

Sample Potential of Energy Savings and Energy Efficiency in Perspective of Its Conservation

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Abstract— The Ministry of Power, Government of India has developed strategic plan to make power available to all by 2012 includes promotion of energy efficiency and its conservation in the country, which is found to be the least cost option to augment the gap between demand and supply. Nearly 25,000 MW of capacity creation through energy efficiency in the electricity sector alone has been estimated in India. Energy conservation potential for the economy as a whole has been assessed as 23% with maximum potential in industrial and agricultural sectors.

Keywords— Strategic plan, Energy efficiency, Energy conservation.

I. INTRODUCTION

Electricity perhaps is one of the major inventions of today's modern times like fire was that of ancient times. People, now can be said as electricity consumers are so used to habitual of using electricity which has made a deep impact on our routine lives that every one actually take it for granted as necessity. Considering the vast potential of energy savings and benefits of energy efficiency, the Government of India enacted the Energy Conservation Act, 2001 (52 of 2001). The Act provides for the legal framework, institutional arrangement and a regulatory mechanism at the Central and State level to embark upon energy efficiency drive in the country. Five major provisions of EC Act relate to Designated Consumers, Standard and Labeling of Appliances, Energy Conservation Building Codes, Creation of Institutional Set up (BEE) and Establishment of Energy Conservation Fund. [1]

The Energy Conservation Act became effective from 1st March, 2002 and Bureau of Energy Efficiency (BEE) operationalized from 1st March, 2002. Energy efficiency institutional practices and programs in India are now mainly being guided through various voluntary and mandatory provisions of the Energy Conservation Act. The EC Act was amended in 2010 and the same are discussed here.

II. ENERGY CONSERVATION AMENDMENT ACT 2010

The EC Act 2001 was amended in 2010 and the main amendments of the Act are discussed here.

A. Main Amendments:

The main amendments of EC Act 2010 are:

- The Central Government may issue the energy savings certificate to the designated consumer whose energy consumption is less than the prescribed norms and standards in accordance with the procedure as may be prescribed.
- The designated consumer whose energy consumption is more than the prescribed norms and standards shall be entitled to purchase the energy savings certificate to comply with the prescribed norms and standards.
- The Central Government may, in consultation with the Bureau, prescribe the value of per metric ton of oil equivalent of energy consumed.
- Commercial buildings which are having a connected load of 100 kW or contract demand of 120 kVA and above come under the purview of ECBC under EC Act.

B. Energy conservation Building Code (ECBC):

The Energy Conservation Building Code (ECBC) was launched by the Government of India on 27th May, 2007. The ECBC sets minimum energy standards for new commercial buildings having a connected load of 100kW or contract demand of 120kVA in terms of Energy Conservation (Amendment) Act, 2010.

Harmonization of ECBC with National Building Code (NBC) is also under progress by including a chapter on "Approach to Sustainability" in NBC-2005. BEE has developed ECO-nirman conformance check tool with an objective of helping architects and design professionals to assess the conformance of their designs with code requirements.

Labelling programme for 3 categories of buildings (day use office buildings/BPOs/Shopping malls) has been developed and put in public domain. Till now 136 buildings have been found eligible for issue of label while ESCO model

is being promoted for carrying out energy efficiency measures in existing buildings through performance contracting.

C. Strengthening Institutional Capacity

State Designated Agencies (SDAs) are statutory bodies set up by states to implement energy conservation measures at state level. The main emphasis of the scheme is to build capacity of the SDAs to enable them to discharge regulatory, facilitative and enforcement functions under the EC Act 2001. The scheme seeks to develop and implement Energy Conservation Action Plan (ECAP) based on a uniform template evolved for taking measures necessary to build institutional and human capacity, enabling the SDAs to implement energy efficiency programmes and undertake evaluation and monitoring of the Energy conservation activities implemented in the state.

Till date, 32 States/UTs have designated their SDAs to coordinate, regulate and enforce the provisions of Energy Conservation Act, 2001.

Most of these organizations have limited experience in energy efficiency / conservation. This resulted in the need for building capacity, enhancing their understanding and knowledge about energy efficiency, having a common action plan to implement measures to reduce energy intensity of the State etc. The approved scheme of the Ministry of Power therefore enables SDAs to:

- a) Prepare a 5 year Energy Conservation Action Plan (ECAP)
- b) Implementation of ECAP with yearly deliverables
- c) Enhance capacity to undertake regulatory duties that they are required to perform under the Act.

The Ministry of Power had approved the scheme to provide financial support to the SDAs for strengthening their institutional capacity. Under the SDA scheme financial support was provided to the SDAs to carry out the following activities:

- Creation of IT infrastructure
- Creation of database for Energy Managers / Energy Auditors and Designated Consumers and other stakeholders.
- Organizing workshops / training programmes
- Creating awareness through electronic media / print media
- Preparation of Detailed Project Reports of Govt. Buildings under IGEA.
- Implementation of Energy Efficiency Demonstration Projects in the area of energy efficient street lighting, revamping of drinking water pumping system and energy efficiency in SMEs clusters

- To convert the existing incandescent bulbs (ILBs) in the households and the street lights of one village with LEDs.

III. STATE ENERGY CONSERVATION FUND (SECF)

SECF is a statutory requirement under section 16 of the Energy Conservation Act 2001 and is one of the key elements of the ECAP. The scheme is for support of Rs. 70 Crores as contribution by BEE to SECF to invest in Energy Efficiency projects. The effort will be to create a pool of financially sustainable activities for SDAs (like training programmes, fee for services, etc) which can augment the fund. The Ministry of Power has approved the scheme "Contribution to SECF by the Bureau of Energy Efficiency" for which Rs 70 Crores was sanctioned and to be disbursed during the last three financial years of the XI five year plan, i.e. 2009-10, 2010-11 and 2011-12. The funds were disbursed to those states who have constituted their state energy conservation fund and finalized the rules and regulations to operationalize the same.

IV. ENERGY EFFICIENCY IN SMALL & MEDIUM ENTERPRISES

Energy use and technology gap study has been completed in 20 SMEs cluster and is in progress in other 5 clusters. Cluster specific manual on energy conservation opportunities have been prepared in 20 clusters and information dissemination workshop for various stakeholders have been completed in 34 clusters. Preparation of DPRs on energy efficient technologies in under progress and peer review of the prepared DPRs is being done by SIDBI/ISTSL. Capacity building workshop for Local Service Providers (LSPs) has been organized in 4 clusters. BEE also initiated the small group activities (SGA) and Total Energy Management (TEM) programme to inculcate the energy efficiency practices in SMEs with support of experts from Japan. The pilot activities of SGA/TEM have been implemented in three SMEs clusters (9 units) so far.

V. MANUAL AND CODES

Energy audits have been conducted in past with little or no standard test procedures and inadequate instrumentation. When Manuals of standardized test procedures are available and uniform codes are adopted, there would be increased awareness and clarity among users regarding the output from an energy audit.

Manuals and codes on 7 Technologies (Equipment) Lighting Systems; Dryers; Cogeneration Plants; Electric Motors; Electric Transformers; Fluid piping systems (network), insulation and Air Conditioners/Chillers (HVAC) have been prepared. The manuals and code would help in standardizing the process of energy audit to support energy manager and energy auditors.

VI. NATIONAL MISSION FOR ENHANCED ENERGY EFFICIENCY (NMEEE)

The National Mission for Enhanced Energy Efficiency is one of the eight missions under the National Action Plan on Climate Change. The scheme has been approved by the cabinet and its implementation will commence in 2010-2011. The objective of the Mission is to achieve growth with ecological sustainability by devising cost effective strategies for end-use demand side management. The Ministry of Power (MoP) and Bureau of Energy Efficiency (BEE) have been entrusted with the task of preparing the implementation plan for the National Mission for Enhanced Energy Efficiency (NMEEE) and to upscale the efforts to create and sustain market for energy efficiency to unlock investment of around Rs. 74,000 Crores. The Mission, by 2014-15, is likely to achieve about 23 million tons oil-equivalent of fuel savings in coal, gas, and petroleum products, along with an expected avoided capacity addition of over 19,000 MW. The carbon dioxide emission reduction is estimated to be 98.55 million tons annually. [5]

The Government of India has approved the financial outlay of Rs.235.35 crores and a budgetary provision for Rs 108.30 crores for the current financial year. NMEEE will usher in the following four initiatives, in addition to the policies and programmes for energy efficiency being implemented by BEE. These initiatives are as follows:

A. Perform Achieve & Trade (PAT):

Perform, Achieve and Trade (PAT), which is 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.

Targets for improvements in energy efficiency will be set under Section 14 of the Energy Conservation Act, 2001 in a manner that reflects fuel usage and the economic effort involved. The Government, in March 2007, notified units in nine sectors, namely aluminium, cement, chlor-alkali, fertilizers, iron and steel, pulp and paper, railways, textiles and thermal power plants, as Designated Consumers (DCs).

Designated Consumers (DCs) in 8 industrial sectors will have mandatory participation in the 1st cycle of PAT scheme which will be implemented during 2011-12 to 2013-14. It is estimated that the total energy consumption by about 462 DCs in 8 energy intensive sector is about 165 million tons of oil equivalent (MTOE) with Power Plant sector having the lion's share (i.e. 64%). Moreover, only 5 sectors like Power plant, Iron & Steel, Cement, Fertilizer and Aluminium do consume 97% of total energy consumed by 8 sectors. About 5.4%

reduction which is estimated as 8.97 MTOE are targeted in 3 years from energy intensive industries. Among the 23 MTOE set as target from NMEEE, implementation of PAT scheme do focus on achieving 8.97 MTOE by the end of first PAT cycle. [5]

In an effort to provide an online platform to operationalize the PAT scheme, development of an internet based system (PATNET) is under process and work-order on PATNET has been awarded to NIIT to develop the e-platform of entire PAT scheme.

B. Energy Market Transformation Efficiency (MTEE):

Energy Market Transformation Efficiency (MTEE) to accelerate the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable with focus on leveraging international financial instruments, including Clean Development Mechanism (CDM) to make energy efficient appliances affordable and increase their levels of penetration.

Since the public sector holds the key to aggregation of CDM projects so as to reduce transaction costs, barriers to widespread adoption of CDM need to be removed through the following measures.

- i. Make it mandatory for all public investment and over time, all public operations to be assessed for their potential to attract carbon finance.
- ii. Promote programmatic CDM to reduce transaction costs and aggregation of small energy-efficiency projects
- iii. Develop and implement a national CDM strategy for energy efficiency
- iv. Promote market access of small industries in energy-efficiency projects
- v. Promote transparency in pricing
- vi. Ensure that the legal status of CERs is clear to avoid disputes related to taxation
- vii. Enhance capacity-building and training

Under this initiative of NMEEE, BEE has developed the umbrella framework BLY-Programme of Activities (PoA) which has been registered under UNFCCC-EB on 29th April 2010. The PoA would define key CDM requirements, including the project baseline, additionality, methodology, monitoring protocols through which CO₂ emission reductions would be assessed. The PoA approach reduces time and transaction costs for registering the projects since the key CDM requirements will not need to be addressed by area-

specific projects within the PoA. BEE plays a role of a coordinating and managing entity (CME) in the BLY - PoA. Kerala State has distributed the CFLs in the entire state. Karnataka State has also launched the scheme and CFL distribution has started. BLY is at different stages of implementation in many other states like Punjab, Haryana, Andhra Pradesh, Orissa, Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Rajasthan, Goa, West Bengal, Tamilnadu and Delhi. These projects can be added to the registered umbrella framework as and when they are developed during the lifetime of the PoA.

Another program under this initiative is the development of Super Efficient Equipment Programme (SEEP). This program is proposed to develop superefficient appliances with an aim to reduce consumption and enable demand side management. The goal is not only to reduce cost of energy efficient equipments to stimulate accelerated market transformation but also to encourage domestic manufacturing to sustain the market.

C. Energy Efficiency Financing Platform (EEFP):

Energy Efficiency Financing Platform (EEFP), to help stimulate necessary funding for Energy Service Company (ESCO) based delivery mechanisms for energy efficiency. The costs will be recovered from the energy savings, which will also reduce the subsidy bill of the state government. The scheme has the potential to be replicated across the country.

BEE has undertaken the following measures, in addition to those related to implementing demonstration projects in government buildings, in order to stimulate the market.

- i. Putting in place a government-supported standard methodology that covers the entire project chain from audit to performance measurement and verification
- ii. Designing a standard performance contract
- iii. Designing appropriate financial mechanisms to fund projects
- iv. Implementing projects and evaluating their impact
- v. Building capacity in ESCOs and project owners

In an effort to provide EEFP, MoUs with M/s. PTC India Ltd, M/s. SIDBI and HSBC Bank have been signed by BEE. PTC India Ltd. has commenced financing of several building energy efficiency projects in Rashtrapati Bhavan Estate, ESIC Hospitals at Rohini and East Delhi, AIIMS, Safdarjung Hospital. SIDBI has taken up project preparation of energy

efficiency projects in 25 SME clusters which will then be offered financing. [5]

Further, investment grade energy audits have been completed for large public buildings in the country. Based on the recommendations of these audits iconic buildings in the states will be taken up for implementation through ESCO route.

D. Framework for Energy Efficient Economic Development (FEEED):

Framework for Energy Efficient Economic Development used to develop fiscal instruments to promote energy efficiency including innovative fiscal instruments and policy measures like the Partial Risk Guarantee Fund (PRGF) and Venture Capital Fund for Energy Efficiency (VCFEE), Public Procurement of energy efficient goods and services, Utility based Demand Side Management (DSM), etc.

Efforts of the government to create a market for energy efficiency need to be supplemented with appropriate fiscal instruments, which must be designed to address the following objectives:

- i. Reassuring lenders by providing a guarantee for performance contracts
- ii. Providing a venture capital fund from the Government to provide equity for energy-efficiency projects
- iii. Promoting leadership in the public sector on energy efficiency
- iv. Promoting energy efficiency in public procurement based on life cycle cost analysis
- v. Promoting regulatory incentives to state utilities through electricity regulatory commissions for DSM projects
- vi. Offering concessions on taxes and duties to attract investment.

VII. CONCLUSIONS

The provision of energy in today's time continues to play a critical input for combating poverty, while improving employability and productivity. Developing countries have challenges and are struggling to ensure availability of affordable electricity and fossil fuels to various segments of their population, the rich and the poor. Those who are more energy efficient are bound to emerge as winners. Since power is a precious and scarce resource, it must be ensured that the losses in the transmission and distribution system are kept to a minimum level. Of course some losses are unavoidable since it is not possible to have a totally loss-free transmission. The cost of power generation, transmission and distribution are

passed on to the consumers; it should be ensured that the techniques and materials used for transmission are not overly expensive so that electricity costs are maintained within reasonable levels minimum.

For the past more than a decade, energy conservation award is being given by GoI. Since then, the participating units have collectively saved Rs13399 crores and the investment made on energy efficiency projects was recovered back in 20 months. In energy terms, 14535 Million kWh of electrical power, 27 lakhs kilolitre of oil, 91 lakhs metric tonne of coal and 22 billion cubic metre of gas was saved, through the energy conservation measures of the participating units.

Speaking on the occasion, Union Power Minister, in the past said, that Energy conservation across all sectors of the economy is essential for balancing growth in energy demand and economic growth, while ensuring that India's access to energy is managed efficiently. India is one of the first developing countries to have achieved the unique distinction of successfully achieving the decoupling of economic growth from energy use. The National Energy Conservation Awards are a testament to the Government's and the industry's commitment towards efficient energy management and conservation.

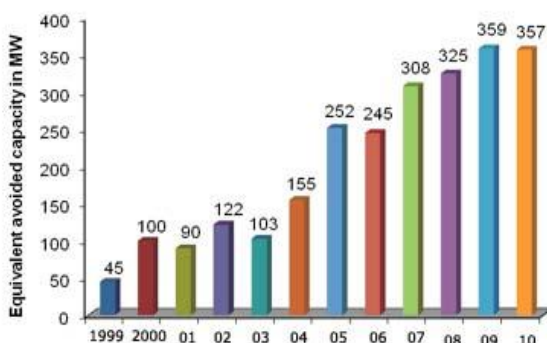


Fig1: Electrical energy savings in terms of equivalent avoided capacity in (MW) (source: MoP)

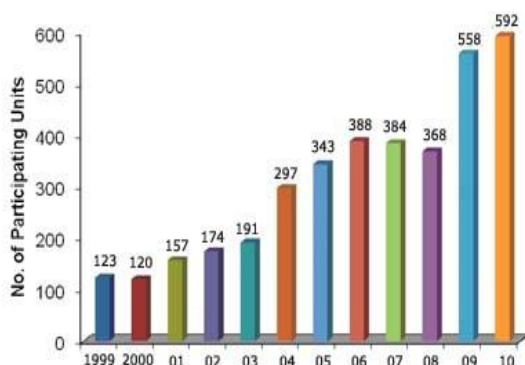


Fig 2: Encouraging response from Indian industry in the industry in the national energy conservation award scheme (source: MoP)

It is very clear that this Energy Conservation Awards have motivated the industry, individuals to undertake sincere endeavors in saving electricity. It is expected that in coming days Energy Conservation Award policy would help in motivating the other energy consumers in joining and promotion of a nationwide energy conservation movement, which shall be a kind of contribution to the Nation.

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