



Energy Management Centre - Kerala
Thiruvananthapuram 695 017

Abstract

Energy Management Centre – Detailed Energy Audit in Buildings
category – Deposit work - Orders issued - Reg

No. EMC/107/2024-ETB-1(EED)

Dated 03-05-2024

Read: 1) G.O.(Rt) No. 2/2011/PD dated 01-01-2011

ORDER

Government of Kerala as per read 1 has made energy audit mandatory for all HT/EHT consumers and High rise buildings to regulate energy consumption. Energy Management Centre -Kerala is the nodal agency for implementing the audit scheme in the State. For conducting an energy audit, except for designated consumers, Energy Management Centre-Kerala had empanelled 52 energy audit firms till date.

Energy Management Centre - Kerala (EMC) is releasing guidelines for conducting detailed energy audits of buildings within the state. These audits are commissioned as deposit work, with fees determined by the connected load and air-conditioned area of the building under scrutiny. The scope of the energy audit is predefined, outlined alongside the guidelines, and strictly adhered to by the auditing firm throughout the process, from field study to report preparation. Upon receiving the work order, EMC commits to completing the field study within 30 days. Subsequently, within 15 days of concluding the field study, EMC submits a draft report to the consumer. Consumers are encouraged to review the draft report and provide their feedback within 15 days of receiving it. Once the comments are received, EMC incorporates them into the final energy audit report. This final report, enriched with consumer input, is then promptly delivered to the consumer. The consumer has to remit 100% of the energy audit fee as advance for the conduct of the energy audit.

Case 1: Energy Audit in Commercial Buildings (High Tension (HT) Consumer)

The proposed fees for carrying out detailed energy audit at High Tension buildings according to the connected load (kW) of the buildings is

Conditions	Buildings having connected load up to 100 kW	Rate per kW for the Connected load (kW) exceeding 100 kW and Maximum of 1000 kW
Buildings having an air-conditioned area of up to or less than 50% of the total built-up area	Rs. 40,000	Rs. 160 per kW
Buildings having an air-conditioned area of more than 50% of the total built-up area	Rs. 45,000	Rs. 190 per kW
GST @ 18% will be charged as extra.		

These rates are valid for commercial buildings having a connected load up to 1000 kW.

Discount:

Flat 20% discount on energy audit fee will be provided to Institutions/ Departments for carrying out energy audit at their facilities. This offer operates on a first-come, first-served basis and is available to a limited number of consumers.

Case 2: Energy Audit in Commercial building (Low Tension (LT) Consumer)

The proposed fee for carrying out walk through energy audit at Low Tension buildings according to the connected load (kW) of the buildings is

Connected Load	Energy Audit fee (Rs)
Up to 9.99 kW	5000.00
10 kW to 19.99 kW	6000.00

20 kW to 29.99 kW	9000.00
30 kW and above	12000.00
GST @ 18% will be charged as extra.	

There is no discount applicable in case of Low tension consumers.

The above discount scheme is applicable to only those consumers who deposit the energy audit fee to the below mentioned EMC bank account in advance.

Certificate of Energy audit: A certificate of energy audit will be provided to consumers who successfully conduct an energy audit under this scheme at no charge. Consumers who have conducted energy audits outside the scheme are also eligible to receive the certificate upon payment of Rs. 1000.00/- (GST extra) to the EMC bank account.

EMC account details:

Account Name: Energy Management Centre

Account Number: 32860100005883

Bank: Bank of Baroda, Ulloor Branch

IFSC Code: BARBOULLOR

GST No: 32AAATE1024A1ZU

Dr. R. Harikumar

Director

Copy to:

1. Joint Director
2. Registrar
3. Head, NMEEE & DSM Division
4. Accounts Officer
5. Secretary to Director / Stock File
6. Files
7. To all EMC Empanelled energy audit firms

SCOPE OF THE WORK

Detailed Energy Audit in Commercial buildings (HT Consumers)

The scope of the work includes a detail study for energy conservation options of various energy sources like Electricity and Thermal Sources like HSD, LPG, Biogas etc. in the building and recommends actions for reducing the same. The Energy Auditor shall conduct 1 hour awareness training programme to the facility based on the findings of Energy Audit.

The broad scope of the study will be as per the following.

- A. Review of present electricity, thermal sources & estimation of energy consumption in various load centers like lighting, Air-Conditioning, Water Pumping, Office Equipment, Inverter / UPS etc.
- B. **Electrical Distribution System**
 - a. Review of present electrical distribution like Single Line Diagram (SLD), transformer loading, cable loading, normal & emergency loads, electricity distribution in various areas / floors etc.
 - b. Study of Reactive Power Management and option for power factor improvement.
 - c. Study of power quality issues like Harmonics, current unbalance, voltage unbalance etc,
 - d. Exploring the feasibility of Energy Conservation measures
 - e. Options (ENCON) in electrical power distribution system.
 - f. Study of Power Quality problems and correlation with Reactive power management, Energy losses etc.
- C. **Lighting System**
 - a. Review of present lighting system, lighting inventories etc.
 - b. Estimation of lighting load at various locations like different floors, outside (campus) light, pump house and other important locations.

- c. Detail lux level survey at various locations and comparison with acceptable standards.
- d. Review Lighting arrangement.
- e. Study of present lighting control system and recommend for
- f. Improvement.
- g. Analysis of lighting performance indices like Lux/m, lux/watt, lux/watt/m and comparison with norms of high rise buildings.
- h. Exploring the Energy Conservation Options (ENCON) in lighting System.

D. Heating, Ventilation & Air-Conditioning System (HVAC system)

- a. Review of present HVAC system like Central Airconditioning system, VRF Airconditioning, window AC, split AC; package AC, Water Coolers, and Air Heaters etc.
- b. Performance assessment of VRF Systems, window AC, Split AC and Package AC systems.
- c. Performance Assessment of Chillers, Cooling Towers, Air Handling Units (AHUs) and cold insulation system of central AC.
- d. Analysis of HVAC Performance like estimation of Energy Efficiency Ratio (EER i.e. KW/TR), Specific Energy Consumption (SEC) of Chilled Water Pumps, Condenser Water Pumps, AHUs etc and comparison of the operating data with the design data.
- e. Analysis of Range and Approach of Cooling Towers
- f. Exploring the Energy Conservation Options (ENCON) in HVAC System.

E. Diesel Generator (DG) Sets

- a. Review of DG set operation schedules
- b. Performance Assessment of DG sets in terms of Specific Fuel Consumption (SFC i.e. KWh/Litres),
- c. Estimate the Energy Consumed in kCal.
- d. Exploring the Energy Conservation Options (ENCON) in DG
- e. Sets.

F. Water Pumping System

- a. Review of water pumping, storage and distribution systems.
- b. Performance assessment of all major water pumps i.e. power consumption vs. flow delivered, estimation of pump efficiency etc.
- c. Exploring the Energy Conservation Options (ENCON) in Water Pumping System.

G. Thermic Fluid Heaters / Boilers

- a. Performance assessment of hot water generators or thermic fluid heaters like estimation of efficiency etc.
- b. Exploring the ENCON options in this systems

H. Motor Load Survey

- a. Conducting the motor load survey of all drives to estimate the percentage loading.
- b. Exploring the ENCON options in electric drive system.

I. Energy Monitoring & Accounting System

- a. Detail review of present energy monitoring & accounting system in terms of metering, record keeping, data logging, periodic performance analysis etc.
- b. Recommend for effective energy monitoring & accounting system.

J. Others

- a. Review of present maintenance practice, replacement policies and building safety practices as applicable to high rising buildings and recommend for improvements.
 - b. Cost-Benefit Analysis of each ENCON options indicating simple pay back period, return on investment (ROI), internal rate of return (IRR).
 - c. Preparation of Detail Project Report and submission of the same to Building owner.
- a. **Renewable energy integration**
Potential for Renewable energy applications, such as Solar thermal, Solar-PV, Biogas, Waste-to-energy, with cost-benefit

analysis and savings on commercial energy

l. **E- Mobility adaptation**

Potential for E-Mobility adaptation, by switching over to Electric Cars, installing EV Charging stations etc.

DELIVERABLES IN THE DETAIL PROJECT REPORT (DPR)

The DPR should contain the following information:

- Methodology adopted for the study.
- Present energy scenario of the building.
- Detail analysis of the data obtained through field visits, trial measurements by portable gadgets, discussion with concerned personnel etc.
- Recommendations for energy saving options in all possible areas with cost-benefit analysis.
- Technical Specifications for any retrofit options,
- List of suppliers / manufacturers of energy efficient technologies.

Conduct of Energy Audit – Compliance with safety, health, hazards, accidents, damage, loss prevention and environmental standards, rules, regulations, accepted practices and similar statutes.

v. **Energy Audit Firm:**

It is the sole responsibility of the energy audit firm (who has been awarded the assignment of conducting energy audit) to ensure compliance, in its entirety, with the concerned and applicable standards, rules, regulations and accepted practices pertaining to the Occupational Safety and Health Hazard, accidents, damages, loss prevention, Environmental aspects, and other similar statutes. This shall cover its own personnel, employees, properties, instruments, tools and equipment, systems and all those associated with the energy audit activities within the plant/factory/building/facility/and-or any such premises, as applicable.

v. **The energy audit facility:**

It is the sole responsibility of the client company (whose facility is energy audited) to ensure that competent/qualified/certified personnel of the client company shall only extend the coordination and support

to the energy audit team for the smooth conduct of energy audit, issue access permits, provide adequate office and storage space , ensure safe working place and conditions, provide data and drawings, extend field assistance and guidance to conduct instrumented trails and measurements and any or all such and similar needs and necessities to accomplish the energy audit.

Contents of Energy Audit Report

- i. **Acknowledgement**
- ii. **Contents**
- iii. **Certification**
- iv. **Executive Summary** – The Executive Summary shall include tabulation of all the Energy conserving recommendations in abstract including specifications, capital investment, annual energy savings, annual return on monetary savings, simple pay-back period.
- v. **Introduction** – This chapter shall include Introduction about EMC and only basic details of the building, its purpose of use, building plan, number of occupants, built up area, type of business, Annual Energy consumption, Annual Energy cost, Energy cost as a percentage of annual expenses, preferably in tabular format, Energy share in pie-chart format etc.
- vi. **Energy & Utility Description** – This chapter shall include the details of Electricity supply, provider, tariff category and slab, sanctioned connected load, measured connected load, 24 Hours Load Curve, maximum demand, etc. preferably in tabulated form, details of Electrical Panels and Distribution Boards / Single Line Diagram approved latest by Kerala State Electrical Inspectorate, details of highest capacity loads, Load Matrix mapping distribution of various loads area wise arriving total quantity, load and energy consumption, Breakup / Piechart of different Electrical loads – both areawise and categorywise, Breakup / Pie chart of different Energy consumption – both areawise and categorywise
- vii. **Energy Performance** – This chapter shall include the tabulation

of Measured Annual Energy consumption – Electrical, Thermal, Total, Annual Energy Cost, Measured Specific Energy Consumption (kWh/production), Measured Energy Performance Index (kWh/sqm), Measured Breakup of Energy – Thermal & Electrical, source wise etc.

- viii. **Climate Impact** – This chapter shall include the tabulation of annual energy carbon footprint – source wise, carbon offsets from any source available etc., graphs etc.
- ix. **Energy Performance Assessment of Major Equipments** – This Chapter shall include Energy Efficiency and Loading assessment of highest rated and key equipments in the facility
- x. **Power Quality Assessment** – This Chapter shall include a tabulation of major power quality issues analyzed including the order of voltage and current harmonics upto 15th in case of normal buildings and 25th in case of hospitals, Voltage THD, Current THD, Voltage Flicker, Voltage Dips and Swells, Over and Under Voltage, Frequency deviation, Distortion PF, Transformer derating factor, standard graphs etc.
- xi. **Thermal Imaging Study** – This chapter shall include the thermal imaging study of loose contacts and overloading of Electrical Busbars and switchgear, Motors, Capacitors, Heat infiltration through roof, leakages etc.
- xii. **Recommendations for Energy Conservation** – This chapter shall include detailed Energy savings calculations of items mentioned in Executive Summary clearly showing pre and post fitted – watts, numbers, working hours, energy consumed, daily energy savings, annual energy savings, annual monetary savings, annual investment, annual carbon offset, simple payback period. The recommendations must be classified as Energy Efficiency measures, Renewable Energy integration, E-Mobility adaptation and behaviour Change initiatives.
- xiii. **Energy Policy** – This chapter shall include draft energy policy that the management shall follow to work towards ISO 50001.
- xiv. **Annexure I - Load Matrix** mapping distribution of various loads area wise arriving total quantity, load and energy consumption

- xv. **Annexure II – Electricity Bills** (Latest Detailed Bill downloaded from utility website)
- xvi. **Annexure III** – Data obtained from instruments including plots
- xvii. **Annexure IV – Standard Data** – shall include the value of standard watts of fittings, cost of fittings recommended, conversion of physical quantities etc.
- xviii. **Annexure V** – Name plate details of major energy consuming equipments
- xix. **Annexure VI – Vendor details** - Details of multiple vendors and contact details who can supply the equipments mentioned in Recommendations for Energy Conservation.

Scope of Work - Walk-through Energy Audit at Commercial Buildings (LT connection)

The energy auditor should perform the following activities at each audit site:

1. A walk-through Energy audit survey
2. Identify Energy Conservation Opportunities
3. Identification of Solar PV Potential
4. One hour awareness training programme should be given to the consumer.

Contents of the Energy Audit Report

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- ii. **Contents**
- iii. **Certification**
- iv. **Executive Summary** – The Executive Summary shall include tabulation of all the Energy conserving recommendations in abstract including specifications, capital investment, annual energy savings, annual return on monetary savings, simple pay-back period.
- v. **Introduction** – This chapter shall include Introduction about

EMC and only basic details of the building, its purpose of use, building plan, number of occupants, built up area, type of business, Annual Energy consumption, Annual Energy cost, Energy cost as a percentage of annual expenses, preferably in tabular format, Energy share in pie-chart format etc.

- vi. **Energy & Utility Description** – This chapter shall include the details of Electricity supply, provider, tariff category and slab, sanctioned connected load, measured connected load, maximum demand, etc. preferably in tabulated form, details of Electrical Panels and Distribution Boards / Single Line Diagram approved latest by Kerala State Electrical Inspectorate, details of highest capacity loads, Load Matrix mapping distribution of various loads area wise arriving total quantity, load and energy consumption, Breakup / Pie chart of different Electrical loads – both area wise and category wise, Breakup / Pie chart of different Energy consumption – both area wise and category wise
- vii. **Energy Performance** – This chapter shall include the tabulation of Annual Energy consumption – Electrical, Thermal, Total, Annual Energy Cost, Specific Energy Consumption (kWh/production), Energy Performance Index (kWh/sqm), Breakup of Energy – Thermal & Electrical, source wise etc.
- viii. **Climate Impact** – This chapter shall include the tabulation of annual energy carbon footprint – source wise, carbon offsets from any source available etc., graphs etc.
- ix. **Recommendations for Energy Conservation** – This chapter shall include detailed Energy savings calculations of items mentioned in Executive Summary clearly showing pre and post fitted – watts, numbers, working hours, energy consumed, daily energy savings, annual energy savings, annual monetary savings, annual investment, annual carbon offset, simple payback period. The recommendations must be classified as Energy Efficiency measures, Renewable Energy integration, E-Mobility adaptation and Behaviour Change initiatives.
- x. **Renewable Energy Integration** - The required capacity of the solar power plant, area required, annual energy generation potential, payback calculations shall be clearly mentioned in the report. If there is more area available at the building the capacity

of the plant that can be proposed at the building with its energy generation and payback calculations shall be mentioned.

- xi. **Energy Policy** – This chapter shall include draft energy policy that the management shall follow to work towards ISO 50001.
- xii. **Annexure I - Load Matrix** mapping distribution of various loads area wise arriving total quantity, load and energy consumption
- xiii. **Annexure II – Electricity Bills** (Latest Detailed Bill downloaded from utility website)
- xiv. **Annexure III – Standard Data** – shall include the value of standard watts of fittings, cost of fittings recommended, conversion of physical quantities etc.
- xv. **Annexure IV** – Name plate details of major energy consuming equipment
- xvi. **Annexure IV – Vendor details** - Details of multiple vendors and contact details who can supply the equipment mentioned in Recommendations for Energy Conservation.