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## 1. Abstract

As India is poised to become the fifth-largest economy in the world, building stock is being added at a healthy rate of 8% per year, and building energy use is increasing exponentially. Although the buildings sector provides a challenge due to the extraordinary amount and pace of building construction, it also represents the most promising opportunities for fast and deep greenhouse gas emission mitigation. Improving energy efficiency in buildings is a priority of Government and has to be implemented by joint efforts of both central and state governments. Kerala as a State is committed to achieve coherence between the strategies and implementations being done at national and international levels.

Kerala has seen a rapid growth in urbanization and infrastructure in the last few years owing to high population density, tourist influx, several development programs and funding from government. This has also led to sharp decadal growth of commercial buildings (about 251% from 2001-2009) in the State of Kerala along with increasing energy demands. An efficient and cost effective way to deal with this situation is mandating ECBC for commercial buildings having 100kW or greater connected load or a contract demand of 120kVA or greater. The Kerala ECBC has been integrated into the state level planning process so that all commercial buildings under the prescribed category, implement the identified adaptation measures to achieve the sustainability goals of the state government.

Empanelment of professionals in Building Energy Efficiency targets at creation of a pool of building professionals in the State of Kerala, to implement the concepts and actions of energy efficiency and conservation in building sector. The promotion of such an expert team is expected to be the spine of the ECBC implementation in the State of Kerala, providing assistance for the design and construction of ECBC compliant buildings.

## 2. Introduction

The Energy Conservation Building Code (ECBC) was launched in May 2007 by the Bureau of Energy Efficiency (BEE), Ministry of Power. Its main objective is to establish minimum requirements for energy efficient design and construction of buildings. Recognizing the energy and cost savings of efficient buildings and to help address growing energy needs, Government of Kerala has notified Kerala Energy Conservation (Building Code) Rules 2017-(G.O. (P) No.3/2017/PD dated 11<sup>th</sup> April 2017 vide Kerala Gazette Vol VI, No. 936 dated 8<sup>th</sup> May 2017). KSECBC states that, any building or building complex in the state of Kerala having a connected load of 100kW or greater or a contract demand of 120kVA or greater or having an air conditioned area of 500 m<sup>2</sup> or above and buildings that are intended to be used for commercial purposes including office buildings except for buildings with residential purpose or warehouse are accounted under the scope of ECBC compliance. Correspondingly, the ECBC clauses has been incorporated in the Kerala Municipality Building Rules (KMBR) vide G.O (P) No. 77/2019/LSGD dated 2/11/2019 and Kerala Panchayat Building Rules (KPBR) vide G.O.(P) No.78/2019/LSGD dated 2/11/2019. The ECBC stipulates mandatory requirements and prescriptive directives for building components and systems.

The ECBC compliance procedure requires the building to fulfil a set of mandatory provisions related to energy use as well as show compliance with specified requirements stipulated for different building components and systems. The ECBC specifies prescriptive requirements for building components and systems. However, to maintain flexibility for the design and construction team, the Code compliance requirements can be met by following one of two methods:

Sl. No.	Approach	Characteristics
1	Prescriptive Method	<ul style="list-style-type: none"> <li>• Specifies prescribed minimum energy efficiency parameters for various components and systems of the proposed building</li> <li>• Requires little energy expertise, provides minimum performance requirements, no flexibility</li> </ul>
2	Whole Building Performance (WBP) Method	<ul style="list-style-type: none"> <li>• It allows for Code compliance to be achieved by optimizing the energy usage in various building components and systems (Envelope, HVAC, Lighting, Electrical and Renewable Energy systems) in order to find the most cost-effective solution.</li> <li>• Allows flexibility in meeting or exceeding energy efficiency requirements.</li> </ul>

### 3. Objectives

1. The EMC-Kerala, vide the empanelment of Building Energy Simulation Expert (BESE), Provisional Building Energy Efficiency Expert(PBEEE) and Building Energy Efficiency Expert(BEEE) creates a special cadre of building professionals who would help building owners, architectural firm, builders & consultants to design ECBC compliant building incorporating necessary energy conservation measures in the design before the building is constructed.
2. The EMC-Kerala, vide the empanelment of BEEE, also ensures availability of building professionals who are capable of doing ECBC compliance check for upcoming buildings in the State till Certified Energy Auditors (Building) is notified by BEE.
3. EMC has initiated the process of empanelment of firms for Energy Efficient Buildings. Empanelment of firms in Building Energy Efficiency targets at creation of a pool of certified firms in the State of Kerala, to implement the concepts and actions of energy efficiency and conservation in building sector. In this empanelment process there is a mandatory provision for a prescribed number of BEEEs, PBEEEs and BESE available with firms. (For more details, [https://www.keralaenergy.gov.in/files/pdf2022/EMC\\_Empanellled\\_Firms\\_for\\_EE\\_Buildings\\_guidelines\\_-\\_TOR.pdf](https://www.keralaenergy.gov.in/files/pdf2022/EMC_Empanellled_Firms_for_EE_Buildings_guidelines_-_TOR.pdf))

### 4. Category of empanelment

### 1. *Building Energy Simulation Expert (BESE)*

- Engineers, Architects and Engineering Diploma holders can apply for this empanelment.
- The final year Engineering & Architecture students also can apply for this empanelment and the empanelment shall be came into exist only after successful completion of the degree course.
- The applicant has to clear the examination conducted as part of the Training A (Course of ECBC compliance check through energy simulation) conducted by EMC-Kerala

### 2. *Provisional Building Energy Efficiency Expert (PBEEE)*

- Engineers, Architects and Engineering Diploma holders with *BESE* empanelment can apply for this empanelment.
- The applicant has to clear the examination as part of Training B (Intensive training on ECBC compliance check) conducted by EMC-Kerala.

### 3. *Building Energy Efficiency Expert*

- Engineers, Architects and Engineering Diploma holders with *BESE* empanelment having minimum 2 years of relevant work experience in buildings sector or energy sector or professional teaching experience can apply for this empanelment. The applicant has to clear the examination as part of Training B (Intensive training on ECBC compliance check) conducted by EMC-Kerala followed by the personal interview.

Note: Green building professionals like LEED-AP, IGBC-AP, GRIHA-Evaluator will be given relaxation attending Training A and Training B, except appearing for and clearing the online exam after Training B.

- Professionals with Provisional Building Energy Efficiency Expert(PBEEE) certification also can apply for this empanelment after attaining sufficient experience in the field of building energy efficiency. The applicant has to involve in ECBC compliance check of at least 5 building projects / involve in design of ECBC compliant buildings and required to submit the certificate in the prescribed format.

## 5. **Expected Outcome**

Creation of sufficient number of experts, in such a way that the requirements expected in the state for energy efficient building design can be met. The empanelled professionals can also take up the requirements expected once the Eco Niwas Samhita (ECBC-Residential) is mainstreamed in the state.

## 6. **Benefits to empanelled professionals**

- Publication of list of empanelled professionals in the Energy Management Centre-Kerala online-portal to help professional development.

- A wide knowledge among the builders about empanelled professionals through the publication
- Encouragement of professionals to initiate services on Energy efficient building design as a career
- Readily available contact details of BEEE, PBEEE and BESE to help the customers to identify the best and proximate location of professional.
- Rewarding BEEE by giving recognition for the selected professionals for active participation & providing committed services for multiple projects, for ECBC compliance probably through a Kerala State Energy Conservation Awards (to be decided by monitoring committee).

## 7. Empanelment Process

- Interested professionals can apply for this empanelment according to their eligibility as per para 4.
- The application for empanelment has to be submitted to EMC-Kerala through the registration link provided on EMC website. The empanelment fee (Inclusive of training fee) have to be remitted to EMC-Kerala and the payment details need to be submitted to EMC-Kerala at the time of registration. The application fee for empanelment is as follows.

Sl. No.	Category of empanelment	Empanelment fee* (Exclusive of GST ) INR
1	<i>Building Energy Simulation Expert (BESE)</i>	<ul style="list-style-type: none"> <li>• 5000 for professionals</li> <li>• 3000 for students</li> </ul>
2	<i>Provisional Building Energy Efficiency Expert (PBEEE)</i>	10000**
3	<i>Building Energy Efficiency Expert (BEEE)</i>	10000**

\* The empanelment fee is non-refundable. Those participants who wish to attend the training A only to start with, may remit the training fee (Rs. 2500/1500 for professionals/students plus applicable GST) and get trained and will be provided an opportunity to pay the remaining if they intend to attend the evaluation process and get certified as a BESE. Those participants who wish to attend the training B only to start , may remit the training fee (Rs. 5000 plus applicable GST) and get trained and will be provided an opportunity to pay the remaining if they intend to attend the evaluation process and get certified as a PBEEE /BEEE.

For those applicants who would like to get empanelled without attending the training as part of empanelment, the application fee for empanelment is as follows.

Sl. No.	Category of empanelment	Empanelment fee(Exclusive of GST ) INR
1	<i>Building Energy Simulation Expert (BESE)</i>	3000
2	<i>Provisional Building Energy Efficiency Expert (PBEEE)</i>	6000
3	<i>Building Energy Efficiency Expert (BEEE)</i>	6000

It is mandatory that all the applicants shall clear the examination conducted as part of the empanelment process, even if the applicants are not attending the training part.

\*\* The BESE empanelled professionals need to remit Rs. 10000 + applicable GST for the PBEEE and BEEE empanelment.

- The building professionals meet the qualification criteria as per para. 4, who want to get

empanelled by EMC can attend the BEEE training organised by EMC.

- The training programs as part of the empanelment process are also conducted by the training agencies and institutes empanelled with EMC-Kerala.
- At the end of the each training programme, the applicant has to clear the online qualification test including topics related to ECBC in Kerala Municipality Building Rules & Kerala Panchayat Building Rules & Building energy simulation, conducted by EMC.
- Failing to clear the above test, the applicant can attend for a re-test and get qualified by the EMC on payment of requisite fee, Rs. 1200 and maximum of only 'two' re-test can be availed to the applicant.
- The details of training A and Training B is attached as annexure.

#### **8. Other details**

- The applicant is expected to furnish all the details mentioned in the selection criteria clauses and submit the copy along with the application.
- Original certificates are to be provided for verification by applicants at the time of interview. Applicants failing to submit the said documents will not be considered for the evaluation.
- Confirmation towards Empanelment will entirely be at the discretion of EMC- Kerala.
- Empanelment of BEEE is for a period of 2 years and the applicant has to renew the empanelment after the expiry of tenure.
- Those applicants who are intended to renew their empanelment shall submit their application to EMC through the online form (<https://forms.gle/WrJiXH56feBMPMH69>).
- The renewal of the empanelment shall be for a period of 2 years and the renewal fee is Rs. 590/- (Inclusive of GST)

#### **9. Conclusion**

The proposal of empanelment of building professionals, is to ensure the availability of ECBC Technical Assistance to every locations of the State of Kerala - at least one professional in all 140 constituencies of the State, including sufficient availability in Municipalities and Corporations. This empanelment ensures a decentralised service support of professional expertise in the field of energy efficiency throughout the State and to reduce the energy demand projected by the building sector

## 10. Annexure-A

**Training A**

<b><u>Online Certificate Course on ECBC compliance check through Energy Simulation</u></b>		
<b>Session no.</b>	<b>Session title</b>	<b>Duration(mins)</b>
1	1.1 ECBC- A Brief on ECBC and Kerala State ECBC Rules 2017	30
	1.2 Understanding Building Physics	60
2	2.1 Introduction on ECBC & Compliance Approach <ul style="list-style-type: none"> <li>• Mandatory Requirements</li> <li>• Prescriptive Approach</li> <li>• Whole Building Performance Approach</li> </ul>	45
	2.2 Case Study ECBC Compliant Building with Cost Analysis	60
3	3.1 Technical Aspects of ECBC	30
	3.2 Building Physics, U-Value Calculation	45
	3.3 Building Design, Form, Zoning & Orientation Optimization	45
4	4.1 Daylighting Analysis - Shading, Daylighting, Glass Selection	60
	4.2 Case Study - Presentation	30
5	5.1 Introduction to Energy Modelling	45
	5.2 Demonstrations on Tools Interface	45
	5.3 Presentation of Case Study	30
6	6.1 Hands-on Training for Sample Energy Model: <ul style="list-style-type: none"> <li>• Building Geometry Development</li> </ul>	90
7	7.1 Optimization of Building Envelope ( <i>Zoning, Insulation, Shading Devices, and their Impact on Building Energy-Load Calculation</i> )	45
	7.2 HVAC System Sizing	45
8	8.1 Modelling of Different Systems	60
	8.2 Simulation of Developed Model	30
9	9.1 Simulation-Output Analysis	90
10	10.1 Hands-on Training Exercise Problem <ul style="list-style-type: none"> <li>• Base case modelling as per KSECBC Rules (ECBC 2007 Guide) - Notified in the State</li> </ul>	90
11	11.1 Hands-on Training Exercise Problem Proposed Case as per Sample Exercise Shared <ul style="list-style-type: none"> <li>• Proposed Case Modelling as per the exercise given.</li> </ul>	90
12	12.1 Hands-on Training- Exercise Problem EPI evaluation and comparison of Base Case and Proposed Case Models-(Specific Building Type from the Code)	90
	<b>Total course duration</b>	20 Hrs
<b><u>EXAMINATION</u></b>		
1	ECBC Examination for Participants - Multiple Choice Questions type.	60 mins



2	Simulation Examination for a sample energy model of typical building type- With the Building Descriptions shared with participants	30 hours
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**Training B**

Intensive training on ECBC compliance check	
Modules	Duration(Mins)

<b>Module 1</b>	
<b>ECBC Awareness &amp; Overview</b>	
World Energy Scenario & Energy scenario in India	15
About ECO-III Project, Milestones, EC Act,	10
Introduction to ECBC	15
Impact of ECBC Compliance	10
Q & A Session	10
Total Duration (Minutes)	0
Total Hours	1hr.
<b>Module 2</b>	
<b>ECBC Scope &amp; Administration</b>	
ECBC Scope, Applicability	10
ECBC Compliance approach KSECBC Rules 2017	10
ECBC Compliance Process in Kerala	15
Administration and Enforcement	10
ECBC Documents in force	15
Q & A Session	10
Total Duration (Minutes)	0
Total Hours	1.2hrs.
Assignment: ECBC Compliance check building permit documentation	
<b>Module 3</b>	
<b>Envelope Design Considerations</b>	
Design & details of opaque construction, Fenestration, Shading devise, cool roofs	30
Heat transfer principles - Material Properties - Moisture & Infiltration - Design methods Calculations	30
Code requirements - Mandatory & Prescriptive- ECBC Compliance forms	15
Q & A Session	15
Total Duration (Minutes)	90
Total Hours	1.5 hrs.
Assignment: Calculation of thermal property of Construction materials /U-Value calculation for a sample building	
<b>Module 4</b>	
<b>Heating Ventilation &amp; Air-Conditioning - basics ECBC</b>	
Whole building design approach and role of HVAC	15
Refrigerative cooling, system types and details	25
HVAC System components & Efficiency	25
Cooling load reduction	15
System Balancing & Building Commissioning overview	10
Mandatory & Prescriptive- ECBC Compliance forms	15
Q & A Session	15
Total Duration (Minutes)	0
Total Hours	2hrs.
Assignment: HVAC modelling in Simulation tool for a sample system	
<b>Module 5</b>	

<b>Lighting Basics</b>	
Lighting Principles, Light Quality optimisation	20
Energy Efficient Lighting Systems	15
Lighting control design, BAM, SFM	15
Whole building approach, Concept of LPD	10
Mandatory & Prescriptive -ECBC Compliance forms	15
Q & A Session	15
Total Duration (Minutes)	0
Total Hours	1.5hrs.
Assignment: LPD calculations (Manual and Simulation tool based)	
<b>Module 6</b>	
<b>Daylighting Analysis</b>	
Significance of Daylighting Analysis, DEF, Surface Reflectance, UDI Code Requirements	20
Daylighting Analysis Simulation Method	55
Q & A Session	15
Total Duration (Minutes)	90
Total Hours	1.5 hrs.
Assignment: Daylighting factor calculation (based on Prescribed ECBC Methods)	
<b>Module 7</b>	
<b>Electrical Power</b>	
Power Distribution, Transformers, Electric Motors	10
Types- selection criteria- Sizing	10
Losses- PF & PFC- Efficiency	10
Mandatory & Prescriptive- ECBC Compliance forms	10
<b>Service Hot Water &amp; Pumping - basics</b>	
Types of water heaters - Source type and system details	10
Solar water heater sizing- Efficiency- Supplementary water heating	10
Energy loss- piping Insulation- heat traps	10
Mandatory & Prescriptive- ECBC Compliance forms	10
Q & A Session	10
Total Duration (Minutes)	90
Total Hours	1.5hrs
Assignment: Modelling Service hot water systems in simulation tool (for a sample building)	
<b>Module 8</b>	
<b>Hands-on Compliance Check</b>	
Prescriptive requirements	50
Trade- off compliance	30
Q & A Session	15
Total Duration (Minutes)	0
Total Hours	1.5hrs.
Assignment: Prescriptive analysis method for a hypothetical project	
<b>Module 9</b>	

<b>Hands-on Compliance Check</b>	
Whole Building Performance using software	150
Q & A Session	60
Total Duration (Minutes)	210
Total Hours	3.25hrs.
Assignment: Whole building analysis method for a sample project	
<b>Module 10</b>	
<b>Report Generation &amp; Assessments</b>	
Guidance on Report Generation as per the ECBC	30
Assessment on ECBC Compliance	30
Total Duration (Minutes)	60
Total Hours	1hrs.
Assignment: Report generation for a Pre-modelled sample project.	
<b>Total Course Duration in Hours</b>	<b>16 hrs.</b>
<b>EXAMINATION</b>	
KSECBC compliance checking and report generation on a sample project	<b>14 Days</b>