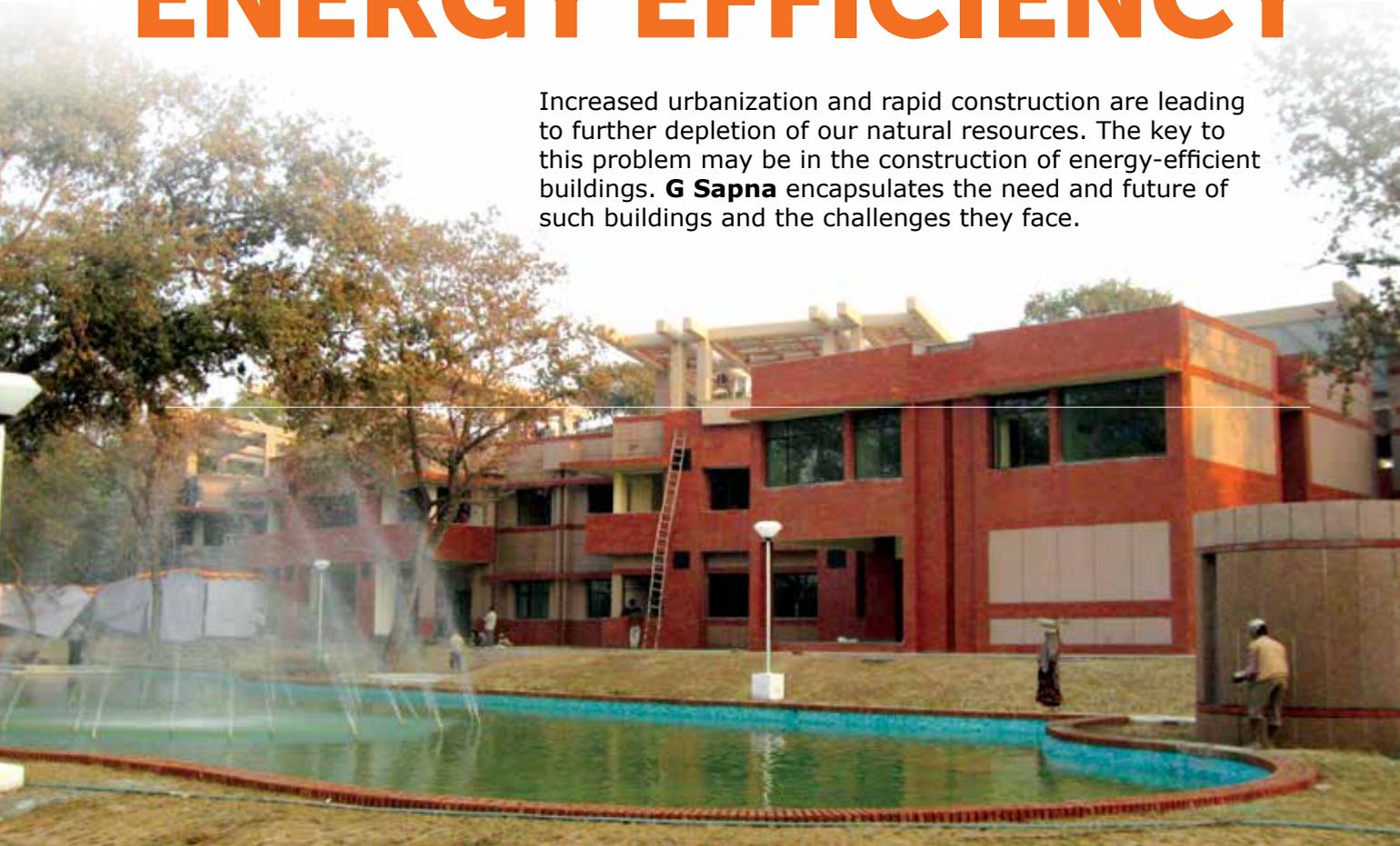


# Opting for ENERGY EFFICIENCY

Increased urbanization and rapid construction are leading to further depletion of our natural resources. The key to this problem may be in the construction of energy-efficient buildings. **G Sapna** encapsulates the need and future of such buildings and the challenges they face.



It is not just about laying the bricks, concrete, and cement anymore. Buildings in this day and age also have to adhere to energy-efficient norms. While this is true the world over, India is no exception either with the country's policy makers making a keen note. As a result, what was once voluntary for the states, has now been made mandatory by the Centre.

This was evident recently when it was announced that, "All state governments would have to compulsorily implement the minimum requirements for energy-efficient design and construction set by the Central Government by 2017 to meet the challenges of depleting

resources, increased urbanization, and rapid construction."

On the sidelines of the "Urbanscapes: How Sustainable are our Buildings" workshop, Sanjay Seth, a senior energy economist at Bureau of Energy Efficiency (BEE), was quoted as telling IANS, "While the Energy Conservation Building Code (ECBC) has been developed by BEE, its enforcement lies with the state governments and urban local bodies through notification within their states as per their regional requirements. Seven states have notified the code, while 15 are on the way to doing so." The need to graduate towards

energy-efficient buildings has found a consistent mention in most of the reports and studies. Take for instance, the one released by the Natural Resources Defense Council (NRDC) and the Administrative Staff College of India (ASCI), on presenting solutions and incentives to overcome the most common barriers to energy efficiency. Titled "Greener Construction Saves Money: Incentives for Energy Efficient Buildings across India", the report offers tools to motivate building developers to reap the savings of energy efficiency and mitigate the rising demand for energy. According to the study, "In light of the energy security risk posed by

the projected quadrupling of energy imports by 2027, the opportunity to cut energy demand domestically while developers and tenants of green buildings save money, makes energy-efficient construction a clear win for the country.”

This only goes on to reinforce the analysis on “India Energy Security Scenarios 2047”, by the Planning Commission. It reveals that if states across India who have adopted stronger building efficiency codes and developers participate in strong programmes for rating commercial buildings, an estimated 3,453 terawatt hours of cumulative electricity could be saved by 2030. This is equivalent to powering 358 million Indian homes annually between 2014 and 2030 based on current annual consumption levels for electrified homes.

Industry experts are of the opinion that creative incentives for energy efficiency investments in new construction, such as property tax rebates, creation of special economic zones, increased floor space index and expedited permit processes, can help reduce some of the biggest barriers to widespread adoption of energy efficiency. For instance, many states in India have limits on the Floor Space Index (FSI), a measure of the built-up floor area of a building relative to the size of the plot it is built on. To incentivize developers to build green, a portion of this extra FSI may be given to developers of efficient buildings for no cost, thus increasing the value of their properties. Energy Service Companies (ESCOs)—entities that can pay for energy efficiency investments upfront and recover the costs through surcharges on future energy savings—also offer a compelling model to potentially support the financing and scaling of efficiency upgrades.

Anjali Jaiswal, NRDC Senior Attorney and Director of the group’s India Initiative, agrees that, “Indian states

have an incredible opportunity to construct more efficient buildings today.” By dramatically reducing energy demand through building codes and increased participation in ratings programmes, cities can avoid costly retrofits down the road and energy can save now for decades to come. Incorporating effective compliance mechanisms is key to ensuring codes are successfully establishing at least the minimum efficiency of buildings,” she adds.

### The Origin

Way back in 2001, the Energy Conservation Act, Section 15, mentioned the ECBC and aimed at more energy-efficient buildings. Originally developed by the BEE in 2007, its adoption was voluntary. While the Act listed that each and every state has to go forward with this code, with energy being a concurrent subject, the Centre could only guide on energy related matters, but could not enforce its implementation. Therefore, the state had to take a decision as to how it wanted to go about executing the ECBC.

Thus, in 2007, when the Ministry of Power, through BEE, came up with the ECBC, it could not make it compulsory for the states. As a result, the Centre came up with a voluntary Code in the same year. It allowed for flexibility in implementation by offering a Prescriptive Method, which provided a list of requirements for code compliance, and a Whole Building Performance Method, which used architectural design software to optimise the buildings, energy performance while minimizing costs. Having the option of either method, gave developers, architects, and designers the ability to respond to changing technologies and prices over time. Additionally, the ECBC also called for the use of energy-saving CFLs and LED

lights, more natural lighting, more efficient electrical systems and solar water heaters.

### Pressing Need

As per the new regulation, however, the ECBC will be made mandatory for all states by the end of the 12th Five Year Plan (2012-17). In fact, states like Rajasthan, Odisha, Uttarakhand, and Andhra Pradesh have already notified the code. Experts feel that a rapid expansion in India’s real estate market has not only led to an increase in the demand for energy, but also the need for increasing the energy efficiency of buildings in India.

According to Ramdas Shenoy, Executive Director, Marketing & Business Excellence at Green India Building Systems and Services (GIBSS), “India has now become world’s third largest economy in terms of PPP ahead of Japan, and being the world’s second largest population, with a quest for improved quality of life, energy usage in India is expected to rise, fuelling the energy demand further. Increased energy consumption will lead to more greenhouse gas (GHG) emissions with serious impacts on the global environment; in particular, since the predominant usage of coal in the country’s energy sector is expected to continue until 2020.”

He goes on to add that the construction industry in India is growing at over 10 per cent, hence energy efficiency assumes tremendous importance. Buildings are the third largest consumers of energy after industry and agriculture, and annually consume more than 20 per cent of electricity used in an energy starved nation. Increasing energy efficiency of buildings will bring down its operating cost, specifically in the commercial building space.

Srinivas Chary Vedala, Dean of Research and Management Studies and Director, Urban Governance,

Infrastructure, Environment and Energy at the Administrative Staff College of India (ASCI), Hyderabad, avers that the ECBC is a regulatory instrument aimed at improving energy efficiency of commercial buildings. "These buildings account for a major share in the overall energy usage in a city and need immediate attention. The systematic implementation of ECBC can significantly bring down power consumption and enhances energy security of urban areas. Reduction of power consumption implies reduction of power bills to citizens, deferment of capital investment for the power utilities and most importantly the reduction of pollution. Thus, the benefits of ECBC are multifold and make business sense from the private sector and government perspective."

On the need for urgent measures, he explains, "It is recognizing the fact that there is a sense of urgency to push this agenda in the context of the urban sector. Now, India is modestly urbanized, compared to the Western world, which is at a very high level of urbanization, Since we are just urbanizing, it means densification, vertical structures, concretization and higher levels of expectation. Given this scenario, the sense of urgency, which India is now recognizing through the ECBC is very important."

Stressing on the energy saving potential, Shenoy adds, "It can be as high as 40 to 50 per cent, if addressed at the right stage of building construction. The emphasis should be to reduce energy on the demand side, thereby reducing the electricity consumption of the buildings. At GIBSS too, our endeavour is to focus on energy efficiency technologies, namely geothermal cooling for air conditioning, LED lighting solutions, and hot-water co-generation solutions."

He believes that the building codes provide the much needed framework and institutional arrangement for

initiating an energy efficiency drive. ECBC enables the states to modify it as per their climatic conditions. Implementation of building codes will definitely help buildings to reduce electricity consumption by 30 to 40 per cent, but if you look at adopting the right technologies like geothermal cooling and lighting, you can have savings up to 60 to 80 per cent.

"If building codes are implemented by states, one will see lot of development for energy-efficient products like building insulation, lighting system and air conditioning systems and people will start adopting new designs in lighting, day lighting, natural ventilation, thereby improving the building performance, elaborates Shenoy.

## The Barriers

Despite the visible advantages, in terms of being cost-effective and environment-friendly, there are challenges when it comes to implementing the ECBC. Explaining the reluctance on part of the builders and financiers, Rajkiran V Bilolikar, Assistant Professor, Energy Area, Administrative Staff College of India (ASCI) states, in times of high power tariff for commercial buildings, the consumer gradually understands this concept that he should pay less to the electricity utility, either by conserving electricity or by using energy-efficient appliances/buildings. So, the consumer should be in such a premise which uses lesser energy. But since that kind of awareness is not yet there, builders are not ready to go for it. Also, financiers are not ready because they feel that anyways they (the builders) are benefiting, so why should we given them low interest rates.

"Normally in the building sector, once the real estate owner or developer, whoever constructs the building, the benefits of energy conservation are

borne by the consumer or the person who is using the building premises. In commercial buildings, the real estate owner constructs the building and many consumers/utilizers can occupy that part of the building and use it. So, the builder will not get any kind of benefit out of it. Therefore, he feels that why should I invest more and construct an energy-efficient building?" he adds.

Concurring with his view, Shenoy also feels that the building developers are not interested, because they don't tend to gain from the initial investments in building energy-efficient buildings. "They have to understand that they can increase their profits through attractive premiums, lower energy bills, brand value and higher occupancy rates. Developers may also avail higher FARs & FSIs for projects which confirm to these codes. There is a clear cost saving advantage for tenants and owners because of lower utility bills."

Rajkiran is of the opinion that consumers in the Indian market do not think about the total utilization part over a period of time and all they are worried about is the first initial capital



investment. "Thus, the first barrier we have to address is the split incentive problem and convince builders to construct these kind of buildings."

Agreeing that it is a very sensitive subject, Chary elucidates, "The minute we say conserve energy, people will start questioning, what's in it for me? Of course, one can argue that one will save energy and money, but then they would argue that they may need upfront high capital investment, initially. The initial investment is coming from a builder, the benefit will be going to you and me, to the consumer, the one who occupies the building. Generally, the developer and the occupier are two different individuals. The question is there is no incentive for the builder to really put upfront costs, unless and until he presents it as a differentiator or a niche product."

Elaborating, he states, "You will see smart buildings and so many ways in which builders highlight the green aspect and say that the building that you are going to occupy from a buyer's point of view is a smart building. But by and large, there is an upfront cost,

but the incentives are not going to be there for a citizen, since incentive for a builder to spend that money does not exist."

Stressing on regulation, Chary adds, when it comes to common property resources, there is a need to have a sense of regulation. "Without regulation, voluntarism by itself cannot really get us the results. So, there is a recognition that voluntary compliance has its own limitation, India has recognized this and that is why they are going for a mandatory regulation."

For instance, it was decided in the state of Andhra Pradesh (before the bifurcation) that the compliance should not be with the service provider, (in this case, the municipality), instead, the mechanism should be kept outside the purview of the typical department and there should be a third party validation of all this. Explaining the need for this, Chary elucidates, "We have so many laws, implementation is a big issue, there are speed money components transparency related problems, so that's the reason we decided to keep the compliance issue and this validation exercise outside the purview of a conventional department. A third party financial auditor who comes and validates the book of accounts of an agency, will be able to do it more objectively."

Stressing on the need for capacity building, he adds, "Without good capacity, the ability to construct, design, is a big issue. Implementing it through municipal officers is also a big issue. So, that's where with the help of the AP government, the ASCI, NRDC, and Indian Institutes of Information Technology (IIIT) created a comprehensive capacity building framework. We need to build capacities upfront, even before a regulation comes into place, otherwise the credibility of that initiative would be undermined."

According to Bandana Jha, a research scholar at IIT Delhi and a green

building consultant, who specializes in energy efficiency, the move for an ECBC is a good one. However, making it mandatory only for buildings that are going to come up is not going to help matters, she feels.

Arun Thomas, Vice-President, Strategic Business Development & Partnerships, GIBSS, believes that the landscape of awareness levels on energy-efficient practices is interestingly poised in the commercial building sector in India which comprise commercial buildings, institutional buildings, and industrial buildings. The motivation for adopting building construction codes and rating systems are therefore at varying degrees within these three segments.

"The institutional buildings are built with a moral responsibility and therefore have a very high appetite for conforming to the codes and rating systems and are keen to adopt innovative technologies that are energy efficient. Most buildings being built by the central and the state governments are by default 3 star Green Rating for Integrated Habitat Assessment (GRIHA) rated buildings and conform to the ECBC code. Few landmark projects aspire for 5 star rating and deploy innovative technologies," he explains.

The commercial buildings, Thomas adds, are primarily driven by project specific budgetary aspects. There are two sub-segments within commercial buildings with respect to their adoption drives — commercial buildings that house the mature industries such as IT and high-end hospitality demonstrates a high level of adoption as they are keen to be in the forefront of reducing cost through energy efficiency measures and the multi-tenanted commercial office buildings that are slower to adopt these technologies as this segment faces the outcome posed by "split incentive challenge" wherein the developer or owner invests and tenant





benefits. The “split incentive challenge” is a dampener in the adoption of such innovative technologies in the commercial buildings sector.

The industrial buildings demonstrates two main characteristics — the mature industries who are constantly seeking to reduce their specific energy consumption have very high awareness levels and seek many innovative measures and technologies to achieve this objective. “The energy intensive and large industries are on a mission to reduce their specific energy consumption and business cost across their operations and have developed clear roadmap at an industry level on how this shall be achieved collectively by the industry — a case in point is the cement industry in India that has a mission to reduce the energy and water footprint significantly by 2020 to remain globally competitive,” states Thomas.

Shenoy believes that though a nationwide mandatory enforcement of the Code will yield considerable annual energy savings, it’s in the building owner’s own interest to implement energy-efficient measures. “Moreover one has to appreciate that access to electricity also means drinking water availability, infrastructure effectiveness,

health care and overall quality of life. This has meaningful impact for India, which is energy starved as demand for electricity outstrips generation capacity.”

Currently, the Code focuses on commercial buildings, which would be around 10 to 15 per cent of India’s energy consumption, informs Shenoy. Energy consumed by these buildings could be attributed to lighting, running office equipment and HVAC. Solutions like geothermal, radiant cooling, Light Emitting Diodes (LED) based lighting and induction lighting with appropriate controls, hot water solutions, could bring considerable savings to the tune of 60 per cent to 80 per cent, thereby reducing the consumption significantly.

Lamenting that there is a lack of knowledge of benefits related to energy efficiency in buildings among the political fraternity and policy makers at state and national level, Shenoy questions as to whether the Centre, State and local bodies are equipped to enforce the ECBC in ‘toto’ is a big question. “Also everyone in the value chain will have to start appreciating the value that ECBC will bring on the table.”

## Old versus the New

Apart from new buildings, the ECBC also covers old buildings which are getting renovated and/or extended. However, whether issues of the old buildings need to be addressed or the new ones are to be tackled foremost, is a debate which continues to rage. In the recent past, there have been some notable instances such as the Express Towers in Mumbai and the Godrej Bhavan in Mumbai, which were renovated to be green, energy-efficient buildings.

Bandana Jha is of the firm opinion that we need to ensure energy efficiency in the existing buildings, if we want to achieve efficiency in the

full sense. “One of the main things that needs to be done is to tackle the existing commercial buildings, which means reduce the energy input to a certain extent, as per the Indian Green Building Council (IGBC) benchmark or BEE star rating for existing commercial buildings. This will surely help in achieving energy efficiency. Presently, there are huge commercial buildings such as malls, which are energy guzzlers. Therefore, the need of the hour is to have mandatory norms, use energy-efficient fixtures, reduce their energy benchmarks, and reduce the EPI to the global benchmark. Also, they should depend on renewable energy so that a considerable amount of energy is saved.”

She adds that 40 to 50 per cent energy can be saved and you can reduce demand in existing buildings, there will be a larger quantum of saving. Moreover, if there is a mandatory norm, the developer will have to adhere to energy efficiency measures whilst the building is getting made.

However, Chary feels that though there is a problem, we need to ensure that the ones which are going to come are energy efficient. “Let’s start with that and then tackle the retrofit or the older buildings. The number of buildings which will come up in the next 20 years are going to be more than the ones which were built in the last 150 years.”

“In the last 100 years, around a million buildings have been built. Yes, retrofitting is useful, but challenging. Concessional lending, financially viable and a sense of awareness are needed. Since this will take time, we have decided to first tackle the ones that have not been built and then the ones which already exist,” he stresses.

## What lies Ahead?

Mentioning the ‘LEED approach’, Shenoy explains, “It is the Learn, Execute, Enforce, and Develop. For enforcement,

the state and local bodies should provide fast clearances, tax rebates and other sops to implement ECBC. The bottom line is to get all the stakeholders together. Some of the other measures which he believes could help are: Real Estate Developers through a network of builders and financial institutions can highlight efficiency successes and support adoption of similar practices. Awareness could also be increased with regard to codes, rating systems and programs, and incentives through

education. Financial Institutions can reap the rewards of the energy efficiency industry by supporting with financial products such as insurance and mortgages, with performance clauses and higher requirement ratios for energy savings, at an initial stage of construction.

Increasing interaction in the value chain like LEED, GRIHA, and other building certification groups to popularize green loan products and devise innovative business

models would also help. Furthermore, state and local bodies can integrate locally-modified ECBC guidelines into municipal building bylaws. He also suggests creating builder incentives locally through single window processes, fee reductions, and tiered property tax structures. Corporate entities, he believes, can share their experiences with stakeholders encouraging employees to reduce energy use by providing reward programmes will also help a great deal. **EF**

## State Scenario

Rajasthan was one of the first states in India to adopt ECBC as a mandatory code. It did so with minor additions on March 28, 2011 (through a stakeholder process) and on September 28, 2011, this became mandatory.

Union Territories and states which have already implemented the ECBC include Odisha, Puducherry, Andhra Pradesh, and Uttarakhand, while Haryana is in the process of doing so. According to the Bureau of Energy Efficiency (BEE), some of the other states which are in various stages of ECBC implementation and adoption include Uttar Pradesh, Karnataka, Kerala, Gujarat, Haryana, Madhya Pradesh, Tamil Nadu, Maharashtra, Chhattisgarh, and West Bengal.

In Punjab, it was announced that commercial and other major buildings would have to adhere to the ECBC. Thus, in February 2014, at a stakeholders' meeting held jointly by Punjab Energy Development Agency (PEDA), BEE, and Indian Institute of Architects (IIA) Chandigarh-Punjab Chapter, discussions were held on the implementation of Punjab Energy Conservation Building Code in the state.

Furthermore, the Andhra Pradesh government too announced it would accord top priority to energy efficiency measures to ensure guaranteed power supply in the state. In a release, it informed that the state will come out with a separate action plan under the guidance of the State Energy Conservation Mission (SECM) for implementing short-term and long-term programmes for the targeted energy savings by adopting latest technologies.

Prior to the state's bifurcation, the ECBC in AP was approved by a government steering committee consisting of developers, builders and efficiency experts, as well as ASCI, the IIIT, and NRDC. The government of AP, after consultations with real estate developers, stakeholders, came up with a mandatory notification in January 2014. After more than a year of technical review and extensive stakeholder consultation with real estate developers and experts, it formally adopted the ECBC into state law and it was announced that the Code would be effective from August 2014.

A study by NRDC and ASCI found that financial bodies and utilities were not all that keen on these measures. Financial institutions felt that there was no point in paying low interest rates to developers because energy conservation itself gives some kind of benefits, such as helping save money. In Ahmedabad, Mumbai, Chennai, and Jaipur, where the research team met real estate developers and financiers from across the country, they realised that if a building is sold as an energy-efficient one, then automatically, the market should be there.

"Even the utilities felt, why should we give them the benefits? As for the government, it believes that since there are enough property tax and other incentives, there is no need for any further incentives. Then, there are issues with capacity and control as well. Regulatory bodies feel that everything is in the civic body's hands, so what can they do. Therefore, as of now, it is an unorganized sector," revealed Rajkiran V Bilolikar, Assistant Professor, Energy Area, ASCI.

After considering the barriers, it was decided that the definition of ECBC would be tweaked. Earlier, for a 100 kW connected load, the building premises would come under ECBC compliance. Since the authority is with the municipal bodies, the definition was changed to, "If a building plot area is of 1,000 metre square or the built-up area is of 2,000 metre square, then that building should come under ECBC compliance. We developed third party compliance and handed it over them. So, the government will empower few firms or Mechanical, Electric and Plumbing companies," Rajkiran added.