

## **Case Study: Energy Conservation Building Code (ECBC) in India**

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### **Background**

Energy conservation is a key for India with its power and energy shortages. To provide a boost to energy conservation activities The Indian Parliament passed the Energy Conservation Act 2001, in 2001. The Energy Conservation Act deals with several mandatory as well as promotional measures relating to:

- Designated consumers (energy intensive industry, commercial buildings and establishments).
- Equipment and appliance standards and labeling
- Energy conservation building codes for new commercial buildings with connected load of 500 kW or contract demand of 600 KVA and above.
- Research and development, training and capacity building.

The Bureau of Energy Efficiency (BEE), an autonomous body under Ministry of Power was set up in 2002 under the act with the following objectives.

- Provide a policy framework and direction to national energy conservation and efficiency activities.
- Co-ordinate policies and programme on energy efficiency and conservation with stakeholders.
- To establish energy measurement, monitoring and verification protocol.
- To leverage multi-lateral, bilateral and private sector support in implementation of Energy Conservation Act and efficient use energy and its conservation.
- To demonstrate delivery of energy efficiency services as mandated in Energy Conservation Act through public private partnership.
- To plan, manage and implement energy conservation programmes as per Energy Conservation Act.

With high and increasing energy consumption in buildings, about 149 billion units, energy conservation in buildings is one of the priority area. The regulatory and promotional functions assigned to BEE under the Energy Conservation Act includes development of energy conservation building codes. In order to execute the functions, it is empowered to, BEE has formulated an action plan for carrying out its activities. The thrust areas which are related to the buildings are a) thrust area no. 4: Energy efficiency in buildings and establishments b) thrust are no. 5: Energy conservation building code

### **Development of ECBC**

Under its statutory authority, BEE has developed a draft Energy Conservation Building Code in India. The Energy Conservation Building Code (ECBC) 2006 has been developed by the International Institute for Energy Conservation (IIEC) under contract with the United States Agency for International Development (USAID) as a part of the Energy Conservation and Commercialization (ECO) Project providing support to the Bureau of Energy Efficiency (BEE) Action Plan. The purpose of this code is to provide minimum requirements for the energy-efficient design and construction of buildings. It is

planned that the code shall be mandatory (once enforced) for commercial buildings or building complexes.

The process of development of ECBE involved extensive data collection and analysis regarding building types, building materials, equipments like Air conditioning, lighting etc. common in India. Further, the code takes in to consideration the climatic condition. There are 5 distinct climatic zones in India and the ECBC take in to account these climatic zones in case of Building envelop design. The Base case models were then developed for buildings in these climatic zones with identification of options for energy conservation in different building systems viz: envelop, lighting, air conditioning, power, hot water. The development of ECBC had participation of all four major stakeholders: Use, Government and NGOs, Industry and Financing institutions.

It is proposed to make the ECBE mandatory for all new building that have a connected load of 500 kW or greater or a contract demand of 600 kVA or greater. The code is also applicable to all buildings with a conditioned floor area of 1,000 m<sup>2</sup> (10,000 ft<sup>2</sup>) or greater. The code is recommended for all other buildings. The present ECBC is first such effort in India and thus the ease of implementation has been a criteria while designing the code.

The draft energy efficient building code thus developed has been circulated to all stakeholders, mainly the state government agencies for their feedback. The involvement of state agencies was critical as the implementation would be through state agencies as well as the state government, in consultation with BEE, can modify the code to suit the region. The comments from all the stakeholders have been incorporated. The ECBC thus has been finalized and planned to be launched on 26<sup>th</sup> May 2007.

### **The provisions of ECBC**

The building code has provisions for

- (a) Building envelopes, except for unconditioned storage spaces or warehouses,
- (b) Mechanical systems and equipment, including heating, ventilating, and air conditioning,
- (c) Service hot water heating,
- (d) Interior and exterior lighting, and
- (e) Electrical power and motors.

Further, for the above systems there are various options for energy conservation have been identifies as 'Compliance options'. There are some mandatory provisions for each of the building systems and there are prescriptive options. The compliance options which are of prescriptive type, the project implementer can analyze feasibility of different options in terms of cost and energy saving and opt for feasible options.

The provisions of this code do not apply to:

- (a) Buildings that do not use either electricity or fossil fuel,
- (b) Equipment and portions of building systems that use energy primarily for manufacturing processes, and

(c) Multi-family buildings of three or fewer stories above grade, and single-family buildings.

### **Barriers in Code implementation:**

In consultation with IIEC, the agency that developed the energy conservation code and are involved in facilitating the implementation process, the following were identified as barriers to code implementation:

1. **Technical barriers:** The market for the energy efficient products (glazing , chillers, insulation) is still not developed and product availability to meet the code requirements is a major barrier. Associated barrier is inadequate testing facilities to certify products as per code requirement.  
The technical capabilities of code implementing agencies are not adequate to support code implementation and verification.  
There is lack of knowledge among designers to analyze designs based on code requirements. Energy simulation capability to quantify savings based on energy efficiency parameters as defined by the code is very limited. The building construction industry (contractors, services providers) are not geared to apply these measures practically on site.  
The energy conservation act empowers the state government to amend the energy conservation building codes to suit the regional and local climatic conditions. This provision may in longer run lead to large deviations from the ECBC that has been developed by the BEE. This may lead to confusion among builders/developers /designers/confusion
2. **Institutional barriers:** Although there are state designated agencies for code implementation, the institutional framework to support the same is yet to be in place. There is no defined mechanism within the states, as to how the code shall be enforced.
3. **Financial barriers:** As initial boost on promotion of energy efficient products and services is required in form of import duty relaxation, reduced tax , excise duty . The government could play a major role in realizing the same.

### **Implementation plan**

Though the draft ECBC mentions that the code would be mandatory for certain type of buildings, with above mentioned barriers it is expected that these would be implemented on voluntary basis initially. Based on the experience of implementation, the would be made mandatory as well as scope would be increased in terms of types of building as well as building systems covered under the code.

To help the implementation of ECBE, various facilitative measures are being undertaken/planned by the BEE. These include

- The energy conservation awards scheme
- Awareness generation and training related activities
  - Capacity building of State and Municipal implementing agencies

- Design Manuals, Software, and Training and Technical support for Architects, Engineers, and Code Officials
- Awareness programs for building owners, designers, and users