

Energy Efficiency is the Key for Sustainable Development

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In India the electrification of households has taken place on a massive scale and demand for energy has increased. One of the key reasons for this has been the growing population. Another, is the enormous increase in energy intensive economic activities. As the conventional sources of energy are reducing and the renewable sources are under developing phase, improving energy efficiency at all levels of the energy spectrum is the cost-effective and quick solution to address this problem.

There is a direct relation between energy, environment and sustainable development. A country seeking sustainable development ideally must utilize only those energy resources which have minimal environmental impact. Some of the concerns regarding the limitations imposed on sustainable development by environmental emissions and their negative impacts can in part be overcome through increased energy efficiency. The government, through Nationally Determined Contributions has aimed to reduce emission intensity of GDP to 33-35 per cent below what it was in 2005 by 2030. However, to

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achieve this target, there is a need for a concerted move to ensure increased energy efficiency especially in 3 sectors-

- Industrial sector
- Real estate
- Consumer appliance

Industrial Sector

Industrial sector continues to be the highest energy consuming domain where energy conservation would play a vital role. There is also huge potential for energy conservation and technology enhancement for efficiency in key intensive industries. With an aim of energy efficiency improvement, Bureau of Energy Efficiency (BEE) is implementing Perform, Achieve and Trade (PAT) scheme under the National Mission for Enhanced Energy Efficiency (NMEEE).

Perform Achieve and Trade (PAT)

It is a regulatory instrument to reduce specific energy consumption in energy intensive industries, with an associated market based mechanism to enhance the cost effectiveness through certification of excess energy saving which can be traded. PAT cycle- I had 478 DC's covering total 8 sectors including Aluminum, Cement, Chlor-Alkali, Fertilizer, Iron & Steel, Paper & Pulp, Thermal Power Plant, Textile, which were mandated to reduce their specific energy consumption (SEC) i.e. energy used per unit of production. Overall, the SEC reduction targets envisaged to secure an energy saving of 6.686 million tonne of oil equivalent (mtoe). The implementation of PAT in designated industries has led to energy saving of 8.67 MTOE in year 2015 which is about 1.25 per cent of total primary energy supply to the country in the "first cycle". This energy saving also translates into mitigating about 31 million tonne of CO₂ emission.

The energy savings of the Designated Consumers (DCs) of PAT Cycle-I have been converted to tradable Energy Saving Certificates (ESCerts). About 38.25 lakh ESCerts had been issued to 306 designated



consumers while 110 Designated Consumers have to purchase about 14.25 lakh for their compliance. The total volume of ESCerts traded by 2018 was about 12.98 lakhs resulting into a business of about INR 100 crores.

The "second cycle" of PAT was notified in March, 2016 covering 621 DCs from 11 sectors which include eight existing sectors and three new sectors, viz. Railways, Refineries and DISCOMs. PAT in its second cycle seeks to achieve an overall energy consumption target of 8.869 MTOE. Since PAT scheme is currently based on a rolling cycle i.e. inclusion of new sectors/designated consumers every year, the "third cycle" of PAT was notified in March 2017 and it seeks to achieve an overall energy consumption reduction of 1.06 MTOE for which SEC reduction targets have been assigned to 116 DCs from six energy intensive sectors. Targets for the "fourth cycle" of PAT have been notified in March 2018 under which 109 DCs have been notified from existing sectors and two new sectors i.e. Petrochemical and Commercial Buildings (Hotels) with an overall SEC reduction target of 0.6998 million tonne of oil equivalent. At present total 956 designated consumers belonging to 13 energy intensive sectors are under PAT cycles-II, III, IV and V undergoing implementation of energy efficiency projects to achieve the assigned targets.

Real Estate Sector

The Bureau of Energy Efficiency (BEE) envisages a phased approach for developing an energy conservation code for the residential sector. The idea is to create a simple and implementable code focusing on building envelope which can be integrated with the existing building codes and bye-laws.

The design of the building envelope will have a direct impact on:

- Heat conduction through the roof, opaque wall and glazed windows
- Solar radiation gains through glazed windows
- Natural ventilation
- Day-lighting

The real estate sector consumes over 30 per cent of the total electricity consumption in India annually and is second only to the industrial sector as the largest emitter of greenhouse gases; of which around 75 per cent is used in residential spaces.

The building envelope thus will impact both the thermal comfort as well as electricity used for space conditioning. In this context, BEE has two programs (1) Eco Samhita, Energy Conservation Building Code for Residential Buildings, and (2) Labelling for Energy Efficient Homes.

Eco Samhita (Energy Conservation Building Code for Residential Buildings)

The Eco-Niwas Samhita (Part I: Building Envelope) aims to set minimum building envelope performance standards to limit heat gains (for cooling dominated climates) and to limit heat loss (for heating dominated climate) as well as for ensuring adequate natural ventilation and daylighting. The code is applicable to all residential use building projects built on plot area $\geq 500 \text{ m}^2$. The code has been developed with special consideration for its adoption by the Urban Local Bodies (ULBs) into building bylaws. This strategy enables most of the new urban housing stock to be brought into the net for capturing the opportunities and the benefits of energy efficiency in residential buildings.

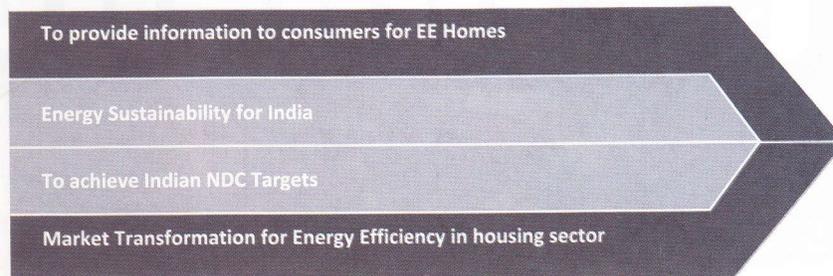
The Part I – Building Envelope Design is the first component of the Eco-Niwas Samhita, Building Code for Residential Buildings. Its early and immediate introduction was aimed at improving the construction and design of new residential building stock, as it is being built currently and in the near future, to significantly curtail the anticipated energy demand for comfort cooling in times to come. This critical investment in envelope construction and design made today will reap the benefits of reduced GHG emissions for the entire lifetime of the buildings.

The code is designed in a simple-to-apply format, requiring only arithmetic tabulation based on the architectural design drawings of the residential buildings. This will be usable by architects as well as engineers and will not require any specialized skills or simulation software. This also enables the Code to be readily adopted in the building bylaws and regulatory instruments such as Environmental Clearance for Large Projects.

Labelling Programme for Energy-Efficient Homes

To enable consumers to compare building performances

from a sustainable energy point of view, a comprehensive labelling scheme is important. Energy labels help consumers to make efficient decisions through the provision of direct, reliable and cost less information. The objective of proposed labelling programme is mentioned below:



This is expected to save substantial energy through improving energy efficiency to houses nationwide. The estimated energy saving potential through proposed labelling program is around 388 BU by the year 2030.

In conjunction with this, the programme also brings up various ancillary benefits:

- It shall act as an embryo to stimulate the larger energy-efficient materials and technologies market. To seek the energy efficiency label, customers shall demand energy efficient building materials which in turn, would give enough impetus to suppliers to produce the same.
- After the implementation of the labelling mechanism, the housing value chain would encourage an additional set of professionals to expedite the complete process of residential label granting. This way, the labelling regime shall also be a stimulant for the Indian job market.
- It will also motivate material manufacturers to invest in energy-efficient material manufacturing in India.
- Labelling mechanism shall cause a reduction in energy bills. This will empower individuals with a greater disposable income that can be consumed at other avenues, saved for future contingencies or

invested for cash-generating asset creation for overall economic growth.

- It helps the nation in working towards the fulfilment of Global Sustainable Development Goals 7 of the United Nations: Affordable and Clean Energy.

Consumer Appliances

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Bureau of Energy Efficiency (BEE) has been promoting energy conservation through optimum temperature settings for Air Conditioners. According to the study of BEE, one degree increase in the AC temperature setting results in saving of 6 per cent of electricity consumed. 24-26 degree Celsius default setting has been recommended by BEE for energy savings and also to reduce greenhouse gas emission.

Measures to promote advancement of technology and energy efficiency in Microwave Ovens which is becoming a popular household gadget, are also being taken. Savings of over 3.0 Billion units of electricity are estimated at consumer-end through adoption of Star Rated Microwave Ovens and Washing Machines by 2030. This would be equivalent to Green House Gases (GHG) reduction of 2.4 Million-ton of CO_2 by the year 2030 through these recent initiatives. □

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