potential for energy saving. Also, there is an enormous room for implementing energy efficiency projects through ESCO mode, although not many projects have been implemented yet through this route.

The overall size of energy efficiency investment market under ESCO system of performance contract as estimated by one ADB study in India is Rs. 14000 crores. Till now, only 5% of this market has been tapped through ESCO mode mainly in the areas of lighting and some industrial applications.

Although government has implemented several measures to promote increased efficiency, efforts have gained momentum only in large industrial enterprises (e.g. petrochemical, refining) and commercial (e.g. hotels, IT enabled service providers) enterprises. This is because:

- Large industry tend to have world-scale manufacturing capacities that engage international design / engineering consultants whose best practices incorporate EE measures, invest in process equipment from the best (or among the best) suppliers world-wide
- Key decision-makers of large Indian corporates have high international exposures and awareness levels; as also that the Indian arms of multi-national corporations are in many cases required to conform to international standards
- In certain cases, opportunities for investment in cogeneration, waste-heat

recovery systems, improved compressed air systems, boiler and steam system improvements, lighting systems etc. are continuously sought as more efficient technologies appear on the scene

- They have easy accesses to credit - such clientele have relatively high credit ratings

On the other hand, EE investments are still to gain momentum in small and medium enterprises (SME), municipal corporations, government buildings, most commercial buildings (schools, offices, hospitals etc.), residential complexes etc. A pilot initiative of implementing energy efficiency projects through ESCOs was carried out in nine government buildings but the progress thereafter is very slow.

While a number of Energy Auditors and Consultants are active in India, the number of ESCOs capable of implementing performance contracts let alone shared- savings contracts are very few. The legislative and regulatory framework is being put in place only now to encourage energy efficiency and conservation. One of the main objectives of this exercise is to identify barriers that have thus far prevented market transformation by designing appropriate measures that can overcome these barriers.

Barriers to ESCO market in India

Many studies have focused on the barriers that exist in India preventing financing of energy efficiency projects. These include a study commissioned by IREDA through Econeler and the World Bank Three Country Study. The main barriers identified by these studies are:

a) Financing Barriers

Energy Service Companies (ESCOs) and building owners have insufficient access to project financing for up-front investment costs for energy efficiency retrofit projects. Some of the reasons for this are:

- The number of ESCOs is limited. Further, most of the ESCOs are service companies with balance sheets that are not strong enough to secure funding. Non-recourse finance is also not easily available given the high risk perception associated with this activity.
- Most banks require collateral of at least 100% of the loan value, which in light of the above, is difficult for ESCOs to provide.
- Most banks are yet to initiate comprehensive or long-term lending programs for energy efficiency projects. Moreover, domestic

financial institutions are generally not familiar or adept at analyzing the financial aspects of energy efficiency projects, and hence even less willing to extend credit for these projects.

- Some banks are interested in the performance contracting model offered by ESCOs, but in most cases ESCOs do not have sufficient assets to provide the requite comfort to such banks.
- Focus on a minimum first cost and hence only rudimentary levels of energy efficiency are currently considered by building owners.

b) High Transactions Costs

Energy efficiency projects are relatively small and can carry high transaction costs for lenders and end-users, especially when using new and unfamiliar procedures such as energy performance contracting.

c) Inadequate Information and Awareness

Local banks lack information about the financing aspects of energy-saving investments, the implementation experiences of others, and its pressing need for overall public good. Consumers and banks are less aware of financial options and benefits of energy savings, and have the perception that committed funds for energy efficiency projects carry very high risks.

d) Institutional barriers

Institutional barriers in terms of lack of focus on energy efficiency due to:

- The asset based lending stipulation of RBI that does not provide banks with adequate freedom to look at non-recourse lending without security
- The perceived risk of receivables as a result on yet undemonstrated efficacy of working of performance contracts
- Lack of fiscal incentives to banks under direct taxes a la infrastructure sector
- Absence of an institutional guarantee mechanism.

The interest of banks and other Fls in ESCO projects remains low, even though some successful demonstration projects were implemented with donor assistance. ESCO's in India show poor balance sheets, and very few ESCOs can finance EE projects with their own funds. Widely acceptable models for the industry, commercial and government sectors are still needed. While BEE is making efforts to develop the market by arranging for preparation of almost 2000 DPRs in various sectors, the need to demonstrate the

ESCO business model is paramount given that it is a very different model that a normal project financing, particularly from the financial institution standpoint. The successful demonstration of the business model, based on securitisation of future cash flows under a performance contract, holds the key for unlocking the market. Implementation of some projects successfully will not only enhance the credibility of performance contracting model in the perception of banks/ financial institutions and facility owners thereby reducing their risk assessment. Government leadership is necessary to not only provide a push to this activity but also the much needed credibility. For the Energy Efficiency project market to take off, key need is a separate implementing agency which addresses all the issues/barriers which impede the progress in investments in energy efficiency projects and can take the implementation leadership position in the market. The proposed EESL fits into this role very well and would push the energy efficiency market further.

After successful demonstration of EE projects based on ESCO model, other players will be enthused to enter this market. EESL can then either enter into partnerships, JVs with other implementing partners like ESCOs, industry etc. to promote energy efficiency in the country or create SPVs (special purpose vehicles) for financing specific project or a pool of projects. SPVs can act as a financing agent either to manage and administer public sector financing mechanisms, or to receive public capital for their own SPV-led funding mechanism.

After studying all the ongoing programs of BEE and analysing the market potential and future scenario, business models have been devised for various activities. EESL has to play multi-dimensional role. EESL will compete in the open market to tap business in the area of Energy Efficiency. In the existing scenario, EESL could work in following broad areas:

EESL as ESCO

- Bachat Lamp Yojana
- Energy Efficient Building
- Agricultural DSM and Municipal DSM

EESL as Consultancy Organization

- CDM projects in
    - Industrial sector
    - DSM

- Energy Efficiency
- Combined Heat and Power

EESL as a Resource Centre

- Capacity building of SDAs employees
- Training/Capacity Building of Utilities
- Training /Capacity Building of other Stakeholder and Bankers
- Training under 3-L program
- Operation of Website " www.energymanagertraining.com"

A consolidated business plan for EESL combining all these models has been prepared, which indicates the economic viability **(Project IRR 22%)** of EESL. The business model of EESL has been prepared for 5 years' business period. The result of this model shows following financial requirements:

Total Fund Requirements for Five Years Business Period (in Rs crs)	
Requirement of Fresh Equity	187.1
Requirement of Equity through Internal Accruals	137.5
Total Debt Requirement	319.0
Total Fund required	643.6

EESL will have a consolidated fresh equity (External equity) requirement of Rs.187.1 crores. EESL will utilize entire equity in first two years as the company's operations will result in revenue generation at a much later date. The early infusion of equity will help in reducing debt requirement (and resultant interest payout) in the initial period when the revenue generation is less.