

ENERGY MANAGEMENT CENTRE -KERALA

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TERMS OF REFERENCE (TOR)

*Empanelment of Firms in Building Energy Efficiency in
Kerala*

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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 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. 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 11th April 2017 vide Kerala Gazette Vol VI, No. 936 dated 8th 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 m² 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 Municipal 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 the two methods:

Sl. No.	Approach	Characteristics
1	Prescriptive Method	<ul style="list-style-type: none"> • Specifies prescribed minimum energy efficiency parameters for various components and systems of the proposed building • Requires little energy expertise, provides minimum performance requirements, no flexibility
2	Whole Building Performance (WBP) Method	<ul style="list-style-type: none"> • 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. • Allows flexibility in meeting or exceeding energy efficiency requirements.

Empanelment of professionals in Building Energy Efficiency

The EMC-Kerala had started empanelment of professionals in Building Energy Efficiency to create 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 empanelment is categorized as 1) Building Energy Simulation Expert (BESE), 2) Provisional Building Energy Efficiency Expert (PBEEE) 3) Building Energy Efficiency Expert (BEEE) based on their experience and expertise. This special cadre of building professionals 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.

3. Objectives

1. The EMC-Kerala, vide the empanelment of Firms in Building Energy Efficiency creates a group of firms *eligible for providing services related to energy efficient building design and construction.*
2. The EMC-Kerala, vide the empanelment of Firms in Building Energy Efficiency, also ensures availability of firms eligible to do the design and construct energy efficient buildings for EMC and other government bodies.

4. Categories of empanelment

1. Energy Efficient Building Designers (EEBD)

- The Architectural/Engineering/MEP firms or Architectural/ Engineering colleges in Kerala can apply for this empanelment.
- The firm should consist of at least one BEEE and one PBEEE and two BESE in the firm.
- The firm is eligible to design and construct energy efficient buildings with Built Up Area up to 10000 Square metre

2. Certified Designers of Energy Efficient Buildings(C-DEEB)

- (i) The firm with registration as institution, architects, engineers, town planners as per KMBR (Chapter - XXI)
- (ii) The firm should have at least 15 years of experience in the building sector.
- (iii) All the technical staffs (Architects & Engineers) of the firm should attend the Training A organized by EMC-Kerala
- (iv) The firm should register at least one Architect with 15 years experience and one Civil Engineer, one Electrical Engineer and/or a Mechanical engineer with BEEE certification as employees or authorised consultants (to be formally informed/registered with EMC).
- (v) Report prepared by the BEEEs of the firm must be countersigned by the Proprietor/owner or the authorised representative of the firm specified as per clause 4.2 (i) and shall be the only person authorised to sign on behalf of the firm.
- (vi) The firm is eligible to design and construct energy efficient buildings without any limit in Built Up Area.

Note: EMC shall provide the chief architect/owner/proprietor of the firm an Honorary BEEE certification on the completion of an orientation program on ECBC & ENS and its adaptation from building energy simulations, if the firm meets the required qualification criteria of Certified - Designers of Energy Efficient Buildings (C-DEEB).

5. Expected Outcome

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

6. Benefits to empanelled firms

- Publication of list of empanelled firms in the Energy Management Centre-Keralaonline-portal to help professional development.
- A wide knowledge among the builders about empanelled firms through the publication
- EMC may utilize the support empanelled firms for design and construction of energy efficient buildings come under the scope of EMC.

7. Empanelment Process

- Interested firms can apply for this empanelment according to their eligibility as per para4.
- The application for empanelment has to be submitted to EMC-Kerala through the registration link (<https://forms.gle/NJQf1PSbe7DwsjWu8>) provided. The empanelment 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>Energy Efficient Building Designers(EEBD)</i>	5000
2	<i>Certified Developers of Energy Efficient Buildings (C-DEEB) / Honorary BEEE</i>	10000

* The empanelment fee is non-refundable.

- Empanelment of firm is for a period of 3 years and the applicant has to renew the empanelment after the expiry of tenure.
- The applicant is expected to furnish all the details mentioned in the selection criteria clauses and submit the copy along with the application.
- Confirmation towards Empanelment will entirely be at the discretion of EMC- Kerala.
- Over the confirmation, the annual renewal fees may be specified to the applicant.

8. Conclusion

The proposal of empanelment of building firms, is to ensure the availability of firms which can design and construct ECBC compliant and Energy Efficient Buildings in the State.

9. Annexure-A

Training A

<u>Online Certificate Course on ECBC compliance check through Energy Simulation</u>		
Session no.	Session title	Duration(mins)
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"> • Mandatory Requirements • Prescriptive Approach • Whole Building Performance Approach 	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"> • Building Geometry Development 	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"> • Base case modelling as per KSECBC Rules (ECBC 2007 Guide) – Notified in the State 	90
11	11.1 Hands-on Training Exercise Problem Proposed Case as per Sample Exercise Shared <ul style="list-style-type: none"> • Proposed Case Modelling as per the exercise given. 	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
<u>EXAMINATION</u>		
1	ECBC Examination for Participants – Multiple Choice Questions type.	60
2	Simulation Examination for a sample energy model of typical building type– With the Building Descriptions shared with participants	300
	Total course duration	26 Hrs

Training B

Intensive training on ECBC compliance check	
MODULES	DURATION
Module 1	
ECBC Awareness & Overview	
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)	60
Total Hours	1hr.
Module 2	
ECBC Scope & Administration	
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)	70
Total Hours	1.2hrs.
Assignment: ECBC Compliance check building permit documentation	
Module 3	
Envelope Design Considerations	
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	
Module 4	
Heating Ventilation & Air-Conditioning – basics ECBC	
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)	120

	Total Hours	2hrs.
Assignment: HVAC modelling in Simulation tool for a sample system		
Module 5		
Lighting Basics		
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)	90
	Total Hours	1.5hrs.
Assignment: LPD calculations (Manual and Simulation tool based)		
Module 6		
Daylighting Analysis		
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)		
Module 7		
Electrical Power		
Power Distribution, Transformers, Electric Motors		10
Types- selection criteria- Sizing		10
Losses- PF & PFC- Efficiency		10
Mandatory & Prescriptive- ECBC Compliance forms		10
Service Hot Water & Pumping – basics		
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)		
Module 8		
Hands-on Compliance Check		
Prescriptive requirements		50
Trade- off compliance		30
Q & A Session		15

Total Duration (Minutes)	95
Total Hours	1.5hrs.
Assignment: Prescriptive analysis method for a hypothetical project	
Module 9	
Hands-on Compliance Check	
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	
Module 10	
Report Generation & Assessments	
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.	
Total Course Duration	960 hrs
Total Course Duration in Hours	16 hrs.