

REGIONAL WORKSHOPS ON ENERGY CONSERVATION BUILDING CODE IMPLEMENTATION IN STATES

Workshop Proceedings

CHANDIGARH
February 9 & 10, 2017

AHMEDABAD
March 15 & 16, 2017

GUWAHATI
March 23 & 24, 2017

RANCHI
April 19 & 20, 2017

HYDERABAD
April 27 & 28, 2017

Organised by:
Alliance for an Energy Efficient Economy (AEEE)

Supported by:
NITI Aayog, BEE & UNDP-GEF

REGIONAL WORKSHOPS ON ENERGY CONSERVATION BUILDING CODE IMPLEMENTATION IN STATES

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Foreword

Buildings consumed 31% of the total electricity demand in India as of 2016 (MoSPI, Energy Statistics, 2016). Given that 70% of the buildings are yet to be developed between now and 2030 (ECO-III), energy efficiency strategies for this sector becomes extremely critical to ensure a sustainable energy growth trajectory for the country. Starting first with commercial building spaces to roll out energy efficiency best practices, one of the key strategies adopted by the Government of India has been to develop an Energy Conservation Building Code (ECBC), targeted at new and upcoming commercial building spaces. However, power distribution and urban development, both being subjects in the concurrent list of the Indian constitution, the onus for the rollout of this strategy lies with the states of India.

A preliminary review of the status of the ECBC implementation across different states in India reveal that while almost all states are at various stages of mandating energy efficiency regulations, there is much inconsistency and incongruence in the approach that states are taking to mandate and formalise these regulations – something that can be minimised with planning and foresight which has already been initiated by the formation of ECBC cells in the states of Uttar Pradesh, Karnataka, Chhattisgarh, Punjab and Haryana. While some states have already notified and made the regulations mandatory (10 states till date- Rajasthan, Odisha, Uttarakhand, UT of Puducherry, Andhra Pradesh, Punjab, Telangana, Haryana, West Bengal and Karnataka), states like Andhra Pradesh, Telangana, Karnataka, Punjab have progressed further by outlining the plan of action and amending their SoR, bye-laws etc. This is, in part, a result of the different state priorities and perceptions about the need for improving buildings energy efficiency, a lack of awareness, coupled with the lack of capacity and almost no or very low budget allocated for building energy efficiency programs within states. The scenario is further aggravated given the requirement of a complex multi-stakeholder engagement, for adopting these regulations, inhibiting rapid adoption of these programs across different states, even for commercial buildings alone.

While the mandate for bringing about a change in improving the energy efficiency of buildings has been taken up at a Central level by the Bureau of Energy Efficiency (BEE), under the Ministry of Power, the implementation of these regulations at the state level require cross ministerial participation. The state Energy Departments and the state Urban Development Departments are required to jointly coordinate their actions to enable a successful adoption of energy efficiency standards for buildings. Thus, the role of states has, time and again, proved to be crucial for bringing about a change in this sector. So much so, many organizations have identified the requirement of state level actions as the bottleneck in implementing building energy efficiency policies and schemes.

The ECBC rollout exercise has also highlighted the need and importance of adequate planning and interventions at the state level. Without a state prerogative and in the absence of integrated urban planning for its rollout, it would be difficult to make ECBC and other future buildings efficiency plans more effective. Given this background, NITI Aayog with support from BEE, UNDP-GEF and AEEE conducted five regional workshops to sensitise all the States and UTs of India on building energy efficiency policies and help them embark on making their states energy efficient by effective implementation of Government of India's initiative ECBC.


Shri Anil K. Jain
Additional Secretary, Energy



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THE IMPERATIVE OF ECBC IMPLEMENTATION AT STATES AND CITIES

AEEE collaborates with NITI Aayog, Bureau of Energy Efficiency and UNDP-GEF to push for immediate ECBC adoption across 29 States and 7 Union Territories of India.

In a first of its kind exercise, Alliance for an Energy Efficient Economy (AEEE) in partnership with NITI Aayog and the Bureau of Energy Efficiency (BEE), supported by the UNDP-GEF programme, conducted five ECBC regional workshops (Chandigarh - February 9-10, Ahmedabad - March 15-16, Guwahati - March 23-24, Ranchi - April 19-20, Hyderabad - April 27-28) covering all 29 states and 7 UTs of India. These regional workshops were organised exclusively for government officials belonging to the Urban Development Departments (Town and Country Planning, Roads and Building or Public Works Department, major Municipal Corporations or City government officials - many of them from the initial list of 108 smart cities, Development Authorities and State Housing Boards) and Energy Department (State Designated Agencies, Chief Electrical Inspectorates). The workshops highlighted the critical need to immediately amend and notify ECBC in all Indian states and UTs, and for the state energy and urban development departments to work together to accomplish this task without any further delay.

NITI Aayog conveyed a sense of urgency through a communication sent by Mr. Amitabh Kant, CEO to all the Chief Secretaries of the states, Principal Secretaries of the Energy and Urban Development Departments and to the Municipal Commissioners along with Chief Town and Country Planners. This communication was also sent to Chief Architects and Chief Engineers Office, Chairman and Directors at the State Designated Agencies, Chief Electrical Inspectors and to the city officials responsible for modifying building bye-laws and enforcing its compliance at the design and construction of buildings with a connected load of more than 100 kW.

Through these five workshops, AEEE has reached out to more than 500 government officials across India who will be involved in ECBC notification, enforcement and ensuring design-based compliance to start this process. There were more than 300 government officials who participated in the workshops, learned about the administrative aspect of ECBC and were also exposed to the best practices among all Indian states that have led the ECBC notification and enforcement process.

Mr Abhay Bakre, Director General, BEE also reinforced the need for urgency by sharing details of the launch of 2nd version of the Energy Conservation Building Code in 2017, which is much more stringent than the first one launched in 2007 and will have three levels of compliance (ECBC, ECBC+, Super ECBC) to incentivise government and the private sector to not just meet ECBC criteria, but to exceed it. This is possible today because of the availability of materials, appliances and equipment, and advanced technology apart from the availability of trained professionals well-equipped to design and construct ECBC-compliant buildings. BEE has further communicated that the impending notification of ECBC rules and inclusion of residential buildings in the EC Act, energy efficiency practices will be incorporated in all types of buildings in a mandatory fashion. UNDP-GEF has provided technical assistance in the form of awareness and training programme, ECBC cell creation and design assistance to ECBC-compliant buildings, and support in organising these workshops.

Mr. Anil Jain, Additional Secretary and Energy Advisor at NITI Aayog emphasised the need for government organisations to lead by example in adopting ECBC and mainstream ECBC compliance across India, which is largely missing even after 10 years of its launch by the Ministry of Power on May 27th, 2007. One of the main reasons behind the poor ECBC enforcement has been the lack of capacity, coordination and focus on energy efficiency across most of Indian states and UTs reflected in a handful of staff responsible for all EE activities at the state level. While the Government of India has done an admirable job in setting ambitious renewable energy targets, only focusing on

generation without plugging energy wastage and embracing energy efficiency will prove very costly for India and is akin to putting water in a leaky pot.

By conservative estimates, India is building 300,000 sq. ft of commercial floor space every day, and will see one of the largest commercial and residential building construction boom over the next two decades. In the 5th workshop, Infosys, owner of 45 million sq. ft. of grade-A commercial real estate, demonstrated how building energy efficiency espoused by ECBC has led them to reduce their corporate average energy performance index (EPI) from 200 kWh/m²/year to 75 kWh/m²/year and monthly energy consumption per employee from 297 kWh to 145 kWh over nine years without incurring any extra cost, which is the conventional belief. By delaying mandatory enforcement of ECBC, India is negatively impacting its Nationally Determined Contribution, Sustainable Development Goals commitment. At the same time, the lack of mandatory enforcement will have an adverse impact on India's Smart City Mission, because its building stock will have a lock-in inefficiency of 40-50 years putting a negative burden on India's energy security situation.

AEEE, NITI Aayog, BEE and UNDP-GEF urge for immediate intervention to significantly improve the energy efficiency of its existing building stock and new building construction and take action by focusing on the following interventions:

1. Make ECBC enforcement mandatory in all Indian states and UTs by October 1st, 2017 and direct the development authorities to not issue design approvals until building design show compliance with ECBC;
2. Ask all the government ministries and departments to immediately comply with ECBC for all government building design and construction with a connected load of 100 kW or more;
3. Mandate disclosure of energy use (Energy Performance Index) for all public and private commercial buildings with a connected load of 100 kW or more and immediately install meters to start monitoring energy consumed by air-conditioning and fans, lighting, plug power and elevators to instil a culture of data-driven energy management.



Dr. Satish Kumar
Executive Chairperson
Alliance for an Energy Efficient Economy

WORKSHOP PROCEEDINGS

1st REGIONAL WORKSHOP ON ECBC IMPLEMENTATION IN STATES

February 9 & 10, 2017 | JW Marriott, Chandigarh

Participating States & UTs:

Punjab, Haryana, Delhi, Himachal Pradesh, Uttarakhand Jammu and Kashmir; and Chandigarh

DAY 0: FEBRUARY 9, 2017

SITE VISIT: VISIT TO A NET ZERO ENERGY BUILDING – HAREDA, PANCHKULA

The two-day workshop started with the site-visit at the Haryana Renewable Energy Department's (HAREDA), a GRIHA 5-Star rated Net Zero Energy Building, also known as Akshay Urja Bhawan, on the evening of 9th Feb 2017. The delegates, led by Mr Anil Kumar Jain, Additional Secretary, NITI Aayog, were welcomed by HAREDA Director Ms Ashima Brar, IAS and were taken through an interactive tour of the building, coordinated by HAREDA officials and the building's architect Mr Siddhartha Wig. The various facets of energy efficiency and environment neutral design elements integrated in the building were explained to the participants. The site visit was followed by a discussion on how other participating states could replicate the sustainability and energy efficiency related aspects as seen in the HAREDA building across the different states. The positive demonstrative effect that government buildings have for encouraging and motivating other buildings were discussed. The session moderated by Mr Jain, and Mr D. K. Chopra saw participation from six states: Punjab, Haryana, Delhi, Himachal Pradesh, Uttarakhand Jammu and Kashmir; and Chandigarh and included senior representatives Ms Varsha Joshi, Secretary (Power), Delhi; Ms Ashima Brar, Director, HAREDA; Ms Jyoti N. Khairwal, Director, UREDA; Mr D.K. Gupta, Director (UD), Himachal Pradesh; Chief Engineers of PWD & CPWD, officials from Town & Country Planning and State Designated Agencies among others.

DAY 1: FEBRUARY 10, 2017

SESSION 1: INAUGURAL SESSION

Welcome address

by Mr Anil Kumar Jain, Additional Secretary, Energy, NITI Aayog

The second day of the event at JW Marriott Hotel, Chandigarh started with opening remarks by Mr Anil K Jain, IAS. Mr Jain emphasised the importance of energy efficiency in buildings and the key role that ECBC implementation in states is poised to play towards ensuring an energy secure pathway for India. He demonstrated how NITI Aayog is leading by example by achieving increasing levels of energy efficiency in its own building, by taking up energy efficiency measures within the building premises. Not only has the NITI Aayog building in New Delhi been rated 5-star by the Bureau of Energy Efficiency (BEE), but it also has integrated measures to substantially reduce its energy intensity through the ESCO route.

Presentation: Theme Setting presentation

by Mr Saurabh Diddi, Energy Economist, BEE

Mr Saurabh Diddi, Energy Economist, BEE, gave an overview of the Bureau's activities aligned with its mandate to promote energy efficiency of the Indian economy. He highlighted the achievements in rolling out energy efficiency programmes across various sectors and explained the various targets before BEE. He informed that after the ECBC notification issued by BEE in 2007, so far only 10 states have notified ECBC in their states. Mr Diddi emphasised the critical role that implementation of ECBC in states had towards India's energy efficiency endeavours. He also shared details of the launch of 2nd version of the Energy Conservation Building Code in 2017, which is much more stringent than the first one launched in 2007 and will have three levels of compliance (ECBC, ECBC+, SuperECBC) to incentivise government and the private sector to not just meet ECBC criteria, but to exceed it.

Presentation: Energy Efficiency Improvements in Commercial Buildings (EECB) – UNDP project

by Dr S. N. Srinivas, Programme Analyst, UNDP

Dr Srinivas gave the participants an overview of the efforts promoting the transition to ECBC over the last ten years by UNDP. Broadly classified under capacity development, implementation assistance and supporting ECBC implementation case studies, he requested the state participants to start developing some showcase buildings for energy efficiency, highlighting leadership and moving towards energy efficiency to reduce the energy intensity in the buildings sector in their respective states. He also extended the possibility of supporting states with necessary technical assistance, specifically creation of ECBC cells if required.

The inaugural session concluded with Dr Satish Kumar summarising and thanking the speakers for the first session.

SESSION 2: STATE'S PERSPECTIVE ON ECBC IMPLEMENTATION

Presentation: Overview of ECBC and its implementation

by Dr Satish Kumar, Executive Chairman, Alliance for an Energy Efficient Economy (AEEE)

Dr Satish Kumar provided an overview of the status of ECBC implementation in India. He highlighted some of the challenges, such as inter-departmental coordination, capacity building, etc., that the states might be facing in rolling out the regulations. The presentation set the theme for the subsequent panel discussion which saw participation from senior representatives from various states and BEE.

Presentation: BEE's Experience on ECBC Implementation

by Mr Arijit Sengupta, Assistant Energy Economist, BEE

Mr Arijit Sengupta highlighted some key interventions made in the country to enable energy-efficiency drive in the economy such as creation of BEE, establishment of State Designated Agencies (SDAs), rolling out of ECBC for energy conservation in buildings, etc. He emphasised on the role of municipal administrations in approving building designs incorporating ECBC, along-with coordinated support among the key players in the states, viz., utilities, town and country planners, housing department officials and public works enterprises- roads and buildings officials. The presentation gave a clear picture of the notification and implementation status of ECBC setting the theme for discussions on the way forward to implement ECBC in states with support from inter-state governmental departments.

Panel Discussion

Representatives of Delhi highlighted that the peak demand of power supply in the National Capital of the country is mainly due to the air-conditioning load, with 50% of the total electricity consumption being attributed to the domestic sector. They stressed on behavioural change in consumer practices for efficient use of energy at local level. They stated that the government of Delhi will be moving forward to get the notification done, underlining various initiatives of energy conservation in the region, like replacement of street lights by SDMC, distribution of 77 lakh LED bulbs including rural areas and competition among school-going children for efficient use of energy and mentioned some exemplary energy efficiency practices in the Secretariat building in Delhi. It was communicated to the audience that GoI have notified 2016 Unified Building Bye-Laws for Delhi, categorising green features such as Energy Efficiency, Water Management, Renewable Energy and Waste Management having specific requirements as per the area of construction. Also, they communicated their plans on going forward by replacing old inefficient fans and ACs with new star-rated energy efficient equipment. Problems like sourcing smart meters and setting them up, in addition to non-availability of market for energy efficient building material, was quoted as concerns by her.

Punjab officials underlined the need of implementing ECBC and other energy conservation practices to save the environment. They informed the audience of the notification done by Punjab's Urban Development Department and Local Governing Bodies to implement ECBC in Punjab along-with the incentives provided by the respective departments on ECBC compliance. They also mentioned various initiatives to sensitise government departments, students and professors from architecture colleges, engineering colleges, practising architects and contractors for implementing building codes. They deliberated on identification and formation of market for building materials and to create an online repository with all kinds of building material and properties and local availability to lead the way of manufacturing energy-efficient materials in the country.

Uttarakhand representatives emphasised the need for an online tool to assist ECBC compliance covering all stages from submissions of drawing to compliance checking with minimal human interference to make ECBC

implementation. They stressed on incorporating ECBC for households along-with old constructions as well so as to have larger impact on Indian economy. They emphasised on providing interest free loans to ECBC complying buildings, commercial or residential, and to associate green building ratings with economic benefits. They also highlighted the need for information in public domain on energy efficient materials, their properties and sector-specific usage and target replacement of old inefficient ACs by energy efficient ACs through tendering process.

Representatives from Haryana put the spotlight on energy conservation measures taken in HAREDA office building and outlined the role of Town and Country Planning department and Urban Local Bodies in making requisite changes in the building Bye-Laws to implement energy conservation measures in the building. They communicated to the audience of rebates on levels of GRIHA Star-rated buildings and that all the techniques and materials for energy efficient buildings are listed in Gurgaon's Renewable Energy park, for disseminating knowledge among common public and students. They also conveyed about mandatory energy audits and efficient lighting systems for designated consumers in state in addition to the Bal Urja Rakhshak Mission, comprising of 25 schools from nearby regions, propagating the effective need and urgency of energy efficient practices among students.

Himachal Pradesh officials stressed the power deficit in the state during winter season, even after being a power surplus state with abundant hydel power generation, with major portion of electricity consumption being in the industrial sector. Under energy conservation measures taken in the state, they highlighted schemes such as distribution of CFLs in 2009-10, LED bulbs for domestic consumer, street-light replacement programme and monetary benefits to SMEs to carry out energy audits on first come first serve basis. They conveyed to the audience that ECBC draft document was prepared in consultation with EESL, three years back, but not much work had been done after that, because of unclear objectives and shortage of manpower. They requested BEE to set-up an ECBC cell at the SDA level to go forward to putting up the code to the higher authorities in the states.

Representatives from Jammu and Kashmir, highlighted the critical power supply scenario in state with obstacles in providing power to the three diverse geographical locations with distinguished terrain and climate conditions. This is coupled with the power shortage, poor financial health of the department and lack of manpower. They informed the audience that building Bye-Laws have been issued in the public domain and can be amended as per the requirement, including standard schedule of rate for 2017. They pointed out the identified Smart Cities (Jammu and Srinagar) and four AMRUT cities (Jammu, Srinagar, Leh and Anantnag), where some public buildings can be identified for consideration of retrofits and be showcased as model buildings in state. They requested NITI Aayog for hand-holding in setting up ECBC Cell and coordinated efforts to put up push the ECBC notification process. Further, they zeroed-in on the unclear picture as in which department should be responsible for ECBC implementation and pointed lack of coordination between different departments. They informed the audience that under UJALA scheme 60 lakh lamps had been replaced with energy efficient LEDs in the state. They underlined the need for clear communication and proper coordination among the stakeholders.

Chandigarh officials requested BEE to set-up an ECBC cell in the Union Territory as no step has been taken in that respect. Conveying that there is no generation of power in Chandigarh, they informed the gathering of commissioning 50 MW of Solar rooftop power by 2022 out of which 10 MW has already been commissioned. Other energy efficiency initiatives taken in the UT are replacement of street-lights with LED lamps, distribution of LEDs in the region and replacement of old distribution transformers with energy efficient transformers.

Question and Answers/ Comments from Participants:

- Ms Priyanka Kochhar, Regional Manager, GBCI, Gurgaon, Haryana, pointed out the incentivisation scheme of Punjab Government in adopting ECBC and mandatory route adopted by other states and asked which route to follow, and how to strengthen the monitoring of ECBC implementation and who should be responsible for such action.
 - Mr Amarpal Singh replied to the question by stating that both routes have been followed, as in, making it mandatory to adopt ECBC at approval stage and incentivising the contractors who comply with the code. He stated that rather than creating an inspection regime, the architecture community will be responsible for certification and compliance and that PED

will be providing basic energy audits and reports for reference to the consumer to give an idea of ratings and incentives associated.

- Ms Amandeep Mijjer, Senior Town Planner (Nodal Officer), Punjab, raised issues regarding legal provisions for ECBC implementation in states and creating awareness among all the stakeholders both regarding technical aspects as well as incentives if any. She also asked how can the town planners be held responsible to look after all the aspects of ECBC.
 - Mr Amarpal Singh, in his answer, mentioned that the notification of ECBC is itself a legal provision. He stressed on sensitisation amongst the authority to incorporate ECBC compliance while passing any building plan and that everyone in the department need to update their knowledge and all committees and individual will be responsible to include ECBC compliance while passing a building.
- Ms Shalu Thind, Associate Planner, Town and Country Planning Department, Uttarakhand, questioned if UREDA could take the responsibility of ECBC compliance in buildings as architects are not well versed with the technical aspects of ECBC.
 - Ms Khairwal answered that as no major work has been done so far in the state on ECBC, and there are plans to go with software-based solution to ensure ECBC compliance at all stages from construction approval to building occupancy.
 - Mr Chopra mentioned that architects can choose either prescriptive or whole building route for ECBC compliance. He emphasised that adequate training on building energy simulation techniques should be organised for the architecture community for effective ECBC compliance. Once ECBC becomes a part of building bye-laws, it becomes a legal requirement to which building contribution must adhere to. The team can use any of the two approaches to demonstrate ECBC compliance.
 - Mr D.K. Gupta from Himachal Pradesh stressed on the use of checklist for ECBC Compliance in any building plan.
 - Mr M.C. Gupta from Uttarakhand highlighted the motivation a builder gets through benefits, rebates, interest-free loans, etc. to make ECBC compliance part of building design and construction and that there should be strict penalties on non-compliance.
 - Ms Gurmeet Kaur from Chandigarh stated that if energy department and urban development department are not able to check ECBC compliance, then a town planner is also not in the capacity for the same. She underlined the fact that self-certification from architects has been a failed approach and that third-party certification model is better suited to enforce ECBC compliance in buildings.
 - Mr Bagga from Punjab questioned the master trainer approach and pointed out the capacity deficit in states to successfully implement ECBC in the buildings sector.

SESSION 3: ECBC IMPLEMENTATION SUCCESS STORIES: LESSONS LEARNED

Presentation: Regional Experience of ECBC Implementation

by Mr Rajkiran Bilolikar, Associate Professor, ASCI

Mr Rajkiran outlined the significance of leadership in states to create a sense of urgency for implementing ECBC at the highest level- preferably at the Chief Secretary level, so as to sensitise high level officials of various stakeholder departments. He informed the audience of how the Government of AP (before bifurcation) approached ECBC adoption, creating technical committee comprising of high level officials from UD, Energy, Town and Country Planning, SDA, Municipal Corporations, Development Authorities, BEE, Real Estate Developers Association, and technical experts to find the breakthrough in implementing ECBC in the state. He mentioned creation of sub-technical committee at urban local bodies to create awareness, capacity building and for regular review of ECBC compliance at the local level along-with updating online building approval system to incorporate ECBC compliance in building Bye-Laws by amendments and adoption. He stressed on creation of Building Approval Committee to review submitted projects, answer queries on ECBC requirements and process, ensuring ECBC compliance and tracking and reporting the progress in-addition to creating a framework for Third Party Verification for ECBC Compliance in buildings sector.

Presentation: ECBC Implementation Approaches

by Ms Radhika Khosla, Fellow, Centre for Policy Research

The final presentation of the day was given by Ms Radhika Khosla who highlighted the mapping of ECBC process and outcomes in the last 10 years' post ECBC release. She outlined the weak outcomes due to the

institutional architecture and capacity constraints and highlighted the best practices for ECBC implementation that have been adopted by states like Karnataka, Andhra Pradesh, and Telangana. She pointed out rethinking building's energy efficiency from a technical problem to a socio-technical problem incorporating technology and market access, policies, and governance and behavioural change in the ECBC adoption, keeping energy and climate change as parallel perspectives.

SESSION 4: CONCLUDING SESSION: CHANGE / REINFORCEMENT OF STATE'S PERSPECTIVE

The workshop concluded with closing remarks by Dr S. N. Srinivas, Mr Saurabh Diddi, and Dr Satish Kumar. Dr Kumar explained to the group that this workshop, which was the first of many, was only a starting point and the work on aggressively taking up the cause of ECBC implementation in the states now needed to be started. Dr Srinivas agreed that the workshop had been an important first step towards sensitising the states and getting a sense of the challenges being faced by the states in implementing the norms. Mr Diddi outlined that the lessons from the workshop needed to be taken up by the states going forward, and requested for an integrated and coordinated approach in making ECBC a success.

WORKSHOP PHOTOGRAPHS





2nd REGIONAL WORKSHOP ON ECBC IMPLEMENTATION IN STATES

March 15 & 16, 2017 | Hyatt, Ahmedabad

Participating States & UTs:

Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Daman and Diu; and Lakshadweep

DAY 0: MARCH 15, 2017

The delegates were welcomed at the CEPT University campus by Dr Satish Kumar and Prof. Rajan Rawal for a site visit to CEPT University – NZEB building. The site visit saw participation from the states of: Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, and Union Territories of Daman and Diu; and Lakshadweep. The site visit gave participants a better understanding of various energy efficient building design strategies implemented at the NZEB building of CEPT University campus. The site visit, carried out in two batches, constituted first-hand experiences of various testing techniques and strategies for building design (Orientation, building envelope, shading, etc.) and materials (insulation, glass glazing, building blocks, etc.) that can help achieve high performance buildings. After the site visit, an ice-breaking session was held where various issues related to rolling out and implementation of ECBC were discussed in an informal manner. The role and availability of various design energy efficient materials like insulation, glazing, walling etc. along was also discussed. The site visit successfully highlighted among the participants the various building design aspects, as well as the importance of energy and thermal comfort performance monitoring.

DAY 1: MARCH 16, 2017

SESSION 1: INAUGURAL SESSION

Welcome address and Presentation: BEE's Experience of ECBC Implementation

by Mr Arijit Sengupta, Assistant Energy Economist, Bureau of Energy Efficiency

Mr Arijit Sengupta welcomed all the participants to the 2nd regional workshop on ECBC implementation in states. He appreciated the efforts put in to bring all the stakeholders on one platform for discussing the pressing issues related to ECBC implementation across India. He further highlighted India's and BEE's major developments to move towards an energy efficient economy such as enactment of EC Act, 2001, constitution of BEE. He emphasised the need to put the ECBC implementation rules in place, while amending ECBC in states like specifying the roles of planners, auditors, assessors/verifiers etc. Creation of ECBC cells in states was also referred to, for streamlining the implementation process. He also shared details of the launch of 2nd version of the Energy Conservation Building Code in 2017, which is much more stringent than the first one launched in 2007 and will have three levels of compliance (ECBC, ECBC+, SuperECBC) to incentivise government and the private sector to not just meet ECBC criteria, but to exceed it.

Presentation: Energy Efficiency Improvements in Commercial Buildings (EECB) – UNDP project

by Dr S. N. Srinivas, Programme Analyst, UNDP

Dr Srinivas shared UNDP-GEF experience on ECBC implementation in States and indicated UNDP-GEF project plans to go forward in the coming months. Underlining the worldwide projects on building energy efficiency by UNDP-GEF, he highlighted various policy measures adopted by different countries such as mandatory building codes for both commercial and residential sector. He also gave a comprehensive overview of UNDP's ongoing Energy Efficiency Improvements in Commercial Buildings programme in India, which is broadly classified under following categories of capacity development, implementation assistance and supporting case studies for ECBC implementation. He requested the state participants to look into the prospects of online tools for ECBC compliance submission and evaluation. He also suggested states' departments to showcase their leadership and develop exemplary energy efficient buildings in their states. He also extended the possibility of supporting states with necessary technical assistance, specifically creation of ECBC cells if required.

Keynote Address

by Mr Anil Kumar Jain, Additional Secretary, NITI Aayog

Mr Anil Kumar Jain highlighted the contrast between the reducing energy intensity coupled with increasing comfort levels in the developed nations with that of the increasing energy intensity without any improvements in the comfort levels for developing nations like India. He pointed out that this is due to the continuous

ongoing emphasis on energy efficiency on the part of the developed nations and the lack of same among the developing block. Various energy conservation measures taken up by NITI Aayog in its building were focussed on during his address, highlighting the savings achieved through them. He also stated EESL's initiative to undertake Building Energy Efficiency Retrofits in public buildings, showcasing the economic, environmental and comfort benefits associated with the improvements on energy efficiency. He asserted the necessity of notifying ECBC in respective states and extended support from NITI Aayog, BEE, EESL, UNDP-GEF and AEEE for successfully notifying the same.

The inaugural session concluded with Dr Satish Kumar summarising and thanking the speakers for the first session.

SESSION 2: STATE'S PERSPECTIVE ON ECBC IMPLEMENTATION

Presentation: States' Roles and Responsibilities in ECBC implementation

by Dr Satish Kumar, Executive Chairman, Alliance for an Energy Efficient Economy

Dr Satish Kumar gave the audience an overview of ECBC and summarised the progress of ECBC implementation across the country. He also highlighted the roles and responsibilities of various technical and administrative requirements in different departments of Energy and Urban Development to ensure ECBC implementation. He highlighted some of the challenges, such as inter-departmental coordination, capacity building, etc. that the states face in rolling out the regulations. The presentation set the theme for the subsequent panel discussion which saw participation from senior representatives from various states and BEE.

Panel Discussion

Representatives of Gujarat, suggested awareness creation among stakeholders through knowledge dissemination thus promoting ease of doing business in implementing ECBC, revolutionising the entire mechanisms and thought process to make energy efficiency implementation in buildings successful. They also emphasised on appointing a nodal officer in each municipality and putting in place a weekly review mechanism to fast-track implementation. They also asserted making software-based solutions for understanding ECBC compliance aspects to the architects and town planners. They stressed on the importance of giving ownership of ECBC implementation to the lowest level of governance such as the Municipal Corporations, with the support of various high-level stakeholders.

Madhya Pradesh officials spoke about various challenges in implementing ECBC in the state of Madhya Pradesh. They also mentioned the role of ECBC cell being established in the State with the support of BEE and UNDP in defining roles and responsibilities of different stakeholders - the Energy Department, UDD, Town and Country Planning Department, Urban Local Bodies, Architects, etc. - as notification through only one department is not sufficient and may not be very effective to ensure ECBC enforcement. They also pointed out integrating ECBC compliance mechanism in an online building commissioning portal with the help of IT cell to make the compliance mechanism user-friendly and verification process hassle-free.

Rajasthan representatives suggested that one high level regional ECBC Cell for 3-4 states should be developed so as to create awareness and disseminate the approval process under ECBC compliance to Town and Country planning officials, responsible for approval of buildings. They mentioned that ECBC notification of ECBC in Rajasthan was done as a directive as under the EC Act and not much progress has happened on ground in terms of ECBC implementation.

Maharashtra officials pointed out the lack of coordination among various government departments for ECBC not being implemented in the state. They proposed the Third-Party Assessor (TPA) approach to assist in incorporating ECBC compliance in building plans and then verify the compliance, to be the best possible solution for implementing ECBC in the state. The TPAs will be responsible to conduct audits/checks during construction, post-construction phase and verify the ECBC compliance after the building is occupied.

Presentation: Energy Efficiency Initiatives in Buildings

by Vikas Pandey, Engineer, EESL

Mr Vikas Pandey outlined the significant issues regarding the inefficient practices being adopted across the country in various sectors and highlighted key opportunities that can be tapped from them. He also presented

the various initiatives that EESL has undertaken at central and state level, describing the approach taken by EESL for retrofitting projects. He also described the various business models – PMC, ESCO and Integrated - adopted by EESL and how consultancy services, financing, implementation and operation & maintenance are carried out by EESL in them. Listing out the forthcoming projects that EESL will be taking up in future, he asserted energy efficiency and ESCO based performance contracting to be the most cost-effective option to meet the energy requirements of increased economic growth and minimising the impact of climate change.

Question and Answers/ Comments from Participants:

- Mr Arvind Khatri, Executive Engineer, PWD, Jaipur, Rajasthan, raised the point of simplifying the codes, so that individuals working at ground level can understand the technical aspects as well as code compliance process. As ECBC talks about different disciplines - such as architectural, civil, electrical, mechanical - coordinated effort between all the agencies is key to successfully implement the codes.
- Mr Amit Gajbhiye, Jt. Director, Town and Country Planning Department, Madhya Pradesh, suggested that instead of opening a new window of ECBC compliance for building construction, incorporating ECBC in the pollution norms for buildings would be an easier way forward to enforce compliance. He informed the audience that building bye-laws will be amended to incorporate ECBC as an integral part. He also highlighted the importance of propagating the benefits by adopting the code.
- Mr Srirang Landge, Director, Town and Country Planning Department, Maharashtra, underlined energy efficiency as an essential part of sustainable development and that the designers/architects have to be enlightened of the issues for the need to build ECBC compliant buildings. He also raised concerns on the ownership of the implementation project as notification is done by the energy department and thus the same department should head the implementation process and not pass it to other departments.
- Mr Rajendra Pandya, Consultant, AEEE, Gujarat, stressed on creating a sense of ownership in the department responsible for ECBC implementation and that complete hand-holding among the stakeholders is required so as to develop in-house capability of implementing and monitoring the code at the local body. He underlined the importance of training programmes at the municipal level with the cooperation of BEE and SDAs to create a sense of urgency and ownership among the local bodies. Adding to this he called for separate training programmes for builders and architects and separate programme for monitoring and enforcement authorities. He urged the Roads and Buildings department to take lead and become a major stakeholder in ECBC implementation so that a large upcoming chunk of government buildings can be ECBC complied. Mr Pandya also highlighted the need to incorporate ECBC in the course curriculum of colleges, as done with NBC, to create awareness among the upcoming architects and engineers.
- Mr Kaushal Lodaya, Consultant, MP Urja Vikas Nigam, Madhya Pradesh, specified that ECBC document is very easy to understand for a professional and that the major problem lies in enforcing the code within the boundary of the legislation. He informed the audience that his department is conducting meetings with individual departments. They are working at the ground level to understand the complications faced in implementing the ECBC and how the document can be simplified. Towards this, they are planning to organise capacity building workshops in 10 divisions in the state of Madhya Pradesh.
- Mr Paresh Sharma, Chief town Planner, Gujarat, urged for the provision and propagation of fiscal incentives for adopting ECBC to make its implementation successful.

SESSION 3: ECBC IMPLEMENTATION SUCCESS STORIES: LESSONS LEARNED

Presentation: Regional Experience of ECBC Implementation Approache

by Professor Rajan Rawal, Executive Director, CARBSE, CEPT University

Mr Rajan Rawal communicated to the audience the process of adoption, implementation and enforcement of ECBC. In his presentation, Mr Rawal discussed the ECBC notification process and highlighted various compliance approaches available to fast-track ECB implementation. Tiered approach was suggested to ease both incorporation of ECBC compliance and then verification of those compliance. He provided a useful overview of savings from various energy conservation measures associated with ECBC tiered approach. He discussed the need of having highest savings from 1st tier which only talks about building design related

measures and are in the scope of ULBs buildings approval process. Mr Rawal also highlighted the role of the Third-Party Assessment (TPA) model as one of the solutions for auditing and implementing ECBC norms across states.

Presentation: Energy Efficient Building: Aranya Bhawan, Jaipur
by Mr Prashant Bhanware, Building Energy Efficiency Project

In the final presentation of the workshop, Mr Prashant Bhanware presented the case study of Aranya Bhawan in Jaipur, which is an ECBC compliant building. He showcased the various aspects incorporated during the design phase of the building which brought down the air-conditioning and lighting load requirement of the building drastically. Mr Bhanware highlighted the results of the energy efficiency audit undertaken post occupancy to verify the actual energy performance of the building.

SESSION 4: CONCLUDING SESSION: CHANGE / REINFORCEMENT OF STATE’S PERSPECTIVE

The workshop brought into focus that while many of the challenges that the states were currently facing in implementing the Code were similar, given the variation in the structure of the departments within the states, there was a need to have state specific strategies for rolling out effective implementation of the codes. State Government representatives from Maharashtra and Madhya Pradesh suggested that their states had already prepared the draft ECBC roadmap document, and that they would be notifying ECBC over the course of the next two to three months.

Mr Hemant Patil of Maharashtra Energy Development Agency (MEDA), said “the Third-Party Assessment model appeared to be the way ahead for a quick uptake and implementation of ECBC, and could be explored and adopted by all states”.

While Gujarat, is also in the process of notifying ECBC norms for the state, it appeared that several significant efforts have already been taken up by the state to further the cause of energy efficiency. The Chief Town Planner of Gujarat, Mr Paresh Sharma, emphasised on the need of simpler and faster ECBC implementation to enable ease of doing business.

Of the four states represented, Rajasthan was the only state which has notified the state specific ECBC norms way back in 2011. However, implementation of the norms in Rajasthan has remained low, largely due to the gap between the technical knowhow of the subject among energy department and the implementation agencies in the urban and town-and-country planning departments.

There was unanimous support for this NITI Aayog led initiative as everyone felt that by bringing key stakeholders – Energy, Urban Development, Municipal Corporations, Town and Country Planning, Chief Architect, PWD and Roads and Buildings department and Development Authorities - from multiple states on the same platform, many of the issues and challenges being faced by government in notifying and implementing ECBC can be addressed. The workshop was summarised by Dr Satish Kumar, Executive Chairperson of AEEE and the next steps that will be undertaken by NITI Aayog, BEE and UNDP-GEF to continue to fast track the implementation of ECBC across India were discussed.

WORKSHOP PHOTOGRAPHS









3rd REGIONAL WORKSHOP ON ECBC IMPLEMENTATION IN STATES

March 23 & 24, 2017 | Radisson Blu, Guwahati

Participating States & UTs:

Assam, Tripura, Meghalaya, Manipur, Mizoram, Nagaland, Arunachal Pradesh, Sikkim and West Bengal

DAY 0: MARCH 23, 2017

The delegates were welcomed by Dr. Satish Kumar on 23rd evening during the ice breaking session followed by networking dinner. The session had participation from states: Assam, Meghalaya, Manipur, Nagaland, Arunachal Pradesh, Sikkim And West Bengal. The session introduced participants with an exemplary passive design architecture – a government building at Guwahati. Mr. Rittick Hazarika, Architect from Cadmetric Consulting presented on ECBC compliance and passive design of Assam Water Research and Management Institute (AWRMI) Guwahati, Assam. The presentation highlighted the role of passive design of buildings in ECBC compliance. Energy efficient building designs can be achieved through a combination of planning and detailed building envelope design. He further added that a climate appropriate building envelope and design eases the ECBC compliance. The various facets of energy efficiency and environment neutral design elements integrated in the building were introduced to the participants. A video on energy conscious building designs was also shown, followed by discussions on how other participating states step forward in designing energy efficient buildings in their region based on the climate conditions.

DAY 1: MARCH 24, 2017

SESSION 1: INAUGURAL SESSION

Welcome address

by Mr Harendra Kumar, Joint Advisor, Energy, NITI Aayog

Mr Harendra Kumar, welcomed all the participants to the 3rd Regional Workshop on ECBC implementation in states. Highlighting the critical importance of having energy efficiency across in India, he brought out the importance of buildings in addressing several of India's sustainability objectives. The critical role that states would have to play in achieving these objectives was brought out by him, along with leadership that needs to be shown by the government institutions. With this he welcomed Mr Sathis Kumar, OSD, NITI Aayog to showcase the efforts made by NITI Aayog to retrofit and bring down the energy consumption levels in the existing NITI Aayog building.

Presentation: Energy Efficiency interventions at NITI Aayog

by Mr Sathis Kumar, OSD, NITI Aayog

Mr Sathis Kumar presented to the audience, the leadership role that had been taken up within NITI Aayog to reduce the energy consumption of the 50-year old building. The effort of the first two phases alone, which have focused on changing lighting and fans, has helped reduce the energy consumption of the building by 42% with payback of a year and a half. In addition, the efforts of setting up a solar unit on the terrace of the building has helped substantially reduce the grid connected electricity load.

Presentation: ECBC Implementation Report

by Mr Saurabh Diddi, Energy Economist, BEE

Mr Saurabh Diddi gave a background and overview of the ECBC efforts that have been led by BEE over the last ten years. He mentioned that while there have been initiatives within many states for ensuring greater ECBC compliance like various capacity building programmes, notifications for making these codes mandatory has taken place only in 10 states to date. Far fewer states have taken efforts to implement these notifications, through necessary capacity building and process changes within the states, he cited. Thereafter he presented the efforts which are being taken up by BEE to implement the revised 2017 ECBC codes, and changes from the existing version. Mr Diddi mentioned that BEE will very soon be notifying ECBC rules detailing ECBC enforcement framework for the states.

Presentation: Energy Efficiency Improvements in Commercial Buildings (EECB) – UNDP project

by Dr. S. N. Srinivas, Programme Analyst, UNDP

Dr Srinivas gave the participants an overview of the efforts that UNDP has been championing in enabling a transition to ECBC over the last ten years. Broadly classified under following categories of activities such as capacity development, implementation assistance and supporting case study buildings for implementation of ECBC. He requested the state participants to start developing some show case buildings for energy efficiency, highlighting leadership. He also extended the possibility of supporting states with necessary technical assistance, specifically creation of ECBC cells if required.

Key-Note address

by Mr Rajiv Bora, Additional Chief Secretary, Power, Government of Assam

Mr Rajiv Bora, in his key-note address for the workshop, pointed out that while a large quantum of real-estate has grown over the last decade, the overall demand and building stock will continue to rise for the next couple of decades, doubling or possibly tripling over this period. Citing the example of Assam, a state which has been marginally energy deficient, he mentioned that energy efficiency alone can address this deficit requirement. The alternate option, of generating this deficit power requirement and increasing the energy supply, he highlighted, would not only be a more expensive solution but would have possible negative externalities. Energy efficiency in general, and ECBC in particular, is therefore a vital starting point for enabling this transition. He re-emphasised the need for government to take leadership in not only notifying and mainstreaming ECBC, but more importantly in making government office spaces energy efficient. The need was not only to educate and sensitise architects and practitioners to design efficient buildings, but to start introducing these concepts as part of the college curriculums. He also emphasised the role of training programmes and capacity building in transitioning to ECBC compliance. Mr Bora highlighted the concern that policies become ineffective in the absence of adequate enforcement and reinforced the urgent need for putting ECBC enforcement mechanisms in place.

The inaugural session concluded with Dr Satish Kumar summarising and thanking the speakers for the first session.

SESSION 2: STATE'S PERSPECTIVE ON ECBC IMPLEMENTATION

Presentation: Overview of ECBC and its implementation

by Ms. Mohini Singh, Senior Researcher, Alliance for an Energy Efficient Economy

Ms. Mohini Singh gave the audience an overview of ECBC and summary of the progress of ECBC across the country. She highlighted the administrative roles and responsibilities within different departments of Energy and Urban Development to ensure ECBC implementation. She also stressed on comprehensive understanding of ECBC implementation administrative requirements by government officials while allocating technical queries to technical experts.

Presentation: States' Roles and Responsibilities in ECBC implementation

by Dr. Satish Kumar, Executive Chairman, Alliance for an Energy Efficient Economy

Dr. Satish Kumar highlighted roles and responsibilities of relevant government departments in ECBC implementation along with some of the challenges, such as inter-departmental coordination, capacity building, etc., that the states might be facing in rolling out the regulations. The presentation set the theme for the subsequent panel discussion which saw participation from senior representatives from various states and BEE.

Panel Discussion

Representatives from Arunachal Pradesh suggested that the awareness relating to energy efficient buildings should be strengthened and emphasised the need to have a workshop in the state capital of Itanagar in the next few months. They mentioned the ongoing capacity building programmes for architects, developers and civil engineers, but specified the vital need for capacity building among the policy makers, something that is currently very limited. They mentioned that the newly developed secretariat building in Itanagar is highly energy intensive. In addition to developing the codes, the compliance of the same also needs to be focussed on, he added. Project management support for the north-eastern states, along with technical assistance, would be very important so that there is actual action on the ground. They proposed that it would perhaps be very useful if NITI Aayog, or other national Ministries such as MoEFCC, could conceptualise a fund that could be accessed for making buildings energy efficient, since these efforts would also help in meeting the objectives

of the NAPCC. They highlighted that pilot projects that would help showcase the potential that is offered by energy efficient buildings are also the need of the hour.

Mr Adil, consultant with the Arunachal Pradesh Energy Development Agency for ECBC implementation, explained to the group the new application called the ECBCAPP that has been developed to be a smart assist for people. The app, available on android and iOS platforms allows people to determine the effect that various measures of ECBC would have on the energy intensities of different buildings.

Assam officials gave an overview of the draft outline of the ECBC notification for Assam. The Manipur officials explained the challenge that exists in the state for implementing ECBC. They highlighted the administrative issues resulting from the recent unbundling of the power generation and distribution companies that have led to ECBC being put on the backburner. The state is in the process of reviving the SDA. However, they added that they are certain that the state would take up ECBC soon without any further delay once the SDA is revived.

Representatives of Meghalaya pointed out that while the state has started the discussions on ECBC over the last five years, the movement has been slow. The draft notification, they cited, has already been developed and is currently under review by the various relevant departments. While the current environment and weather in the state of Meghalaya appeared to be amenable to good quality housing, it would be important to make sure that buildings design aspects take advantage of these in their design. Applicability of ECBC in the NE states which could be brought down to 50kW, rather than having one size fit all 100kW, since it would increase the scope and applicability of ECBC. There are also a large number of iconic buildings which are coming up in Meghalaya over the next few years, and they cited that they would explore if the state could bring in these buildings under the ambit of ECBC. They also mentioned that since Meghalaya lies in a cold climatic zone, unlike mainland India, space heating requirement is quite common here.

The status of ECBC in the state of Sikkim was presented by Officers in charge of the SDA in Sikkim. They mentioned that there was a challenge in the state of integrating and bringing together officials from different departments to address the issue of ECBC. Seconding the thoughts of the Commissioner of AP, they cited the importance of implementation of the norms, and requested if the code threshold could be brought down to 50kW. They also put forward a request to the stakeholders for extending technical and capacity building support for taking up some buildings for making them energy efficient in Sikkim. They mentioned that although the current status of ECBC implementation is not good, they are serious about it and have already formed a committee which is looking into it. They also stressed on the need for sensitisation of a policy maker in the state.

West Bengal officials highlighted the efforts that have been taken up by the West Bengal government on the issue of ECBC. They mentioned that the state had already initiated the process of convening a committee for implementing ECBC in the state. The committee has the mandate of not only notifying ECBC, but also has the role of implementing the same. They also cited the efforts that have been taken for retrofitting and converting into energy efficient buildings. They thanked the group gathered for organising this workshop, and requested UNDP to extend the existing support for capacity building if required going forward.

Representatives from the government of Nagaland, put the spotlight on the efforts which are currently underway in the state. Problems identified in Nagaland was that the number of buildings with connected load less than 100kW was very few. Therefore, they also proposed to reduce the threshold for ECBC to 50kW. The matter had been put up to the Chief Secretary for clarification, and they added that this was something that could be taken up by other states as well.

A short presentation was made by Director, APEDA, about the approach that has been taken by the state in fine tuning ECBC for applicability in Arunachal Pradesh. The state has already scaled down the connected load requirement to be considered for ECBC to 50kW. Given the climate in the state, the codes, he said, have been drafted for only two regions, cold and warm-and-humid. He put forward the support that the state was seeking from the national agencies such as BEE and MNRE. The support requested included establishment of ECBC cell in the state, further training to enhance capacity of the state in using simulation tools for effective design and compliance, etc. He also emphasised the fact that the state had already put in place a demonstration project in the form of the Urja Building.

In the last presentation of the session, Mr Preetu K Patgiri from EESL Guwahati, focussed on the energy efficiency potential and possibilities of energy savings in the existing buildings. The approach that has been taken by EESL this far was explained, including the contracting and payment mechanism. PMC, ESCO and Integrated payment methods for energy savings was explained by him for the benefit of the participants. He focussed on the efforts that have been taken by EESL across the different states in this region, and the approach being followed by them for making their buildings more efficient.

SESSION 3: ECBC IMPLEMENTATION SUCCESS STORIES: LESSONS LEARNED

Presentation: States' ECBC notification approaches

by Mr. Kanagaraj Ganesan, UNDP

Mr. Kanagaraj Ganesan outlined the significance and approaches for ECBC notification citing specific examples from different states that have notified ECBC and the corresponding state departments involved. He specifically showcased the approach that had been followed by the Karnataka government for implementing the ECBC in the state. He also gave an interesting glimpse of ECBC initiatives taken in the state of Karnataka. He summarised his presentation by showing a film on a case study of ECBC implementation in Kumar Kruppa Guest House in Karnataka.

Presentation: Designing of Energy Efficient Buildings in colder climate

by Mr. Gaurav Shorey, Director, PSI Energy Pvt. Ltd.

The final presentation of the day was given by Mr Gaurav Shorey, Director - PSI Energy Pvt. Ltd. Through various examples from both hot and cold regions he convinced the participants that ECBC compliance is very simple by just following an integrated approach where architects and engineers work as a team. He also highlighted the utility of ECBC User Guide in understanding the technical nuances from a non-technical perspective and how it is especially useful for the architecture fraternity for not only designing for ECBC but also for energy efficiency in general.

SESSION 4: CONCLUDING SESSION: CHANGE / REINFORCEMENT OF STATE'S PERSPECTIVE

One of the questions that was raised through the session was a query to BEE about whether it would be possible to reduce the ECBC threshold from the 100kW to 50kW. It was pointed out by Mr Diddi, that the current EC Act does not provide for a reduction in this threshold, but this is something that can definitely be considered as part of the revisions currently underway.

The workshop concluded with closing remarks by Dr. Satish Kumar. He outlined that the lessons from the workshop needed to be taken up by the states going forward, and requested for an integrated and coordinated approach in making ECBC a success.

WORKSHOP PHOTOGRAPHS







4th REGIONAL WORKSHOP ON ECBC IMPLEMENTATION IN STATES

April 19 & 20, 2017 | Chanakya BNR, Ranchi

Participating States & UTs:

Uttar Pradesh, Jharkhand, Chhattisgarh, Odisha and Bihar

DAY 0: APRIL 19, 2017

The delegates were welcomed by Dr. Satish Kumar on 19th evening for the interactive session on the need for energy conservation in buildings. The session saw participation from states: Bihar, Chhattisgarh, Jharkhand, Odisha, and Uttar Pradesh. Dr Satish Kumar, Executive Chairman of AEEE, presented on Importance of Energy Management and Metering in enhancing Building Energy Efficiency. The presentation highlighted the role of meters in gathering critical data on energy consumption in the facility. He highlighted how this can help in lowering the building electricity consumption by 2-5%. He further outlined the importance of metering and EMS by showcasing case studies in hospitals and public buildings. The presentation was followed by a video on energy conscious building designs, introducing the participants to the various facets of energy efficiency and environment neutral design elements integrated in the building. This was followed by intense discussions on what ECBC is, the difference between ECBC and Green Buildings, need for ECBC and level of stringency to be followed by states while amending and adopting ECBC. Further, the group discussed how participating states can step forward in designing energy efficient buildings in their region based on their climate conditions. Mr Saurabh Diddi, Energy Economist, BEE, assured that BEE would arrange training on ECBC in states wherever it has not happened so far. Mr Sathis Kumar, OSD, NITI Aayog also shared the upcoming NITI Aayog initiative of State Energy Efficiency Index where all 29 Indian shall be assessed based upon certain indicators about progress made on Energy Efficiency across different sectors such as Transportation, Buildings, Industry, Agriculture. It was informed that AEEE shall be the knowledge partners of NITI Aayog in this initiative and NITI Aayog, along with AEEE, shall reach out to all concerned state departments to take state specific feedback before the assessment framework and indicators were finalised. The session concluded with positive commitment from all participating states and Union Territories (UT) to extend full support in this important endeavour of NITI Aayog. Informal discussions continued during networking dinner.

DAY 1: APRIL 20, 2017

SESSION 1: INAUGURAL SESSION

Welcome Address

by Mr Niranjan Kumar, Director, JREDA, Jharkhand

Appreciating the efforts put in by NITI Aayog in conducting the workshop in Jharkhand on energy conservation, Mr Niranjan Kumar highlighted the works of JREDA in the state, which is on track to set up solar power plants in the state with a total capacity of 950 MW. He outlined a big achievement of setting up rooftop solar accumulating to 5 MW capacity, on 100 government buildings and informed the audience of the plan of providing subsidies for rooftop solar expansion in state and installing solar parks on a 24 km stretch between Devgarh and Baskina for complete power provision for street lights. He also spoke about installing 2000 streetlights, out of which 650 lights have already been installed. He pointed out the importance of ECBC in terms of using power efficiently and reducing consumption of power in the state and highlighted the role of solar energy in replacing coal based power plants.

Special Address

by Ms Sangeeta Singh, Secretary, UPNEDA, Uttar Pradesh

Ms Singh appreciated the initiative taken by NITI Aayog to conduct such a workshop which has helped bridge various topics like awareness about ECBC, problems faced in notification, its implementation and enforcement via formal and informal discussions and by experiences shared by the participants. She stressed on checking the consumption and then plan generation, citing the rise in infrastructure development in the near future. She informed the audience that about 35-40% of the total electricity consumption is attributed to buildings in Uttar Pradesh and stressed ECBC compliance should be integrated right from building construction stage rather than retrofitting after building is completed. She indicated that notification of ECBC is in process in the state. She highlighted the lack of funds and knowledge on energy efficient materials to be the key reasons in

reluctance to the adoption of code. She also mentioned about the achievement of 50% compliance of ECBC in one of the building in Kannauj, UP. Ms Singh outlined the role of stringent ground verification and penalties in case of non-compliance in successful implementation of ECBC.

Presentation: ECBC Implementation Report

by Mr Saurabh Diddi, Energy Economist, BEE

Mr Saurabh Diddi reiterated Ms Singh's words and highlighted the need to notify and implement ECBC in the country by respective states with stringent enforcement action plan. He provided the overview of EC Act, highlighting the powers vested with states to notify and implement ECBC as per EC Act, Chapter 6. He also mentioned of the support BEE is willing to provide to create ECBC Cells, creation of a pool of 3rd party certified verifiers and ECBC master trainers. Mr Diddi gave the participants an outline of ECBC 2017 highlighting two new entrants in the code, ECBC+ and Super ECBC compliance buildings. He also mentioned of the incentives in pipeline for showing compliance with Super ECBC requirements.

Keynote Address

By Mr Harendra Kumar, Joint Adviser, NITI Aayog

Mr Harendra Kumar welcomed the participants to the workshop and cited the critical importance of having energy efficiency across India. He brought out the importance of buildings in addressing several of India's sustainability objectives. The critical role that states would have to play in achieving these objectives was brought out by him, along with leadership that needs to be demonstrated by the government institutions.

The inaugural session concluded with Dr Satish Kumar summarising, and thanking the speakers for the first session.

SESSION 2: STATE'S PERSPECTIVE ON ECBC IMPLEMENTATION – PANEL DISCUSSION

Presentation: ECBC Implementation Experience of UNDP

by Ms Archana Bhardwaj & Mr Abdullah Nisar Siddiqui

Ms Archana Bhardwaj shared UNDP's national and international experience on promoting energy efficiency in the building sector. In India UNDP is providing support to buildings in demonstrating ECBC compliance. UNDP is planning to promote energy passport concept and introduce subject on "energy efficiency in building sector" in undergraduate's courses curriculum. Ms Bhardwaj's address was followed by a thought-provoking presentation by Mr Siddiqui. He shared about the role of buildings in providing comfort to human beings and further elucidated ECBC technical details. Mr Siddiqui highlighted the role of central government, state government and local government in ECBC implementation. Almost 27 buildings are supported by UNDP to demonstrate ECBC compliance; also, they are providing technical assistance to 10 buildings.

Presentation: Energy Conservation Measures taken at NITI Aayog

By Mr S. Sathis Kumar, OSD, NITI Aayog

Mr Sathis Kumar presented to the audience, the leadership role that had been taken up within NITI Aayog to reduce the energy consumption of the 50-year old building. The effort of the first two phases alone, which have focussed on changing lighting and fans, has helped reduce the energy consumption of the building by 42% with payback of a year and a half. In addition, the efforts of setting up a solar unit on the terrace of the building has helped substantially reduce the grid connected electricity load.

Presentation: Energy Efficiency initiatives in buildings by EESL

By Mr Hemant Minz, EESL

Mr Minz from EESL highlighted the increasing energy demand in the building sector and the issues in the sector, stating that there is higher fossil fuel consumption and higher GHG emissions. He stressed that increasing energy demand is a manageable issue but requires sustained efforts. EESL had adopted various business models like PMC, ESCO & Integrated approach to reduce energy demand in buildings. EESL has so far assisted almost 27 buildings in reducing their energy demand, and is further planning to extend the scope beyond. He also highlighted that the ESCO model is an important mechanism to enhance energy efficiency in the existing building sector.

Presentation: AEEE

By Dr Satish Kumar, Executive Chairman, AEEE

Dr Satish explained the philosophy of the workshop. He linked ECBC requirements with common sense, such as human beings when in harsh sun, cut down the glare by wearing cap/ sun shades/ shading eye for their own comfort. He emphasised that the buildings need same to cut down glare and heat inside the building, and explained ECBC suggested measure to reduce this heat gain thus conserving energy. He indicated the norms which are included in ECBC code are well translated from technical parameters to practical parameters in ECBC User Guide. He further discussed roles and responsibilities of states and its various departments in ECBC implementation. He highlighted some of the challenges, such as inter-departmental coordination, capacity building, etc. that the states face in rolling out the regulations. The presentation set the theme for the subsequent panel discussion which saw participation from senior representatives from various states and BEE.

Panel Discussion

Odisha officials informed that they were among the first state to notify ECBC and have also constituted two committees - Apex committee and Expert committee to implement ECBC in state. The state ECBC cell has been established under Bhubaneswar Development Authority (BDA). They further informed that under the leadership of Principal Secretary, Mr PM Mishra, the code was notified. Though Odisha was the 1st state to notify ECBC, the state is struggling to implement the code and the major challenge in implementing ECBC is capacity constraint. They also highlighted that the roles and responsibilities of the state officials must be clearly indicated, as this will help in moving the code implementation more rigorously. They clearly indicated the lack of ECBC implementation roadmap, along with ambiguity about states roles and responsibilities is a deterrent in code's meticulous implementation. BDA was first authority in state which has introduced code in their bye laws. They highlighted that committed leadership is required.

Bihar representatives informed of State level ECBC code draft version being prepared in 2015; however, code enactment is stuck due to lack of coordination, technical know-how and manpower. Working group has been formed to push the notification process, consisting of senior officials from urban development department, energy department and urban local bodies. Rules are also drafted which will be applicable after enactment. They are hopeful that the enactment will be done by December 2017. Amendment of building bye laws as per ECBC is also under consideration but requires expert support and handholding. The need for ECBC cell was also indicated, which can provide technical help to the departments.

All the states also requested for a draft of amended model bye-laws/ building bye-laws, which can be followed to fast-track the amendment process.

The Chhattisgarh representative shared that CSECBC was amended in 2011. A technical committee was formed under the leadership of the Principal Secretary, Energy, consisting of senior officials from UD, PWD, and Finance etc. However, he was transferred and the process has been stuck. The need to convince senior state officials on the importance of ECBC who then can be lead implementation was highlighted. According to them, there are two concerns of state officials – incremental cost associated with ECBC and identification of the department which will facilitate notification and enforcement of ECBC. They emphasised ECBC implementation at a state level is the responsibility of the state as well as the central government. Once the code is pushed at the centre, the state department senior officials will eventually get aligned to the cause. They said the ECBC training should be conducted for all relevant stakeholders, both govt and private sector and awareness workshops need to be conducted for all, as in Chhattisgarh, some departments are not completely aware of ECBC. They also pointed that these meetings do not hit the right chord as, soon after the meeting, no follow-up is done. They requested and pointed that meeting minutes must be circulated.

Jharkhand representative mentioned that the draft Jharkhand amended ECBC is prepared and is put up to the government for notification. Similar to other states, the state is facing challenges in co-ordination among departments and technical competency. GRIHA, a green building rating tool which incorporates ECBC's mandatory parameters is better known in Jharkhand; whereas ECBC is not so well known by some departments. The urban development department is in the process of amending Jharkhand building bye-laws where GRIHA has been incorporated; however, due to lack of awareness, ECBC norms are missing in the draft. The upcoming new secretariat building in Jharkhand also incorporated GRIHA listed parameters. The officials believe if the Principal Secretary pushes the effort, the code will be quickly adopted. Another suggestion was to provide a roadmap to help state officials understand their roles and responsibilities and fast-track implementation. They also suggested to incorporate ECBC in Smart Cities Mission.

SESSION 3: ECBC IMPLEMENTATION SUCCESS STORIES: LESSONS LEARNED

Presentation: ECBC implementation experience of UPNEDA

by Mr Ashok Srivastava, UPNEDA & Mr Anurag Bajpai, Greentree

Mr Srivastava presented a case study of UPERC building, the first energy efficient office building in UP, selected as a demo project to showcase implementation of ECBC. He further highlighted various strategies which were analysed and incorporated in the building to achieve maximum energy savings. In total, three options were considered against base case and incremental cost was analysed for the final selected strategy. The project was supported by UNDP financially for the incremental cost of the project. Mr Srivastava highlighted that while proposing an EE building, the most critical aspect is to convince the client; whereas, implementation takes more time due to coordination issues. Availability of technical expertise and awareness on the availability of the ECBC compliant materials is also a challenge and he suggested appointing dedicated technical expert for the process. He further stressed that monitoring of the building energy consumption and establishing the impact of ECBC measures on actual energy savings is an important aspect and the UPERC building is considering incorporating the monitoring process as well.

Mr Anurag Bajpai, Director, Greentree, presented case study of UNEDA training center in Kannauj. Greentree was hired as a sustainability design firm for the building. He explained the building envelope design parameters which were incorporated in the building. Thermal comfort and visual comfort was duly taken care in the building design and this was demonstrated with the help of simulations. Wind analysis was also carried out to have adequate amount of natural ventilation in the building along with shading design to have adequate daylight in the building. Low heat transfer windows were designed for the building. To reduce the artificial cooling load earth air tunnel is also provided. Finally, energy analysis was also carried.

Presentation: States' ECBC implementation approaches

by Ms Mohini Singh, Senior Researcher, AEEE

Ms Mohini Singh gave the audience an overview of ECBC and summary of the progress on ECBC implementation across the country. She highlighted the administrative roles and responsibilities within different departments of Energy and Urban Development to ensure ECBC implementation. She also stressed on comprehensive understanding of administrative requirements related to ECBC implementation while allocating technical queries to technical experts. ECBC implementation approaches of Andhra Pradesh and Karnataka were discussed. The common take away from the implementation approaches of these states was that senior leadership plays a vital role in ECBC implementation. Under the leadership of Chief Secretary and PWD Chief Architect in Andhra Pradesh and Karnataka respectively, issues like state department coordination, technical competency and enforcement were addressed. The Greater Hyderabad Municipal Corporation online ECBC approval process is one example of fast tracking ECBC enforcement process. She also highlighted the role and need of Third Part Assessors (TPAs) in assisting the government and public sector agencies, who do not have the manpower or the technical competency, to serve as the primary agency conducting ECBC compliance checks.

SESSION 4: CONCLUDING SESSION: CHANGE / REINFORCEMENT OF STATE'S PERSPECTIVE

The workshop concluded with closing remarks by Dr. Satish Kumar. The role and process of TPA model was reemphasised. He highlighted that TPA approach can take care of the technical queries of the code enforcement. The participants unanimously agreed and appreciated the operational level meeting. Role of leadership and awareness at senior officials' level was highlighted a key to ECBC implementation. Creation of ECBC cells was highlighted, which can tackle many of the issues highlighted in the session and BEE extended its support to form cells in participating states. Standard templates for amending building bye-laws were also requested by the participants. He outlined that the lessons from the workshop needed to be taken up by the states going forward, and requested for an integrated and coordinated approach in making ECBC a success.

WORKSHOP PHOTOGRAPHS







5th REGIONAL WORKSHOP ON ECBC IMPLEMENTATION IN STATES

April 27 & 28, 2017 | Infosys-SEZ, Pocharam, Hyderabad

Participating States & Union Territories:

Andaman & Nicobar, Andhra Pradesh, Dadra & Nagar Haveli, Goa, Karnataka, Kerala, Puducherry, Tamil Nadu and Telangana

DAY 0: April 27, 2017

SITE VISIT: VISIT TO A NET ZERO ENERGY CAMPUS- INFOSYS-SEZ, POCHARAM

The two-day workshop initiated with a site-visit of the Infosys-SEZ, Pocharam campus, on 27th April 2017. The delegates, led by Dr Satish Kumar, Executive Chairman, AEEE, were welcomed by Mr Guruprakash Sastry, Regional Head-Infrastructure, Infosys and were taken through an interactive tour of the facility covering four important aspects, viz., Site Planning and Building Design, HVAC Plant, Biogas Plant and Solar Park, coordinated by Infosys officials. The various constituents of the building designs were highlighted to the participants, which helped in bringing down the cooling and lighting requirement of the campus. The delegates led by Mr Guruprakash Sastry visited the chiller plant to get insights on the innovative design and key energy management aspects of the plant, from where they were led to the biogas plant. Almost 80% of the electricity demand of the campus is met by onsite 6.3MW solar plant, which is also connected to the grid. The site visit was followed by a presentation by Mr Sastry on the initiatives taken by Infosys to reduce their energy demand from 2008 onwards, and how the actions have led to a reduction in the overall electricity consumption in the facility and enhancing comfort levels at the campus. This session was followed by discussions on how other participative states can replicate the sustainability and energy efficiency aspects in their respective states as seen in the Infosys, Pocharam campus. The site visit and post site visit discussions had participation from representatives of Andhra Pradesh, Delhi, Goa, Karnataka, Kerala, Puducherry, Tamil Nadu, Telangana and Uttar Pradesh.

DAY 1: April 28, 2017

SESSION 1: INAUGURAL SESSION

Welcome Address

by Mr Guruprakash Sastry, Regional Head-Infrastructure, Bangalore and Infosys-SEZ, Pocharam Team

Mr Sastry welcomed all the delegates to the workshop emphasising on energy efficiency in buildings as the need of the hour. He deliberated on the previous day key discussions and outcomes along with citing site examples. He urged all participants to take away a good learning experience and have a strong stance on implementing energy conservation measures in buildings of their respective states. With this, the 1st session of the workshop kick-started.

Special Address

by Mr Ajay Mishra, Special Chief Secretary; Principal Secretary- Energy, Telangana

Mr Ajay Mishra highlighted some of the pro-active steps taken to promote renewable energy in the state of Telangana. The state has installed decentralised solar plants. Currently, the state has 1350 MW capacity of plant where solar power is being produced through long-term PPAs, with another 1800 MW in-lieu of being commissioned in next 6 months. With Telangana being the first state to take-up net-metering, he underlined the promotional strategy adopted by the government for rooftop solar business. Mr Ajay Mishra also conveyed to the audience the steps taken by the government in the last 5 years in coordination with Ministry of Urban Development Department to implement ECBC in the state along-with other mandatory and promotional schemes to ensure energy conservation measures in buildings. He mentioned the importance of benchmarking energy consumption data and the need to generate publicity material for effective dissemination of knowledge related energy efficiency in general and ECBC specifically.

Special Address

by Mr Abhay Bakre, Director General, BEE

Pointing out the mandate by the central government on ECBC, Mr Abhay Bakre highlighted the approach that states can take up in adopting the code, keeping in mind the exponential growth in the buildings sector and associating the energy to be consumed in them, which will also enable the achievement of India Nationally Determined Contributions. He talked about the role of ECBC app in spreading awareness. He informed the audience of releasing the revised and updated ECBC 2017 document which constitutes new features of compliance, like ECBC Compliant, ECBC+ and Super-ECBC compliant buildings. Mr Bakre also spoke about the financial assistance available for Super-ECBC building in state capital to create awareness among the public as well as private sector. Mr Bakre stressed on creating a pool of Third-Party Assessors to monitor and verify the implementation of the code in the country. He also underlined that coordinated efforts between different government departments is key to successful implementation of ECBC in India.

Presentation: Energy Efficiency Improvements in Commercial Buildings (EECB) – UNDP project

by Dr. S. N. Srinivas, Programme Analyst, UNDP

Dr Srinivas gave the participants an overview of the efforts that UNDP has been supporting in enabling a transition to ECBC complied commercial buildings over the last ten years and outlined critical amount of energy that is going to be consumed in the buildings sector in the coming years. UNDP activities are broadly classified into - capacity development, implementation assistance and supporting case study buildings for implementation of ECBC - he requested the state participants to start developing some show case buildings for energy efficiency, highlighting government leadership in their respective states. Dr Srinivas also showed the audience a picture of successful implementation of energy conservation projects being taken up in buildings internationally. He also extended the possibility of supporting states with necessary technical assistance, specifically creation of ECBC cells if required.

The inaugural session concluded with Dr Satish Kumar summarising and thanking the speakers for the first session.

SESSION 2: STATE'S PERSPECTIVE ON ECBC IMPLEMENTATION

Presentation: Overview of ECBC and its implementation

by Dr Satish Kumar, Executive Chairman, Alliance for an Energy Efficient Economy

Dr Satish gave the audience an overview of ECBC and summary of the progress of ECBC across the country along-with the roles and responsibilities of various technical and administrative requirements in different departments of Energy and Urban Development to ensure ECBC implementation. He also highlighted the utility of ECBC User Guide in understanding the technical nuances from a non-technical perspective.

Presentation: Energy Efficiency Initiatives at NITI Aayog

By Mr Anil Kumar Jain, Additional Secretary, NITI Aayog

Mr Anil Kumar Jain's address emphasised on States' passion and pro-activeness on adopting energy conservation in buildings sector to be the motivator for the workshop, in order to address states' issues and fast-track the process across India. Spotlighting the role of NITI Aayog in transforming and fast-tracking the development initiatives in the country, he pointed out the buildings sector as a crucial segment for targeting energy efficiency practices and extended NITI Aayog support for hand-holding and guidance. Various energy conservation measures taken up by NITI Aayog in its building were marked during his address, highlighting the savings achieved through them and how energy efficiency model can also be financially beneficial. He also urged the states to participate in EESL's public building energy efficiency retrofit project to showcase government leadership in showcasing the economic, environmental and comfort benefits associated with these measures. He emphasised on the need to conduct capacity building programmes in states for all concerned government and private stakeholders. He asserted to notify ECBC in respective states and extended support on behalf of NITI Aayog, BEE, EESL, UNDP-GEF and AEEE for successfully notifying and implementing the same. Mr Jain set the theme for the subsequent panel discussion which saw participation from senior representatives from participating states and BEE.

Panel Discussion

- Telangana representatives informed the audience that State had already notified ECBC and are in the process of organising workshops and educative sessions/awareness programme. They pointed out

that the department had already reached out to BEE to set up an ECBC cell and that TPAs are being put in place along-with procurement policy. The state wants to ensure the use of only energy efficient equipment and appliances. They enquired about possible knowledge materials, containing information about building material to be made easily available. The state is also seeking funds to develop Super ECBC Government buildings in state. Representatives from Telangana also spoke about the need to improve Ease of Doing Business and Self Certification which may encourage larger adoption of such codes and standards across the country.

- Andhra Pradesh officials appreciated the workshop for providing the right platform to discuss issues, learn from each other and move forward in ECBC implementation. They outlined the role of different departments in retrofitting of the old public buildings across the state. They informed the audience of developing an action plan with timelines for revision of Schedule of Rates that shall incorporate ECBC provisions
 - There was a discussion on the additional/incremental costs for introducing energy efficient buildings to which Mr Kanagaraj, UNDP, highlighted the changes made to the Schedule of Rates (SORs) in Karnataka, and Mr Guruprakash Sastry, Infosys, highlighted the significant reduction in costs in the Infosys building itself– even in the capital investments – by just efficient design. It was a proposed by states if Infosys could enter into a MOU with states to help handhold states with training and technical advice.
- Karnataka officials pointed out that the state notified ECBC in November 2014 and outlined the difficulty in modifying and implementing the code due to lack of coordination among different departments and stakeholders involved in the process. They further emphasised the crucial step in ECBC implementation was to develop SORs which included ECBC compliant materials, where BEE and UNDP helped the state to develop the same. They requested DG BEE to help in forming an ECBC committee under the chairmanship of either UDD or Energy Department or TCP Department to allow greater coordination among various departments. They mentioned about fixing roles and responsibilities of different stakeholders to streamline ECBC implementation. They stressed that for public buildings- PWD should take the lead, for private construction- ULBs/Municipal Corporations need to shoulder the responsibility. The Electrical Inspectorate should take the responsibility for inspection and compliance verification. Overall coordination to be taken care by KREDL.
- Kerala representatives mentioned that the initial push to initiate a program on ECBC started in Kerala in 2007, but after a lot of back and forth, the Additional Secretary of Law finally approved it. The officials informed the audience about a one of its kind survey study targeting different categories of buildings to establish existing energy consumption and built-up floor space for buildings and also come out with energy saving potential of these buildings which fall under the purview of the EC Act. They also spoke about the various training programmes conducted in the states which enabled them to develop a large pool of accomplished engineers and architects. They informed the participants that Kerala is in the process of developing an easy-to-use ECBC manual, highlighting the features of ECBC along-with other green building rating systems. They also pointed out the leadership shown by the EMC department in constructing their own building, which is a net carbon building, and leading the way for Public Works Department to build all the subsequent buildings as ECBC compliant.
- Tamil Nadu officials conveyed to the audience that the state specific amended ECBC document was sent to the state government on 22 December 2016 for approval and that the notification would be issued very shortly with the technical committee comprising of senior government officers from all the stakeholder department. They informed the participants of the retrofitting and energy conservation measures undertaken in two of the government buildings in the state and highlighted the efforts being taken up in the state to implement energy conservation measures in buildings. They mentioned that the state may soon set up ECBC cell to further strengthen the ECBC implementation efforts in the state.
- Puducherry officials shared with the participants their experience of revising bye-laws to implement ECBC in the UT. They mentioned that ECBC implementation in the UT has been assigned to an organisation. This organisation is working on ECBC implementation in partnership with PWD, Discoms and TCPO. They also shared their experience of addressing the issue of energy efficiency in buildings, along with incorporation of overall environmental sustainability. They pointed out the lack of capacity building for energy auditing and compliance check in the UT and appealed to the forum to explore if CSR activities can be incorporated in developing some model buildings which can be then be replicated. The representatives appreciated the workshop and shared their desire to create a mini

Infosys in Puducherry, considering the opportunities which were showcased during the site visit and the workshop.

- Goa representatives highlighted the efforts of government in promoting green building concept across the state with recommended systems in place. They suggested that the SOR revision to incorporate ECBC be standardised so that it becomes easy for states to follow. Moreover, the central vigilance commission also may not question. They further suggested that CPWD may come up with some standard format. They zeroed-in on the challenge to raise awareness among stakeholders on the cost-effectiveness of implementing energy conservation measures in the buildings. They requested for hand-holding to create a cell in the state to help in capacity building and creating awareness to sensitise the stakeholders to make necessary amendments in the building bye-laws and incorporate ECBC with strict compliance.
- The session concluded with open-house discussions where it was highlighted that the GHMC had developed an online platform that allows contractors, developers, etc. to evaluate the implication of ECBC/materials on their design. Mr Anil Jain reiterated that such best practices need to be extended to other cities in the region such as Karnataka, AP, etc.

SESSION 3: ECBC IMPLEMENTATION SUCCESS STORIES: LESSONS LEARNED

Presentation: ECBC Implementation in States

by Mr Rajkiran Bilolikar, ASCI, Telangana

Mr Rajkiran outlined the significance of leadership in a state to create the sense of urgency for implementing ECBC at the highest level. He informed the audience of how the Government of AP (before bifurcation) approached ECBC adoption, creating a technical committee comprising high level officials from UD, Energy, Town and Country Planning, SDA, Municipal Corporations, Development Authorities, BEE, Real Estate Developers Association, and technical experts to find the breakthrough in implementing ECBC in the state. He mentioned creation of sub-technical committee at urban local bodies to create awareness, capacity building and for regular review of ECBC compliance at the local level along-with updating online building approval system to incorporate ECBC compliance in building bye-laws by amendments and adoption. He stressed on creation of Building Approval Committee to review submitted projects, answer queries on ECBC requirements and process, ensuring ECBC compliance and tracking and reporting the progress in-addition to creating a framework for Third Party Verification for ECBC Compliance in buildings sector. He also informed the audience that the state of Telangana and Andhra Pradesh were coming up with Easy ECBC manuals to make it easier for people to make ECBC compliant buildings.

Presentation: State-Level Energy Efficiency Indicators

by Dr Satish Kumar, Executive Chairman, AEEE

In the final presentation of the day, Dr Satish Kumar gave an overview of State Energy Efficiency Index in which NITI Aayog is partnering with AEEE and all concerned ministries responsible for efficient use across different sectors including Transportation, Industry, Agriculture and Buildings. He ran through the evaluation framework and some of the identified EE indicators to assess the performance of states and informed that AEEE will reach out to all concerned state departments to take state specific feedback before the assessment framework and indicators were finalised. The presentation concluded with positive commitment from all participating states and UTs to extend full support in this important endeavour of NITI Aayog.

SESSION 4: CONCLUDING SESSION: CHANGE / REINFORCEMENT OF STATE'S PERSPECTIVE

The officials from AP committed that they are in the process of retrofitting their buildings to make them energy efficient, while officials from Goa mentioned that they are facing challenge with retrofitting buildings and adopting ESCO models mostly because of the department's financial conditions and requested NITI Aayog to write to the Chief Secretary highlighting this challenge.

Finally, EESL committed to take up two to three buildings in each state for retrofitting purpose to kickstart the program of implementing energy conservation measures in buildings and to develop model buildings in the state for leading the way of adoption and implementation of ECBC.

Mr Anil Jain informed the audience that a letter from CEO, NITI Aayog may be sent to the Chief Secretaries of respective states to highlight the importance of retrofits in old public buildings and transform them into

energy efficient workplaces and suggested that buildings such as railway stations, bus stands, etc., could also be undertaken in such projects.

There was unanimous support for this NITI Aayog led initiative, as everyone felt that by bringing key stakeholders – Energy, Urban Development, Municipal Corporations, Town and Country Planning, Chief Architect, PWD and Roads and Buildings department and Development Authorities - from multiple states on the same platform, many of the issues and challenges being faced by government in notifying and implementing ECBC can be addressed. The workshop concluded after the session.

Commitments and Requirements

During the last session, all the state representatives were requested to submit three key commitments the state wanted to make on energy conservation in buildings and key requirements that they have. Following are the shared commitments and requests by respective representatives of participating states.

Andhra Pradesh:

- On commitment part, the state is considering to give incentives to fast-track approval to ECBC compliant buildings and will incorporate S.O.R. for ECBC materials at the earliest.
- On requirements part, the state requested BEE to extend support to ECBC Cell beyond 2017 as the ECBC cell was formed recently.

Goa

- The state committed to follow green initiatives and urged the need to amend GLDB Regulations 2010 to make ECBC mandatory and to adopt ECBC concepts in Assembly/Secretariat buildings.
- Urged the need of creation of ECBC cell in the state to draft regulations and sensitise the stakeholders.

Karnataka

- The state of Karnataka committed to amend building by-laws, commencement of capacity building programmes and publishing electrical SOR through PWD.
- On requirements, the state asked for technical support to ECBC Cell, constitution of state level co-ordination committee and to conduct training programmes for the architects.

Kerala

- Committed to make ECBC a part of municipal building regulations, retrofit old heritage building and government buildings as per ECBC.
- Requested hand holding for conducting more workshops on simulation software and making ECBC a part of curriculum in all technical institutes.
- The state also urged for relaxation on building tax/property tax/FAR for ECBC compliant building.

Puducherry

- The Union Territory put down setting up of ECBC Cells, Capacity building initiatives and awareness creation programmes as the next three steps it is going to take.
- Requested help in conducting capacity building programmes among department's staff, local bodies and creating self-help groups. Urged for need of more accredited energy auditors and setting up regional training centres and R&D units in the UT.

Tamil Nadu

- The state government officials of Tamil Nadu advocated for attaining common by-laws by Central Government so as to implement in all the states, banning of materials not attaining ECBC norms in the buildings, shed light on importance of acquiring common data on manufacturers and vendor details along-with schedule of rates for the materials.
- The state requested for help in formation of the ECBC cell and informed the audience that incentivising ECBC compliant buildings may be introduced in the state.

Telangana

- Committed to bring -in next phase of implementation for Measurement and Verification for developing energy consumption monitoring system in the state. The state ensured the permanent establishment of ECBC Cell to smoothen the process of ECBC implementation and also informed of endorsing more capacity building programmes to create the pool of expertise in the state.

Uttar Pradesh

- Sought direction from NITI Aayog and BEE for notifying and implementing ECBC along-with a request to Government of India to write to the Chief Minister's/ Chief Secretary's office so as to make the subject of ECBC a priority in the state.
- The state also committed to direct the SDAs to work only for the respective sector and not indulge in other Renewable Energy programmes, along-with strengthening of the ECBC cell in the state.

WORKSHOP PHOTOGRAPHS







KEY OUTCOMES

1. Amendment and Notification of ECBC

The first major step towards ECBC implementation is its amendment and notification in the State Gazette. Although ten years have passed since the introduction of ECBC by BEE, only ten States/UT have notified so far. States need to fast track the ECBC notification at the earliest.

2. Identification of Roles and Responsibilities

One clear message that emerged from the intense deliberations during the workshop was the need for clarity on the roles and responsibilities of key government stakeholders including various state and city level divisions of the Urban Development Department (UDD) and the State Designated Agency (SDA) of the Bureau of Energy Efficiency.

3. Government Leadership

A major roadblock towards ECBC implementation- Notification of ECBC in state's official gazette could be overcome by senior bureaucrats in the state assuming leadership role was re-emphasised in the workshop. It is suggested to form two committees, 1. Apex Committee Chaired by Chief Secretary and 2. Steering Committee Chaired by Principal Secretary – Energy or Urban Development. These two committees can provide necessary direction and thrash out issues for effective roll out and implementation of ECBC.

4. Restructuring of Capacity Building Programs

Learning from the Telangana experience, different training modules for different stakeholders such as senior bureaucrats, government officials representing different departments of Urban Development and Energy, practicing architects and engineers can be developed. For creating further awareness about ECBC, the need to include ECBC in the curriculum of architectural and engineering courses can be explored. Few States have run comprehensive training programs on ECBC. States need to roll out an extensive training program.

5. Institutional Framework

The State Designated Agencies (SDAs) are the strategic partners for promotion of energy efficiency in the State. But they have limited focus on energy efficiency, as they have limited resources and are often loaded with other responsibilities. It is vital to strengthen the SDAs with necessary resources to perform their roles as envisaged under The EC Act, 2001.

For large scale implementation of ECBC in states, it is suggested to explore different models such as third-party assessors, in-house capacity building among others. For larger States, it would be ideal to establish permanent ECBC cells with representation from SDA and UDD (Public Works Dept. / Town & Country Planning / Development Authorities, etc).

6. Need to Develop of Online Tools

Online tools for drawings and document submission, compliance checks and subsequent approvals without human interference for effective and time bound ECBC compliance generated a lot of interest among states' representatives. Telangana has initiated this and was showcased during the workshop. It is worthwhile to have a study of this system for suitable adoption for your State. This will make the process of building in energy efficiency hassle free.

7. Inclusion of the Residential Sector

As on date ECBC only addresses commercial buildings (except group housing projects), Considering the continuously growing energy demands of the domestic sector, you may consider exploring the inclusion of residential sector at the earliest, to reap higher energy efficiency benefits in the buildings sector as a whole.

8. Energy Efficiency through ESCO

As ECBC focuses on new buildings, it is equally important to exploit the energy saving potential in existing building stock. Energy savings in the range of 20-25 per cent with additional cost savings towards equipment maintenance is easily achievable in existing buildings. In NITI Aayog building, we recently carried out energy efficiency retrofits from EESL through ESCO route and were able to achieve energy savings in the range of 35-40%. Few landmark buildings such as Secretariat, High Courts, Hospitals, and others can be taken up to initiate energy efficiency retrofit on trial basis through ESCO and based on the learning's, the exercise can be expanded on a larger scale.

For continuous improvement, monitoring of performance is essential. Mandating disclosure of energy use (Energy Performance Index) for all public and private commercial buildings with a connected load of 100 kW or more will go a long way in ensuring better energy management.

9. International Learning

Learning from the international experiences, Building Energy Passport or Energy Management Information System could supplement ECBC in the near future for realisation of EE in actual energy performance of buildings, since ECBC is primarily a design code and does not emphasise much on the actual energy performance of building once operational.

10. Way Forward

UNDP-GEF expressed commitment to continue their support towards mainstreaming ECBC implementation in states by creating more ECBC cells (starting with Himachal Pradesh and Delhi in the Northern region), enhancement of curriculum and development of educational materials about ECBC and development of online tools among various other ongoing programs.

LIST OF PARTICIPANTS

1st Regional Workshop on ECBC Implementation in States, Chandigarh, February 9 & 10, 2017

February 9, 2017

S.No.	Name	Organisation/ Department	Designation	State
1	Amit Sahoo	CREST	Project Manager	Chandigarh
2	Sukhwinder Abrol	CREST	Project Manager	Chandigarh
3	Ashima Brar	HAREDA	Director	Haryana
4	D. N. Saini	Housing Board Haryana	Chief Architect	Haryana
5	Amarjeet Singh	Housing Board Haryana	Chief Architect	Haryana
6	Sombir Singh	HAREDA	Project Officer	Haryana
7	Dr. D.K. Gupta	Urban Development	Director	Himachal Pradesh
8	Rajiv Kumar	BBNDA	Joint CEO	Himachal Pradesh
9	Rajiv Kumar Verma	DoE	Sr. Executive Engineer	Himachal Pradesh
10	Niraj Kapoor	DoE	Chief Engineer	Himachal Pradesh
11	Khurshid Ahmed	PDD	Chief Engineer	Jammu & Kashmir
12	Hashmat Qazi	PDD	S.E.	Jammu & Kashmir
13	Sanjay Sharma	PDD	SE	Jammu & Kashmir
14	Bimal Tickoo	Urban Development	Sec. (Tech.); Comm.(Works)	Dev. Jammu & Kashmir
15	S. Sathis Kumar	NITI Aayog	OSD	New Delhi
16	K.C. Singh	CPWD	Add. DG	New Delhi
17	Ruchi Gupta	NITI Aayog	YP (Energy)	New Delhi
18	Harendra Kumar	NITI Aayog	Joint Adviser	New Delhi
19	C.K. Varma	CPWD	Chief Engineer	New Delhi
20	A.K. Jha	EEREM, Power Department	Director	New Delhi
21	Dr. S.N. Srinivas	UNDP	Program Analyst	New Delhi
22	Varsha Joshi	Power Department	Secretary	New Delhi
23	A.K. Jain	NITI Aayog	Addl. Secretary	New Delhi
24	R.K. Mehta	DDA	E.E.	New Delhi
25	Umesh Kumar	DDA	SE	New Delhi
26	S.S. Garg	CPWD	SE	New Delhi
27	Rajeev Sao	CPWD	SE	New Delhi
28	Saroj	Punjab Architecture Department	Architect	Punjab
29	Sapna	Punjab Architecture Department	Chief Architect	Punjab
30	A.S. Brar	PWD (B&R)	SE	Punjab
31	Arun Kumar	PWD	S.E. Hoshiarpur	Punjab
32	Ramandeep Singh	Punjab Architecture Department	Assistant Architect	Punjab
33	Rajendra Goel	PWD	Chief Engineer	Uttarakhand
34	M.C. Gupta	Power Cooperation Dehradun	Superintending Engineer	Uttarakhand
35	Shallu Thind	TCP	Associate Planner	Uttarakhand
36	Jyoti Khairwal	Neeraj UREDA	Director	Uttarakhand

February 10, 2017

S.No.	Name	Organisation/ Department	Designation	State
1	Er. P. S. Saini	Department of Hospital Engineering and Planning, Postgraduate Institute of Medical Education & Research (PGIMER)	Superintending Engineer	Hospital Chandigarh
2	Achal Sarna	PGIMER	Engineer	Chandigarh
3	Monika Sarna	PGIMER		Chandigarh
4	Ranjit Singh	Engineering Department, SDA	SE	Chandigarh
5	Gurmeet Kaur	TCP	Senior Town Planner	Chandigarh
6	Rajnish Wadhwa	TCP	Town Planner	Chandigarh

7	K.C. Singh	CPWD	CE	Chandigarh
8	Dr. Poonam Syal	NITTR	Associate Professor	Chandigarh
9	A. K. Dhadwal	Municipal Corporation	Sub Div. Engineer	Chandigarh
10	Ravinder Singh	CREST	Project Director	Chandigarh
11	Sukhwinder Abrol	CREST	Project Manager	Chandigarh
12	Amit Sahoo	CREST (S&T)	Project Manager-cum-Junior Engineer	Chandigarh
13	Pritpal Singh	Punjab State Council for Science & Technology	Senior Engineer	Chandigarh
14	Naresh Kumar	Urban Planning Deptt.	Assistant Town Planner	Chandigarh
15	Roma Marwaha	Divisional Town Planning Wing	Assistant Town Planner	Chandigarh
16	Varsha Joshi	Power Department- Energy Efficiency and Renewable Energy Management Centre (EEREM)	Secretary	Delhi
17	A.K. Jha	EEREM	Director	Delhi
18	Radhika Khosla	Centre for Policy Research	Fellow	Delhi
19	R.K. Mehta	DDA	EE	Delhi
20	Umesh Kumar	DDA	SE	Delhi
21	C.K. Varma	CPWD	CE	Delhi
22	Rajeev Sao	CPWD	SE	Delhi
23	S.S. Garg	CPWD	SE Electrical	Delhi
24	Apurva Chaturvedi	USAID	Senior Clean Energy Specialist	Delhi
25	Priya Sreedharan	USAID	Senior Technical Advisor, Science and Technology Policy Fellow	Delhi
26	S Vikash Ranjan	GIZ	Technical Expert, Indo-German Energy Programme	Delhi
27	Sarbojit Pal	NITI Aayog	Consultant	Delhi
28	Ruchi Gupta	NITI Aayog	Young Professional	Delhi
29	S. Sathis Kumar	NITI Aayog	OSD	Delhi
30	Harendra Kumar	NITI Aayog	Joint Adviser	Delhi
31	Anil Kumar Jain	NITI Aayog	Addl. Secretary	Delhi
32	Dr. S. N. Srinivas	UNDP	Programme Analyst (Energy for Development)	Delhi
33	Abdullah Nisar Siddiqui	UNDP	Asst. Project Manager	Delhi
34	Kanagaraj Ganesan	UNDP	Consultant	Delhi
35	Arijit Sengupta	BEE	Assistant Energy Economist	Delhi
36	Saurabh Diddi	BEE	Energy Economist	Delhi
37	Priyanka Kocchar	GBCI	Regional Manager, Market Development - Asia Pacific and Middle East	Gurgaon
38	D.K. Chopra	HAREDA	Tech. Adviser	Haryana
39	J.S. Kohli	HAREDA	SE	Haryana
40	D.V. Rao	RGTPP, HPGCL	Chief Engineer (Efficiency)	Haryana
41	Manjit Singh Pardeep	HPPC		Haryana
42	Atul Kumar Khanna	Haryana Power Corporation Ltd.	Generation Executive Engineer	Haryana
43	Rajeev Gupta	Haryana Power Corporation Ltd.	Generation Executive Engineer	Haryana
44	Er. Deepak Dureja	Haryana Power Corporation Ltd.	Generation	Haryana
45	K.K. Khulla	Planning Department		Haryana
46	Ajay Sharma	Planning Department	Architect	Haryana
47	Amarjeet Singh	Housing Board Haryana	Chief Architect	Haryana

	Talwar			
48	Ritu Bhatia	Housing Board Haryana	Architect	Haryana
49	Parveen Dahiya	Haryana Power Generation Corporation Ltd.		Haryana
50	Dinesh Kumar Gupta	HVPNL		Haryana
51	A.K. Rana	HUDA, Panchkula	Executive Engineer	Haryana
52	Rajiv Kumar	Baddi Barotiwala Nalagarh Development Authority (BBNDA)	Joint CEO	Himachal Pradesh
53	Dr. D.K. Gupta	Urban Development	Director	Himachal Pradesh
54	Niraj Kapoor	Directorate of Energy	Chief Engineer	Himachal Pradesh
55	R.K. Verma	Directorate of Energy	Senior Executive Engineer	Himachal Pradesh
56	Bimal Tickoo	Urban Development	Secretary (Tech.) Ex-Officio Development Commissioner PWD	Jammu & Kashmir
57	Khurshid Ahmad	Power Development Department	CE	Jammu & Kashmir
58	Hashmat Qazi	Power Development Department	SE	Jammu & Kashmir
59	Sanjay Sharma	PDD	Executive Engineer	Jammu & Kashmir
60	Akhil Kataria	Green Tree Building Energy		Noida
61	DN Saini	Housing Board	Assistant Engineer (Civil)	Panchkula, Haryana
62	Dr. Amarपाल Singh	Punjab Energy Development Agency (PEDA)	Chief Executive	Punjab
63	Sh. Balour Singh	PEDA	Executive Director	Punjab
64	Balkar Singh	Punjab Energy Development Agency (PEDA)	Assistant General Manager	Punjab
65	Sanjeev Bansal	Punjab Energy Development Agency (PEDA)		Punjab
66	Money Khanna	PEDA, ECBC Cell		Punjab
67	Kishan Khatri	PEDA, ECBC Cell		Punjab
68	Vijay Kumar	PWD (B&R)	CE	Punjab
69	Vikas Gupta	PWD	SE	Punjab
70	A.S. Brar	PWD (B&R)	SE	Punjab
71	Bhupinder Singh	PWD (B&R)		Punjab
72	Ram Paul	PWD (B&R)	CE	Punjab
73	Arun Kumar	PWD		Punjab
74	Gaurcharan Singh	PWD	Elec.	Punjab
75	Gautam Kumar	Local Government	Town planner	Punjab
76	Saroj	Punjab Architecture Department	Architect	Punjab
77	Sapna	Punjab Architecture Department	Chief Architect	Punjab
78	Ramandeep Singh	Punjab Architecture Department	Assistant Architect	Punjab
79	Harpal Singh	Police Housing Department	SE	Punjab
80	Amandeep Mijjer	Town and Country Planning	Senior Town Planner	Punjab
81	Gurpreet Singh	Town and Country Planning	Chief Town Planner	Punjab
82	Dinesh K. Garg	Town and Country Planning	Senior Town planner	Punjab
83	Gagan Deep	Town and Country Planning	Planning Officer	Punjab
84	A.K. Goyal	VHBRW	Executive Engineer Civil	Punjab
85	Sohan	Punjab Mandi Board		Punjab
86	Sushil Gupta	PUDA	SE	Punjab
87	Manav Jain	PMIDC	Town Planner	Punjab
88	H. Verma	PSP		Punjab
89	Darshan Kr. Singh	PSPCL		Punjab
90	Anil Gupta	PSPCL	SE/ DSM	Punjab
91	R.P. Gupta	Department of Water Supply & Sanitation	EE	Punjab
92	S.K. Jain	Department of Water Supply & Sanitation	Superintending Engineer	Punjab
93	S. Alipuria	DSM	Addl. S.E.	Punjab

94	Er. Devinder Hans	Panchayati Raj, SAS Nagar, Mohali	SE	Punjab
95	Rajkiran Bilolikar	ASCI	Associate Professor	Telangana
96	Jyoti Khairwal	Neeraj UREDA	Director	Uttarakhand
97	Tribhuvan Rana	Singh UDD	Consultant	Uttarakhand
98	Rajendra Goel	PWD	CE	Uttarakhand
99	M.C. Gupta	UPCL	SE	Uttarakhand
100	Shallu Thind	Town and Country Planning	Associate Planner	Uttarakhand
101	Atul Dutta		Architect	

2nd Regional Workshop on ECBC Implementation in States, Ahmedabad, March 15 & 16, 2017

March 15, 2017

S. No.	Name	Organisation/ Department	Designation	State
1	R.V. Trivedi	Town Planning & Valuation Department	Jr. Town Planner	Gujarat
2	Vishal Vyas	PWD (R&B)	Chief Architect	Gujarat
3	Rajesh Kansara	Project Executive	GEDA	Gujarat
4	I.M. Bhavsar	SDA, GEDA	Chairman	Gujarat
5	Dr. L.S. Sharma	TESLA	M.D.	Gujarat
6	Kiranbhai R. Patel	Vadodara Municipal Corporation	Dy. Ex. Engineer	Gujarat
7	Shwetal Shah	Climate Change Department	Technical Adviser	Gujarat
8	Mukesh Shah	Climate Change Department	Joint Secretary	Gujarat
9	Pranav J. Patel	PWD (R&B)	Jr. Architect	Gujarat
10	K.C. Patel	Town Planning & Valuation Department	Town Planner	Gujarat
11	M.H. Yagnik	Town Planning & Valuation Department	Jr. Town Planner	Gujarat
12	Brijesh Joshi	Ahmedabad Municipal Corporation	Assistant City Engineer	Gujarat
13	D.H. Suthar	Ahmedabad Municipal Corporation	HOD (Street Light Project)	Gujarat
14	M.H. Ninama	Ahmedabad Municipal Corporation	Additional City Engineer (Street Light Project)	Gujarat
15	Ronak Patel	Ahmedabad Municipal Corporation	Assistant Technical Supervisor	Gujarat
16	Yash Shukla	CEPT University	Technical Director	Gujarat
17	B.L. Solanki	MP Housing and Infrastructure Board	Dy. Housing Commissioner	Madhya Pradesh
18	Surendra Bajpai	M.P. Urja Vikas Nigam	Project Director	Madhya Pradesh
19	Dr. Amit Gajbhiye	Town & Country Planning	Jt. Director	Madhya Pradesh
20	Kaushal Lodaya	M.P. Urja Vikas Nigam	Consultant	Madhya Pradesh
21	Gaurav Trivedi	Project monitoring Unit - Infrastructure	PMU-Consultant-M.P. State Planning Commission	Madhya Pradesh
22	S.D. Landge	Urban Development Department	Director, Town Planning & Jt. Secretary	Maharashtra
23	Hemant H. Patil	MEDA	Manager	Maharashtra
24	K.P. Eashwar	ADCS	Managing Director	New Delhi
25	Prashant Bhanware	Indo-Swiss BEEP	Sr. Programme Officer	New Delhi
26	Vikas Pandey	EESL	Engineer	New Delhi
27	Shruti Singh	UNDP	Intern	New Delhi
28	Arvind Khatri	PWD	Executive Engineer	Rajasthan
29	Jagat Singh	PWD	Addl. Chief Engineer	Rajasthan
30	Sunit Mathur	RREC	GM	Rajasthan

March 16, 2017

S.N	Name	Organisation	Designation	State
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o					
1	R.V. Trivedi	Town Planning & Valuation Department	Jr. Town Planner		Gujarat
2	Rajan Rawal	CEPT University	Professor		Gujarat
3	Paresh Sharma	T.P.V.D.	Chief Town Planner		Gujarat
4	Dharmendra Pathak	T.P.V.D.	Town Planner		Gujarat
5	Nidhi Visa	GEDA	Junior Project Officer		Gujarat
6	Kiranbhai R. Patel	Vadodara Municipal Corporation	Dy. Ex. Engineer		Gujarat
7	Dr. L.S. Sharma	TESLA	M.D.		Gujarat
8	Rajesh	GEDA	Project Executive		Gujarat
9	Kaushal Shah	Saket Projects Ltd.	Head-EMD		Gujarat
10	Mukesh Shah	Climate Change Department	Joint Secretary		Gujarat
11	Krunal Shah	Mitcon Ltd	Assistant V.P.		Gujarat
12	Lovleen Garg	GIFT City	AVP		Gujarat
13	Srikant NP	GIFT City	Manager		Gujarat
14	M.H. Yagnik	Town Planning & Valuation Department	Jr. Town Planner		Gujarat
15	Brijesh Joshi	Ahmedabad Municipal Corporation	Assistant City Engineer		Gujarat
16	Ronak Patel	Ahmedabad Municipal Corporation	Assistant Technical Supervisor		Gujarat
17	I.M. Bhavsar	SDA, GEDA	Chairman		Gujarat
18	Shwetal Shah	Climate Change Department	Technical Adviser		Gujarat
19	Rakesh Arya	GEDA	Senior Program Executive		Gujarat
20	Janak Trivedi	Town Planning & Valuation Department	Town Planning		Gujarat
21	Maaz Dixit	CEPT University	Student		Gujarat
22	Arjun Desai	CEPT University	Student		Gujarat
23	Sahil Priyadarshi	CEPT University	Student		Gujarat
24	Rashmin Damle	CEPT University	Student		Gujarat
25	Nikhilesh Singh Bist	CEPT University	Student		Gujarat
26	Sandhiya Jayakumar	CEPT University	Student		Gujarat
27	Pooja Mudhe	CEPT University	Student		Gujarat
28	Arihant Jain	CEPT University	Student		Gujarat
29	Vertika Srivastav	CEPT University	Student		Gujarat
30	Kurva Dhonde	CEPT University	Student		Gujarat
31	Mansi Parikh	CEPT University	Student		Gujarat
32	Vasudha Sunger	CEPT University	Student		Gujarat
33	Kaushal Lodaya	M.P. Urja Vikas Nigam	Consultant		Madhya Pradesh
34	Surendra Bajpai	M.P. Urja Vikas Nigam	Project Director		Madhya Pradesh
35	Dr. Amit Gajbhiye	Town & Country Planning	Jt. Director		Madhya Pradesh
36	B.L. Solanki	MP Housing and Infrastructure Board	Dy. Housing Commissioner		Madhya Pradesh
37	Gaurav Trivedi	Project monitoring Unit - Infrastructure	PMU-Consultant-M.P. State Planning Commission		Madhya Pradesh
38	Hemant H. Patil	MEDA	Manager		Maharashtra
39	S.D. Landge	Urban Development Department	Director, Town Planning & Jt. Secretary		Maharashtra
40	K.P. Eashwar	ADCS	Managing Director		New Delhi
41	Arijit Sengupta	BEE	AEE		New Delhi
42	Vikas Pandey	EESL	Engineer		New Delhi
43	Prashant Bhanware	Indo-Swiss BEEP	Sr. Programme Officer		New Delhi
44	Shruti Singh	UNDP	Intern		New Delhi
45	Sunit Mathur	RREC	GM		Rajasthan

46	M.L. Chaudhary	Jaipur Development Authority	ACE	Rajasthan
47	Arvind Khatri	PWD	Executive Engineer	Rajasthan
48	Jagat Singh Mina	PWD	Addl. Chief Engineer	Rajasthan

3rd Regional Workshop on ECBC Implementation in States, Guwahati, March 23 & 24, 2017

March 23, 2017

S.No	Name	Organisation	Designation	State
1	Marki Loya	APEDA, Arunachal Pradesh	Director	Arunachal Pradesh
2	Ashish Kundra	APEDA, Arunachal Pradesh	Commissioner	Arunachal Pradesh
3	Arvind Basak	SDA, Assam	Consultant	Assam
4	Kailash Dus	PWD	EE	Assam
5	Digambar Das	PWD	Sr. Architect	Assam
6	Altaf Uddin Ahmed	PWD (Bldg)	Superintending Engineer	Assam
7	Parveen Sajjad	SDA	Consultant	Assam
8	Utpal Goga	SDA, Inspectorate of Electricity	Senior Elect. Inspector	Assam
9	Utpal Konwar	SDA	Dy. Chief Elect. Inspector	Assam
10	Akhil Ch. Khataniar	SDA	Chief Electrical Inspector cum Adviser	Assam
11	Kajal Kumar Singha	SDA	Electrical Inspector	Assam
12	B.H. Pathak	SDA	Electrical Inspectorate	Assam
13	Pritu K Patgiri	EESL	DSM Consultant	Assam
14	Rittick Hazarika	RHDA	Architect	Assam
15	Hijam Chittan	Manipur Power supply Company	Manager	Manipur
16	P.K. Shullet	Inspectorate if Electricity, Meghalaya	Senior Electrical Inspector	Meghalaya
17	P.T. Philip	Elect. Inspectorate Nagaland	Sr. Elect. Inspector	Nagaland
18	SMH Adil	GEED, New Delhi	Consultant, APEDA	New Delhi
19	Dilip Kr. Sharma	Energy & Power, Sikkim	Additional Chief Engineer-Cum-Nodal Officer	Sikkim
20	Smt Sigratha Pradhan	SDA, Sikkim	Assistant Engineer	Sikkim
21	Pemba Lopcha	SDA, Sikkim	Executive Engineer	Sikkim
22	Nilandari Bhusan Das	WBSDA	Divisional Engineer	West Bengal
23	Suvasis Guha	Department of Power & NES	Sr. Manager	West Bengal
24	Asish Kumar Jana	M.E. Office, UD&MA	Ex. Engineer	West Bengal
25	Partha Sarkar	Housing Department	Chief Engineer	West Bengal
26	Pradyot Kr. Pal	WBSEDCL	Executive Director (Commercial)	West Bengal

March 24, 2017

S.No	Name	Organisation	Designation	State
1	Atop Lego	PWD	Chief Engineer	Arunachal Pradesh
2	Marki Loya	APEDA, Arunachal Pradesh	Director	Arunachal Pradesh
3	Ashish Kundra	APEDA, Arunachal Pradesh	Commissioner	Arunachal Pradesh
4	Altaf Uddin Ahmed	PWD (Bldg)	Superintending Engineer	Assam
5	Arvind Basak	SDA, Assam	Consultant	Assam
6	Parveen Sajjad	SDA	Consultant	Assam
7	Utpal Goga	SDA, Inspectorate of Electricity	Senior Elect. Inspector	Assam
8	Kajal Kumar Singha	SDA	Electrical Inspector	Assam
9	Utpal Konwar	SDA	Dy. Chief Elect. Inspector	Assam
10	Akhil Ch. Khataniar	SDA	Chief Electrical Inspector cum Adviser	Assam
11	Rajiv Bora	Power, G.O.A	Addl. Chief Secretary	Assam

12	Digambar Das	PWD	Sr. Architect	Assam
13	Pritu K Patgiri	EESL	DSM Consultant	Assam
14	Simanta Baruah	Jyoti Guwahati Municipal Corporation	Executive Engineer	Assam
15	B.H. Pathak	SDA	Electrical Inspectorate	Assam
16	Nagen Kalita	Town & Country Planning	Superintending Engineer	Assam
17	Tasdiqur Rahmaw	Municipal Corporation	Chief Engineer	Assam
18	Gaurav Shorey	PSI Energy	Director	Delhi
19	Hijam Chittan	Manipur Power supply Company	Manager	Manipur
20	P.K. Shullet	Inspectorate of Electricity, Meghalaya	Senior Electrical Inspector	Meghalaya
21	P.T. Philip	Elect. Inspectorate Nagaland	Sr. Elect. Inspector	Nagaland
22	SMH Adil	GEED, New Delhi	Consultant, APEDA	New Delhi
23	Dilip Kr. Sharma	Energy & Power, Sikkim	Additional Chief Engineer-Cum-Nodal Officer	Sikkim
24	Pemba Lopcha	SDA, Sikkim	Executive Engineer	Sikkim
25	Smt Sigratha Pradhan	SDA, Sikkim	Assistant Engineer	Sikkim
26	Nilandari Das	Bhusan WBSDA	Divisional Engineer	West Bengal
27	Partha Sarkar	Housing Department	Chief Engineer	West Bengal
28	Asish Kumar Jana	M.E. Office, UD&MA	Ex. Engineer	West Bengal
29	Pradyot Kr. Pal	WBSEDCL	Executive Director (Commercial)	West Bengal
30	Suvasis Guha	Department of Power & NES	Sr. Manager	West Bengal

4th Regional Workshop on ECBC Implementation in States, Ranchi, April 19 & 20, 2017

April 19, 2017

S.No.	Name	Organisation/ Department	Designation	State
1	R.V. Trivedi	Town Planning & Valuation Department	Jr. Town Planner	Gujarat
2	Vishal Vyas	PWD (R&B)	Chief Architect	Gujarat
3	Rajesh.Kansara	Project Executive	GEDA	Gujarat
Sr. No.	Name	Organization	Designation	State
1	Khursheed Siddiqui	A. BREDA	Deputy Director	Bihar
2	Pawan Agrawal	Public Works Department	Executive Engineer	Chhattisgarh
3	N.W. Henry	Chhattisgarh State Power Distribution Company	Addl. Chief Engineer	Chhattisgarh
4	Rajeev Gyani	CREDA	Executive Engineer	Chhattisgarh
5	Karl May	GIZ	Director Programme	Delhi
6	Saurabh Diddi	BEE	Energy Economist	Delhi
7	Vikash Ranjan	GIZ	Technical Expert	Delhi
8	Sathis Kumar	NITI Aayog	OSD	Delhi
9	Archana Bhardwaj	UNDP	Program Associate	Delhi
10	Harendra Kumar	NITI Aayog	Jt. Adviser	Delhi
11	Chandan Kumar	Ranchi Regional Development Authority	Assistant Engineer	Jharkhand
12	Gajanand Ram	Urban Development and Housing Department	Town Planner	Jharkhand
13	Bijay Kr. Sinha	Energy Department Jharkhand	Chief Engineer-cum-Chief Electrical Inspector	Jharkhand
14	Sanjay Besra	Jharkhand Bijli Vitaran Nigam Ltd.	Executive Engineer, Electrical	Jharkhand
15	Agam Prasad	Energy Department Jharkhand	Senior Electrical Inspector	Jharkhand
16	Alok Ranjan Pandey	Jharkhand Bijli Vitaran Nigam Ltd.	Chief Engineer, Civil	Jharkhand
17	Hemant Minz	EESL	Engineer Tech.	Jharkhand

18	Hardik Patel	JREDA	Jr. Project Officer	Jharkhand
19	Winamra Negi	JREDA	Sr. Project officer- EE	Jharkhand
20	T. Krishna Teja	JREDA	Jr. Project Officer	Jharkhand
21	B.P. Agrawal	B.C.D. Jharkhand	Planning Engineer	Jharkhand
22	Binay Kr. Sinha	B.C.D. Jharkhand	Superintending Engineer	Jharkhand
23	J.N. Das	B.C.D. Jharkhand	Chief Engineer	Jharkhand
24	L.K.Tibrewal	B.C.D. Jharkhand	Superintending Engineer	Jharkhand
25	Nandlal Baraik	Ranchi Municipal Corporation	City Manager	Jharkhand
26	Saurabh Kr. Keshri	Ranchi Municipal Corporation	Assistant Engineer- Electrical	Jharkhand
27	Sandeep Jha	Consultant Architect, AXIS	Consultant	Jharkhand
28	Deepak Gar	Engineer	Electrical Engineering Department	Jharkhand
29	P.M. Mishra	Dept. of Energy, SDA, Odisha	SE-cum-EI, Rourkela	Odisha
30	S. Mishra	BDA, Bhubaneshwar	Executive Engineer (Electrical)	Odisha
31	Santosh Das	Dept. of Energy, SDA, Odisha	Superintending Engineer (EC & EE)	Odisha
32	C.R. Das	Bhubaneshwar Development Authority	Assistant Engineer- Electrical	Odisha
33	Anurag Bajpai	Green Tree	Director	Uttar Pradesh
34	Ashok Shrivastava	Kr. UPNEDA	Special Project Officer	Uttar Pradesh
35	Sangeeta Singh	UPNEDA	Director	Uttar Pradesh

April 20, 2017

Sr. No.	Name	Designation	Organization	State
1	Khursheed Siddiqui	A. Deputy Director	BREDA	Bihar
2	Anwar Ahmed	Energy Consultant	BREDA	Bihar
3	Hari Shanker Singh	Associate Planner	TCP Office, UD&HD	Bihar
4	Pawan Agrawal	Executive Engineer	Public Works Department	Chhattisgarh
5	N.W. Henry	Addl. Chief Engineer	Chhattisgarh State Power Distribution Company	Chhattisgarh
6	Rajeev Gyani	Executive Engineer	CREDA	Chhattisgarh
7	Karl May	Director Programme	GIZ	Delhi
8	Saurabh Diddi	Energy Economist	BEE	Delhi
9	Vikash Ranjan	Technical Expert	GIZ	Delhi
10	Sathis Kumar	OSD	NITI Aayog	Delhi
11	Archana Bhardwaj	Program Associate	UNDP	Delhi
12	A. N. Siddiqui	Project Manager	UNDP	Delhi
13	Harendra Kumar	Jt. Adviser	NITI Aayog	Delhi
14	Ripunja Bansal	Young Professional	NITI Aayog	Delhi
15	S. Majund	Energy Efficiency Expert	UNDP	Jharkhand
16	Chandan Kumar	Assistant Engineer	Ranchi Regional Development Authority	Jharkhand
17	Gajanand Ram	Town Planner	Urban Development and Housing Department	Jharkhand
18	Bijay Kr. Sinha	Chief Engineer-cum-Chief Electrical Inspector	Energy Department Jharkhand	Jharkhand
19	Sanjay Besra	Executive Engineer, Electrical	Jharkhand Bijli Vitaran Nigam Ltd.	Jharkhand
20	Agam Prasad	Senior Electrical Inspector	Energy Department Jharkhand	Jharkhand
21	Alok Ranjan Pandey	Chief Engineer, Civil	Jharkhand Bijli Vitaran Nigam Ltd.	Jharkhand
22	Hemant Minz	Engineer Tech.	EESL	Jharkhand
23	Hardik Patel	Jr. Project Officer	JREDA	Jharkhand
24	Winamra Negi	Sr. Project officer- EE	JREDA	Jharkhand
25	T. Krishna Teja	Jr. Project Officer	JREDA	Jharkhand

26	Niranjan Kumar	Director	JREDA	Jharkhand
27	Arvind Kr. B. Prasad	Project Director	JREDA	Jharkhand
28	B.P. Agrawal	Planning Engineer	B.C.D. Jharkhand	Jharkhand
29	Binay Kr. Sinha	Superintending Engineer	B.C.D. Jharkhand	Jharkhand
30	J.N. Das	Chief Engineer	B.C.D. Jharkhand	Jharkhand
31	L.K. Tibrewal	Superintending Engineer	B.C.D. Jharkhand	Jharkhand
32	Nandlal Baraik	City Manager	Ranchi Municipal Corporation	Jharkhand
33	Saurabh Kr. Keshri	Assistant Engineer- Electrical	Ranchi Municipal Corporation	Jharkhand
34	Pramod Kumar	Electrical Inspector	Energy Department Jharkhand	Jharkhand
35	Sanjay Kapar Das	Photo journalist	Dainik Bhaskar	Jharkhand
36	Kaushal	Reporter	Dainik Bhaskar	Jharkhand
37	Deepak Rai	State Project Manager	UNDP	Jharkhand
38	Vijay	Technical Expert	UNDP	Jharkhand
39	Shailesh Kr. Singh	Assistant Executive Engineer	B.C.D. Ranchi	Jharkhand
40	Sandeep Jha	Consultant	Consultant Architect, AXIS	Jharkhand
41	Deepak Gar	Electrical Engineering Department	Engineer	Jharkhand
42	P.M. Mishra	SE-cum-EI, Rourkela	Dept. of Energy, SDA, Odisha	Odisha
43	S. Mishra	Executive Engineer (Electrical)	BDA, Bhubaneswar	Odisha
44	Santosh Das	Superintending Engineer (EC & EE)	Dept. of Energy, SDA, Odisha	Odisha
45	C.R. Das	Assistant Engineer- Electrical	Bhubaneswar Development Authority	Odisha
46	Anurag Bajpai	Director	Green Tree	Uttar Pradesh
47	Ashok Shrivastava	Kr. Special Project Officer	UPNEDA	Uttar Pradesh
48	Sangeeta Singh	Director	UPNEDA	Uttar Pradesh

5th Regional Workshop on ECBC Implementation in States, Hyderabad, April 27 & 28, 2017

April 27, 2017

Sr. no.	First Name	Organization	Designation	State
1	V.K. Vijayshree	Roads and Buildings Dept.	Dy. Chief Engineer	Andhra Pradesh
2	A. Chandra Sekhar Reddy	APSECM	CEO	Andhra Pradesh
3	B.P. Sri Lakshmi	APSECM	DGM	Andhra Pradesh
4	Sumita Dawra	Transport, Roads and Buildings	Principal Secretary	Andhra Pradesh
5	P. Subbaraya Sarma	Roads and Buildings Dept.	Chief Engineer	Andhra Pradesh
6	V. Ramachandran	Roads and Building Department	Superintending Engineer- R&B	Andhra Pradesh
7	Prateek Kumar	UNDP	Intern	Delhi
8	Kanagraj G.	UNDP	Consultant	Delhi
9	Sathis Kumar	NITI Aayog	Officer on Special Duty	Delhi
10	Karl May	GIZ	Program Director	Delhi
11	S. Vikash Ranjan	GIZ	Technical Expert	Delhi
12	S.T. Puttaraju	Town and Country Planning Department	Chief Town Planner and Joint Secretary	Goa
13	H.C. Ramachandra	PWD	Executive Engineer	Karnataka
14	Hanumantharayappa	KREDL	Asst. General Manager	Karnataka
15	R. Sridhar	Office of Chief Architect Bangalore-1	Sr. Asst. Architect	Karnataka
16	V.H. Ramakrishna	PWD	Asst. Executive Engineer	Karnataka
17	Narayana	PWD	Asst. Executive Engineer	Karnataka

18	Rajeev P.S.	Govt. of Kerala	Chief Architect	Kerala
19	K.M. Dhareesan Unnithan	EMC	Director	Kerala
20	Soupou Soubourayalon	PWD	Junior Engineer-Electrical	Puducherry
21	E. Ramadoss	PWD	Executive Engineer- Planning	Puducherry
22	V. Vidjea Nehru	T&CP Department	Member Secretary	Puducherry
23	S. Ragunathan	T&CP Department	Chief Town Planner	Puducherry
24	Sapna	Punjab Architectural Department	Chief Architect	Punjab
25	Saroj	Punjab Architectural Department	Architect	Punjab
26	K. Ravichandran	Tamil Nadu housing Board	Executive Engineer	Tamil Nadu
27	D. Ravikumaran	Tamil Nadu housing Board	Executive Engineer	Tamil Nadu
28	M. Sakthivel	Electrical Inspectorate	Electrical Inspector	Tamil Nadu
29	S. Madhan Arumugam	Electrical Inspectorate	Senior Energy Consultant	Tamil Nadu
30	K. Vikas	HMDA	Asst. Project Officer	Telangana
31	V. Dheeraj	HMDA	Asst. Project Officer	Telangana
32	S. Srinivas Rao	Electrical Inspectorate	Electrical Inspector, Hyderabad	Telangana
33	T.S. Chandra Sekhar	Electrical Inspectorate	Dy. Electrical Inspector	Telangana
34	Ch. Param Jyothi	Hyderabad Development Metropolitan Authority	Executive Engineer	Telangana
35	Shankar Narayn	IIA	Architect	Telangana
36	K. Muralidhar Reddy	IIA	Architect and Planner	Telangana
37	B. Ravi	TSSPDCL	Superintending Engineer, EEC	Telangana
38	B.C. Rao	National Academy of Construction-Hyderabad	Principal Consultant	Telangana

April 28, 2017

Sr. No.	Name	Organization	Designation	State
1	V.K. Vijayshree	Roads and Buildings Dept.	Dy. Chief Engineer	Andhra Pradesh
2	B.P. Sri Lakshmi	APSECM	DGM	Andhra Pradesh
3	Sumita Dawra	Transport, Roads and Buildings	Principal Secretary	Andhra Pradesh
4	P. Subbaraya Sarma	Roads and Buildings Dept.	Chief Engineer	Andhra Pradesh
5	V. Ramachandran	Roads and Building Department	Superintending Engineer- R&B	Andhra Pradesh
6	R. Hemanth Kumar	APSECM	Project Engineer	Andhra Pradesh
7	Prateek Kumar	UNDP	Intern	Delhi
8	Kanagraj G.	UNDP	Consultant	Delhi
9	Sathis Kumar	NITI Aayog	Officer on Special Duty	Delhi
10	Karl May	GIZ	Program Director	Delhi
11	S. Vikash Ranjan	GIZ	Technical Expert	Delhi
12	Anil Kumar Jain	NITI Aayog	Addl. Secretary	Delhi
13	Abhay Bakre	BEE	Director General	Delhi
14	S.N. Srinivas	UNDP	Program Analyst	Delhi
15	S.T. Puttaraju	Town and Country Planning Department	Chief Town Planner and Joint Secretary	Goa
16	H.C. Ramachandra	PWD	Executive Engineer	Karnataka
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20	Narayana	PWD	Asst. Executive Engineer	Karnataka

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37	K. Muralidhar Reddy	IIA	Architect and Planner	Telangana
38	B. Ravi	TSSPDCL	Superintending Engineer, EEC	Telangana
39	B.C. Rao	National Academy of Construction-Hyderabad	Principal Consultant	Telangana
40	Ajay Mishra	Energy	Special Chief Secretary	Telangana
41	C Shekar Reddy	CII_IGBC/CSR Estates	Chairman	Telangana
42	Rajkiran V. Bilolikar	ASCI	Associate Professor	Telangana
43	Y.B. Chandra Shekar	EESL	Senior Engineer	Telangana
44	P. Pavan Kumar	TNREDCL	Consultant-EC	Telangana
45	Ch. Hemanth Kumar	TNREDCL	Executive Engineer	Telangana
46	Guruprakash Sastry	Infosys	Reg. Head- Infrastructure	Telangana
47	C Shree Sowmya	ASCI	Consultant	Telangana
48	Ram Kumar	UPNEDA- SDA	In-Charge ECBC Cell	Uttar Pradesh
49	M. Bhavani Rani	DTCP	ADTP	



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