

Energy Management Centre Kerala

Energy Audit Guidelines

The Energy Management Centre - Kerala (EMC) is established in 1996 by the Government of Kerala as an autonomous centre under the Department of Power with the objective of promotion of Energy Conservation. The industrial and commercial sectors consume large share of commercial energy and there is evidently a good potential for conserving 25%-30% energy by following good energy management practices.

The Government of Kerala in order to encourage energy efficiency in the industrial and commercial sectors has passed a resolution to make energy audits mandatory once in every three years for all HT and EHT installations and Commercial and non-domestic high rise buildings (having more than four floors and or 15 meters of height from ground level), hereinafter referred as Designated Energy Consumers (DEC).

To conduct mandatory energy audit in High Tension/ Extra High Tension installations in the Kerala State, competent energy audit firms having experience and expertise in energy audit would be empanelled by EMC. The eligibility criteria for registration are given in Annexure 1. DEC s are also permitted to carry out energy audit through BEE accredited energy audit firms.

Energy Audit Study helps to understand and analyze energy utilization and identify areas of energy wastage, decide how to budget energy use, plan & practice feasible energy conservation methods that will enhance energy efficiency, curtail energy wastage and substantially reduce energy costs. Energy Audit is thus the key to a systematic approach for decision-making in the area of Energy Management. Energy Audit (EA) Study should be directed towards

- Identifying cost-effective measures to improve the efficiency of energy use,
- Estimates of potential energy saving, implementation costs and payback periods for each recommended action, and
- Documenting results & vital information generated through these activities.

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An Energy Audit Study includes (also refer content sheet of an EA Report – Annexure 2)

- Auditing of Energy Consumption (including any heat and power generated)
- General examination of work place (including physical condition of organization, its processes, occupancy time, and variations in ambient temperature and energy consumption pattern etc.)
- Measurement of all energy flows (including testing of boiler or steam raising, heating equipment, refrigeration, etc.)
- Analysis and appraisal of energy usage (e.g. specific fuel consumption, energy-product interrelationship).
- Energy management procedures and methodology.
- Identification of energy improvement opportunities and recommendations for energy efficiency measures and quantification of implementation costs and paybacks.
- Identification of possible usage of co-generation, renewable sources of energy and recommendations for implementation, wherever possible, with cost benefit analysis.

Steps for submission of energy audit report

1. Consultants, for conducting the energy audit, must be selected from the list of EMC authorized consultants.
2. One hard copy of the Draft EA Report and a soft copy in MS Word format along with
 - the plan of action on the EA recommendations (as per the Form I)
 - latest Annual Report (wherever applicable) and
 - latest electricity billmay be submitted to EMC before the specified date of completion of audit.
3. This report has to be presented jointly by the Consultant and the DEC before an expert team constituted by EMC either in the premises of the DEC or in another convenient location, with prior intimation, on a mutually convenient date.
4. EMC would send its comments on the acceptance of the EA Report, with modifications, if any, after the formal presentation.
5. The DEC may submit 2 hard copies Final EA Report and the soft version and EC implementation program/ schedule with details of savings (revised Form I).

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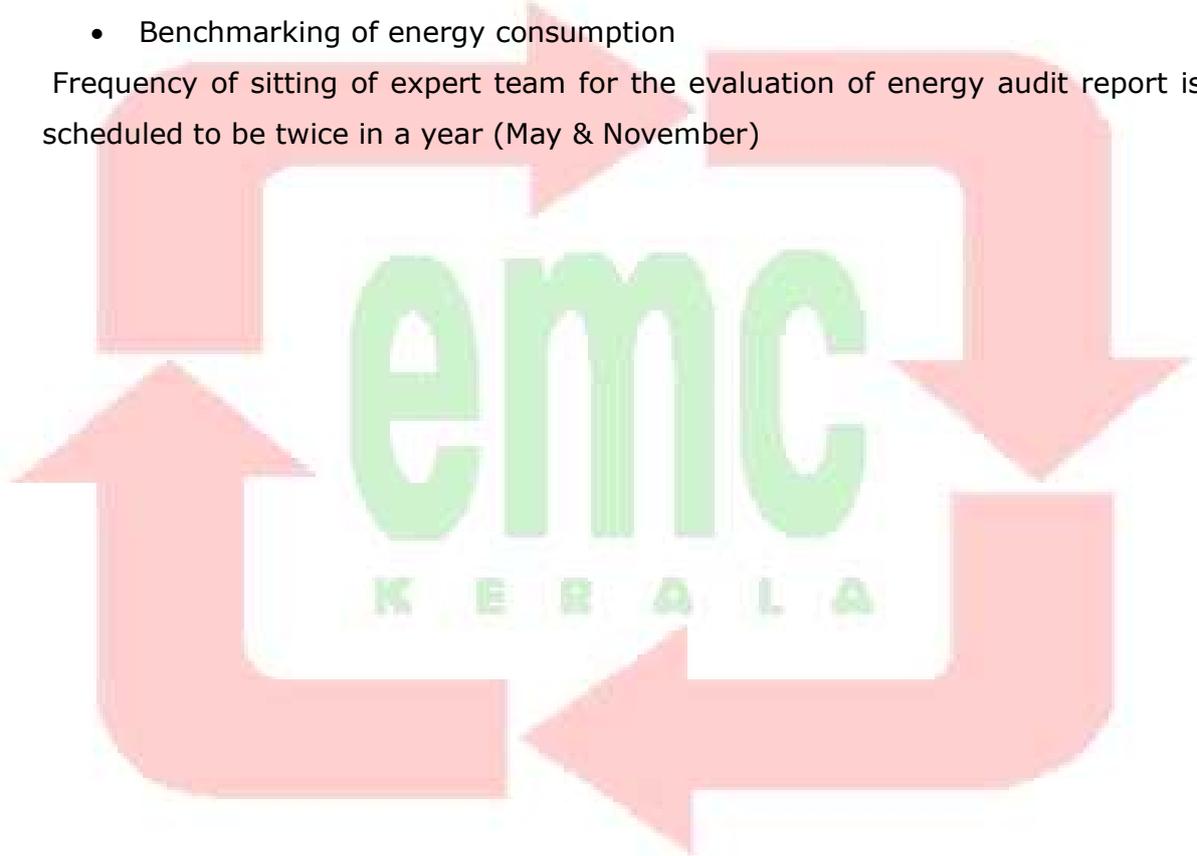
6. Every DEC shall furnish to EMC every year, the details of progress made in consequence of the action taken by it together with details of energy efficiency improvement measures implemented and consequent savings achieved in Form II, within three months of the close of that financial year.

Evaluation procedure

Criteria for evaluation of Energy audit report

- Collection, generation & analysis of data
- Quality of recommendations for improving energy efficiency
- Cost benefit analysis of recommended measures
- Benchmarking of energy consumption

Frequency of sitting of expert team for the evaluation of energy audit report is scheduled to be twice in a year (May & November)



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Annexure 1

Registration of Energy Audit Firm

1. Energy Management Centre- Kerala (EMC) intends to empanel BEE accredited energy auditors/ ESCOS as well as competent firms having experience and expertise in Energy audit. The eligibility criteria for registration are given in this notification. The EMC Registered Energy Audit firm's (EMCREA) , as they will be termed, to carry out periodical Energy Audits mandated by G.O.(Rt) No. 2/2011/P.D dated 01-01-2011 as well as to form a data base of Energy Auditors available for Energy Audit in the State.

2. Registration Fees: - ` 5000/-. The fees will be non-refundable and would be utilized for organizing meetings, workshops and printing directory. Certificate of Registration as EMC Registered Energy Audit firm's will be issued by EMC after detailed scrutiny and evaluation of the firm's credibility. Registered Energy Auditors will be governed by the terms and conditions given below.

3. Eligibility Criteria for Registration

- a. The applicant firm should have minimum one BEE certified Energy Auditor with at least 2 years experience in the field of energy auditing.
- b. Application for empanelment may be submitted as per the Form A.
- c. The applicant must have relevant experience in Energy efficiency, Energy conservation & Management and should have experience in conducting actual energy audit in HT/ EHT installations and commercial high rise building. Necessary documents / certificates / proofs and Energy Audit Report prepared by the applicant should be produced.
- d. The firm should have conducted at least 3 energy audits in the last three years. Copy of three latest Energy Audit Reports, indicating name and Certification Number of Certified Energy Auditor and Team of professionals employed by the firm shall be clearly indicated in the report.

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- e. The firm must possess the basic instruments for required for conducting energy audit. In case, the applicant does not possess costly equipment, necessary proof of understanding with an equipment supplier/ provider may be submitted. List of instruments are as follows
- Power Analyzer Kit (kVA, kW, kWh, V, A, pf, THD, etc)
 - Tachometer
 - Lux Meter
 - Flue Gas Analyzer
 - Ultrasonic flow meter
 - Thermometer (contact/ non contact)
 - Hygrometer
 - Anemometer
 - Manometer/ pitot tube
- f. The firm must have the following infrastructure facilities:
- Office Premises (permanent office address) with phone / fax
 - PC System
 - E-mail ID
- g. Personal interview of applicants, wherever found necessary, will be taken prior to granting registration.
4. Terms & Conditions of Registration
- a. The registration shall be only valid for within the State of Kerala for a specified period of 3 years from the date of issuance of Registration Certificate.
- b. The registration is subject to yearly review and renewal by EMC and shall be liable for cancellation in case of non-performance or violation of any of the terms & conditions of registration by the consultant, specified herein.
- c. The EMC Registered Energy Audit firm (EMCREA) shall be obliged to submit yearly Work Report pertaining to their overall activity, as

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EMCREA, including relevant work done by them privately or under any other schemes anywhere in the country.

- d. The EMCREA shall respond to all or any bids, RFPs, RFQs, Tenders or quotation invited by HT/ EHT installations and commercial high rise buildings covered under G.O.(Rt) No. 2/2011/P.D dated 01-01-2011 in Kerala.
- e. EMCREAs may themselves identify and motivate prospective clients for undertaking energy audit.
- f. The EMCREA shall abide by the scope of work and submit Energy Audit Report as per prescribed Report Template and also abide by the terms & conditions of the Energy Audit Guidelines issued by EMC or BEE.
- g. The assignments have to be completed within time frame as agreed upon with the client in professional manner.
- h. The EMCREA shall be required to participate in all the meetings and workshop convened by EMC.
- i. EMCREA along with the representative of industries should present the finding of the Energy audit before the expert committee and any modification suggested during the presentation should be incorporated in the energy audit report.
- j. No individual Certified Energy Auditor can register with/employed / represent more than one Energy Audit Firm. If same Certified Energy Auditor is found registered with/employed by / represented by more than one firm the firm may be disqualified from Empanelment.
- k. Certificate of Employment, duly signed by the Signatory of the Energy Audit Firm, with employment service history, shall be submitted with the application for empanelment.

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Energy Audit Firms Empanelment (FORM –A)

Application for Empanelment as EMC Registered Energy Audit Firms (EMCREA)

PART A: Details of Applicant

1. Name of Organization: _____
2. Category (Please "" mark at appropriate place)
(Attach registration certificate of the firm)
- a) Individual/ proprietorship
 - b) Partnership
 - c) Private Limited
 - d) Govt., PSU, Autonomous body
3. Address (Postal) _____
- Telephone/s (with STD code): _____
Fax No. _____
email ID _____ / _____
URL (website /blog) _____
4. Name of the CEO and contact details _____
Tele/Fax/Email: _____
5. Name/s of BEE Certified Auditors (Please specify BEE certification no :)
- 1. _____
 - 2. _____
6. Registered with any other Organisation, if yes name of the organisation(attached copy of proof). _____
7. Are you registered with BEE, if yes specify whether as ESCO or AEA _____
7. Details of Support Facilities **(Instruments, computer, etc.)**
(attach list with detailed specification)
- 7.a. Instruments _____
 - 7.b. Computer _____
 - 7.c. Others (Pl specify) _____

Part B : Manpower and Experience

1. Table I : Details of Technical Manpower

Sl No.	Name & Designation	Professional Qualification & year of passing	Post qualification Experience (years)	Years of experience in Energy Auditing	Whether BEE Certified Auditor Specify BEE certification no
1.					
2.					
3.					

(Attach resume of each of the team member. Use separate sheet if required)

2. Table II: Projects undertaken during last three years.

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Sl No	Energy Audit (*)	Sector	Name of the Organisation	Month & year of Audit
1.				
2.				
3.				
4.				
5.				

* - Electrical/Thermal/Both (Use separate sheet, if required)

4. Provide documentary evidence in support of your Energy Audit experience :
 (Attach separately) eg. Copy of minimum three energy audit report or Copy of Completion certificate from client.

5. Additional information if any (attach separately)

Declaration

- The information provided in this form is accurate and true to the best of my knowledge.
- We agree to abide by the terms & conditions of empanelment.
- Kindly enroll our name as EMC Registered Energy Audit firms for carry out periodical Energy Audits mandated by G.O.(Rt) No. 2/2011/P.D dated 01-01-2011.
- Please find enclosed DD of Rs. 5000/- drawn in favour of EMC payable at ..., as Annual Registration Fee. (Bank: _____ Date: _____)

Name & Designation of the authorized signatory: _____

 (Signature)

 (Seal of Organization)

Date: _____

(for office use only)

Date of Receipt : _____

Date of Completion of Evaluation : _____

Approved or not approved : _____

EMCREA no allotted : EMCREA/2011/_ /_

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Annexure 2

Report on DETAILED ENERGY AUDIT Table of Contents

I. Acknowledgement

II. Executive Summary

Energy audit options at a glance and recommendations

1.0 Introduction about the plant.

1.1 General plant details and descriptions

1.2 Energy Audit team

1.3 Component of production cost (Raw materials, energy, chemicals, manpower, overhead, others)

1.4 Major energy use and Areas

2.0 Production Process Description.

2.1 Brief description of manufacturing process.

2.2 Process flow diagram and Major unit operations.

2.3 Major raw material inputs, Quantity and cost.

3.0 Energy and utility System Description.

3.1 List of Utilities

3.2 Brief description of each utility.

3.2.1 Electricity

3.2.2 Steam

3.2.3 Water

3.2.4 Compressed Air

3.2.5 Chilled Water

3.2.6 Cooling Water

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4.0 Detailed process flow diagram and Energy Material Balance

- 4.1 Flow chart showing flow rate, temperature, pressures of all input-output streams
- 4.2 Water Balance for entire industry

5.0 Energy efficiency in utility and process systems

- 5.1 Specific energy consumption.
- 5.2 Boiler efficiency assessment.
- 5.3 Thermic fluid heater performance assessment.
- 5.4 Furnace efficiency analysis.
- 5.5 Cooling water system performance assessment.
- 5.6 DG set performance assessment.
- 5.7 Refrigeration system performance.
- 5.8 Compressed air system performance.
- 5.9 Electric Motor load analysis.
- 5.10 Lighting system.

6.0 Energy conservation Options & Recommendations

- 6.1 List of options in terms of No cost /Low cost, medium cost and high investment cost, Annual Energy & Cost savings & payback.
- 6.2 Implementation plan for energy saving measures/Projects

Annexure 3

- A1. List of energy audit worksheets
- A2. List of instruments
- A3. List of Vendors and Other Technical details

Note: - Format for capturing energy/ production/ service details or figures as used in the Award application format can be given here for reference.

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Annexure 4

Suggested categories of areas of energy efficiency improvement for obtaining details of energy savings

1. Better housekeeping measures
2. Installation of improved process monitoring and control instrumentation or software
3. Fuel handling System
4. Steam generation station
5. Steam distribution station
6. Electricity Generation system
7. Hot Water system
8. Compressed air system
9. Raw/Process Water system
10. Cooling water System
11. Process Cooling/Refrigeration system
12. Heating ventilation and Air conditioning
13. Electrical System
14. Lighting system
15. Melting/Heating/Drying equipment(e.g. Furnaces Heaters, Kilns, Ovens, Dryers, Evaporators etc)
16. Heat exchangers
17. Pumps, Compressors, Fans, Blowers, Piping, Ducting
18. Process equipment (e.g. Reactors, Separation Equipment ,Material, Handling Equipment etc.)
19. Transformers
20. Electric Motors and drives
21. Process Technology
22. Process Integration
23. Process control and automation
24. Other Non-equipment measures (eg Plant Operation/Scheduling, Tariff Schedule etc).
25. Recovery of waste heat for process heat or power generation
26. Retrofitting, modification or sizing of fans, blowers pumps including duct system
27. Other