



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Role of Electrical contractor as safety and energy auditor

Research Scholar - Mrs. Shruti Shouche 1

Research Guide - Dr. Reshma Doiphode 2

1 Department of Commerce & Management

V.P.M.'s R.Z. Shah College of Arts, Science and Commerce

Mulund (East), Mumbai – 400081

2 Department of Commerce & Management

People's College, Sneha Nagar, Nanded

Maharashtra – 431601

1. Abstract

Energy in the form of electricity is found in nature as lightning, ability of electric fish to give shocks and also as static electricity. Scientists like Thales, William Gilbert, Sir Benjamin Franklin, Graham Bell, Galileo, etc. made remarkable contributions towards the field of electricity. Experiments conducted by them resulted into production of manmade electricity by use of various natural resources. Countless efforts by these scientists benefitted the entire humanity. It is the most coveted invention which brought industrial revolutions. Today use of electricity has become such a common and ordinary thing, that people forget the value of it. They have become careless towards the use of electricity and do not bother about waste of electricity. Now in the current situation majority of the electricity is produced with the help of renewable resources, then too the cost of resources to the nature is tremendous. Therefore every unit of energy in the form of electricity is precious and should be used cautiously.

Another aspect of the resource is, though it is a useful resource, it needs to be used very carefully. Safety norms are important to be followed while using electricity based devices and equipments, otherwise it may cause heavy destruction. This particular aspect of the resource has given rise to safety and energy audit. These audits are conducted by certified auditors.

Electrical contracting units are the institutions in the channel of distribution of electricity, which are engaged in transmission, distribution of electricity and also installation as well as maintenance of electrical systems. Their role in today's world is not just of a transmitter, distributor, an installer or energy facilitator, but they also act as energy advisors and consultants. They give suggestions with respect to proper installation of electrical systems. They advise business organisations in bringing down electricity cost, ultimately resulting into energy saving in the benefit of environment. They also observe the electrical infrastructure and suggest improvements in it from the viewpoint of the safety. The knowledge of electrical contractors can be combined with standardization services to have better industrial safety. The scope for electrical contractors to work as energy and safety auditor has been explained here in this paper.

Key words – safety audit, energy audit, electrical contractor

2. Objectives –

1. To understand the concept of energy audit and safety audit
2. To understand need of energy audit
3. To study scope of electrical contracting business
4. To know role of electrical contractor as an energy and safety auditor

Research methodology – This research paper is mainly based on secondary data. Bibliography given at the end of the report gives names of the websites referred. One of the researchers belongs to electrical contracting business family background and thus has a live source of information about the business.

3. What is safety audit? [4]

A safety audit is a structured, methodical assessment and evaluation of how workplace activities affect safety and health. It reveals how an organization is doing in maintaining a safe and healthy environment. Its goal is to ensure a safe and healthy workplace by striving to eliminate unsafe practices and hazards that lead to injuries and accidents.

The process checks about –

- 1) Maintenance of building, machines
- 2) Lighting, ventilation and electrical installations
- 3) Hygiene
- 4) Protection from noise, dirt and dust
- 5) Disposal of all types of wastes, specially toxic wastes
- 6) Safety engineering
- 7) Safety discipline
- 8) Safety education
- 9) Safety policies
- 10) Safety measures

What is energy audit?

Energy audit is the process of evaluation of energy consumption by equipments used by an organisation. It is the process which checks whether the equipment is using standard referred number of units or is it eating more units because of wear and tear or any other reason.

Definition given by [1] Wikipedia is –

“An **energy audit** is an inspection survey and an analysis of energy flows for energy conservation in a building.”

Energy audit can be home audit or industrial audit. Home audit is done for improving energy efficiency at home, whereas industrial audit is conducted not only to improve energy efficiency but also to lower increasing expensive energy costs and to save energy to facilitate sustainable future.

Energy audit consists of –

- 1) Analysis of structure of building
- 2) Study of use of building, working hours and shift timings
- 3) Analysis of installed equipments
- 4) Analysis of weather and climatic conditions
- 5) Evaluation of energy bills
- 6) Assessment of energy saving potential

International standards used to conduct the energy audit – [7]

According to the ASHRAE (The American society of heating, refrigerating, and air conditioning engineers) standard 100-2006 gives steps in the process of energy audit. ISO (The international standard organization) 5002:2014 has the new standards for the energy audit. It has also introduced the recent document and international standards to conduct the energy audit which is the part of the ISO 5001 family standards for management of ‘Energy system’. As indicated by the British Standard Institute (BSI), an energy audit is a systematic inspection and examination of energy utilities and energy utilization of a site, building, framework or association with the expectation to distinguish energy streams and the potential for energy efficiency improvement and reporting them. British Standard Institute introduces the European standards in 2012 for energy audit BSI 16247-1:2012. It describes energy audit in seven stages.

Steps taken by Government of India towards encouragement to energy audit in India – [6]

The techniques used for energy auditing in India are promoted by Ministry of Power, Bureau of Energy Efficiency, Petroleum Conservation Research Association, Ministry of Petroleum & Natural Gas, Government of India; Energy Efficiency Services Limited (EESL) and various other institution which promote the energy auditing techniques.

The government of India passed Energy conservation Act in 2001 with the objective of reducing the energy intensity of Indian economy and the Bureau of Energy Efficiency was set up as the legal body on 1st March’ 2002 at the

central level to encourage the execution of the Energy Conservation Act. The Energy Conservation Act gives an administrative order to standards and labeling of equipment and appliances, energy conservation building codes for commercial buildings; and energy utilization standards for energy-intensive industries.

Safety and energy audit can be conducted internally or externally. Internal audit is conducted by safety committee of the organisation. External audit is either conducted by designated regulatory authority or by an outside consultancy agency.

Who can conduct safety and energy audit?

Any individual or institution who has undergone training programmes conducted by BIS (Bureau of Indian Standards), initiated by NIST (The National institute of training for standards) or by other private organisations engaged in providing training courses in this regard.

Any individual or institution who has undergone training programmes conducted by Government established BEE (Bureau of energy efficiency) can work as an energy auditor.

Who is an electrical contractor?

An electrical contractor can either be a business person or a company that provides electrical services. They are also responsible for any work that needs to be constructed in relation to a particular design and the maintenance of any electrical systems.

An electrical contractor can also be defined as a business person or firm that performs specialized construction work related to the design, installation, and maintenance of electrical systems.

An electrical contracting firm holds license issued by “Industries, Energy and Labour Department of Maharashtra”.

4. Scope of electrical contracting business –

1. Inside wiring and installation (Residential, Commercial, Industrial, tendering)
 - a. MSEB Liaisoning – New connection, Power supply, Extension of load, Change of name, Tariff change, Energy consumption bill problem
2. Transmission, distribution & installation –
 - a. Conductor installation(Tower lines/ H.T. lines – High tension lines)
 - b. Step down/Step up transformer – Oil circuit breaker, Air circuit breaker, Main transformer (step down/step up), Feeder Pillar, Distribution through circuit, L.T. lines (Low tension lines)
3. Consultancy and electrical audit
4. Repairing and maintenance
5. Services & Trading
6. Obtaining permission for generator installation from electrical inspector

The scope of the business is wide and touches each and every aspect of electricity. They have an opportunity to work as certified safety and energy auditors in upcoming period of time. As it is, their functions involve advisory services while installing electrical equipments. This can be extended to providing certified safety and energy auditing services.

[2] The report published by NICEIC, National Inspection Council for Electrical Installation Contracting, which regulates the training and work of electrical enterprises in the UK, in its report on 'Vision – 2021' (2011), the future of the electrical contracting industry gives some of the opportunities and threats faced by the industry -

Opportunities –

- 1 Increasing importance of rewiring and renovation
- 2 Increase in demand for electricians
- 3 Increase in use of domestic and industrial appliances
- 4 Need of advisory services on installations and fine tuning as an energy manager
- 5 Making use of IT and social media for advertising
- 6 Need of 'Green Energy Installers'
- 7 Increase in demand for control system
- 8 Sub - Contracting

5. Need of safety and energy audit –

- 1) Electricity is a two sided sword. It is useful but if not used with caution, it hurts. Therefore it is required to be used with all safety and security measures. Safety audit is one of the precautionary measures to ensure safety. Regular evaluation of all electrical installments and systems, replacement of destroyed parts, checking wire connections, safety by suggesting proper locations for installation of electrical systems, earthing, putting insulation on open wires, putting wooden or glass panels on electrical systems etc. are important steps in safety audit.
- 2) Energy audit is required to reduce energy cost and to save energy in the context of environment deterioration. Demand for electricity is increasing. Government wants to keep electricity consumption minimum without affecting quantity and quality of any productive activity of business and also quality of human life.
- 3) The tables, 1.1 and 1.2 [3] prove that demand for electricity has shown a notifiable increase. To meet this demand, supply is increased with increase in electricity production. Electricity is produced with nonrenewable and renewable resources. Nonrenewable resources include oil, natural gas and nuclear power. For generating thermal energy, resources like coal and wood are used. Therefore Indian Government wants to reduce dependence on thermal power and other non-renewable resources. It wants to increase production of electricity with renewable resources. Table no. 1.3 shows a remarkable shift from nonrenewable resources

to renewable resources. The aim is to make a major addition in power supply by using solar energy. This switchover can be done with an energy audit.

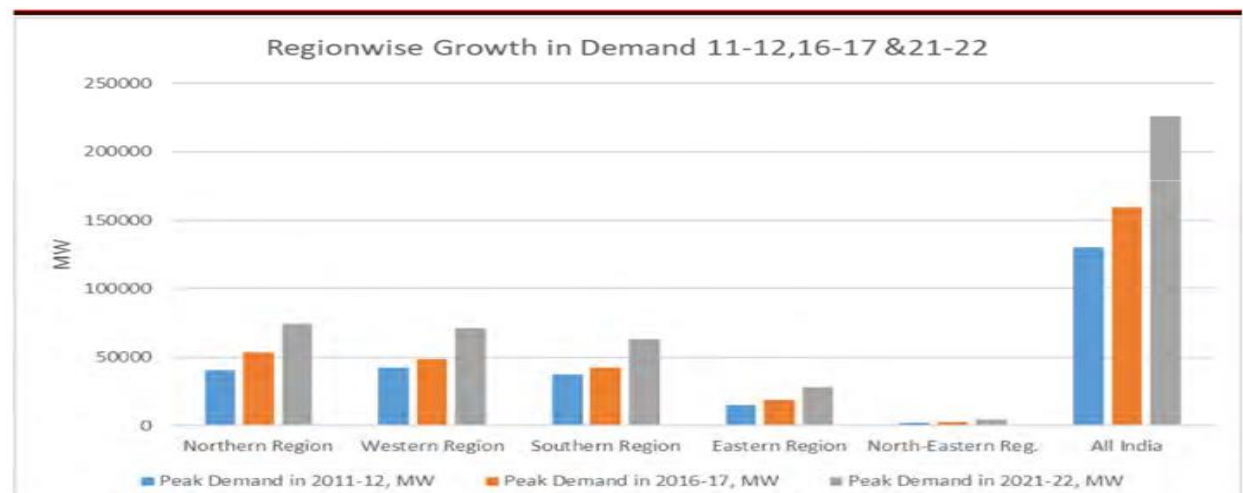


Table 1.1 *

Western Region			
State	Peak Demand in 2011-12, MW	Peak Demand in 2016-17, MW	Expected Peak Demand in 2021-22, MW
Gujarat	10951	14724	21429
Madhya Pradesh	9151	11512	15676
Chhattisgarh	3239	3875	6208
Maharashtra	21069	22516	28866
Goa	527	546	858
Dadra & Nagar Haveli	615	784	1291
Daman & Diu	301	334	426
Western Region	42352	48531	71020

Table 1.2 *

S No	Particulars	Technical	Non-Technical	Total
1	Thermal Generation	26.42	7.83	34.25
2	Renewable Generation			
	Solar	44.68	13.40	58.08
	Wind	9.32	2.79	12.11
	Biomass	2.21	0.66	2.87
3	Small Hydro	0.67	0.20	0.88
4	Hydro Generation	20.56	6.21	26.77
5	Nuclear	3.07	1.31	4.38
6	Power System			
	Transmission	3.43	1.20	4.63
	Distribution	96.46	28.94	125.40
	Total	206.83	62.37	269.20

Table 1.3 *

*(source: 13th National electricity plan, 2018)

6. Conclusion -

In India energy audit is at primary level, as compared to other countries. Bureau of energy efficiency [5] currently has empaneled 127 ESCOs (Energy saving companies). Energy Service Company (ESCO) is a company that offers energy services, usually design, retrofitting and implementation of energy efficiency projects after identifying energy saving opportunities through energy audit of existing facilities. BEE has also introduced PAT (Perform Achieve and trade) scheme under the National Mission for Enhanced Energy Efficiency mission launched by Government of India. PAT is a regulatory instrument to reduce specific energy consumption in energy intensive industries, with an associated market based mechanism to enhance the cost effectiveness through certification of excess energy saving, which can be traded.

[6] The Indian Standard Code (IS: 6665-1972) and Code of Practice for Interior Illumination (IS: 3646-1992) suggests practices of good lighting. Without disturbing lighting quality, illumination cost can be reduced by use of innovative technological advancements. LED (Light emitting diode) bulbs/elite fluorescent tubes are offered in a wide range of lights. Inhabitation sensors and light diminishing frameworks can be used to keep places lit up when it is essential. All these suggestions provided in energy audits help to reduce energy cost, leading to opportunities for electrical contractors to work as safety and energy auditors.

Above explanation gives a hint that in the upcoming period of time, electrical contractor will have an opportunity to work as **Energy advisor or Energy manager**, who will advise and provide consultancy to client on green energy i.e. use of renewable energy sources and also on energy saving.

1. The contractor also will have an opportunity to upgrade energy efficiency of existing buildings or properties.
2. There will be big demand for developing systems to minimize energy consumption.
3. Opportunity to work as energy auditors who assess energy consumption by each installed equipment.
4. Educating people on use of energy, requiring conduction of awareness programmes at schools, homes and work places. This can be driven by electrical contractors with NGOs.
5. Electrical contractors will play an influential role in saving cost of energy.
6. Legislation and a call for green energy sources, is going to make business world use of renewable energy sources, providing more opportunities for electrical contractors and other installation professionals. Electrical contractors have to take the switch over from thermal energy to solar energy, into consideration and develop human skills accordingly, for its implementation. The change also should reflect into consultancy and advices.
7. Opportunity to work as trusted advisors for residential buildings.

8. Bibliography and Webliography (references)–

- [1] Wikipedia.org
- [2] www.niceic.com 'Vision 2021 – The future of the electrical contracting industry', published by National Inspection Council for electrical installation Contracting, UK
- [3] 13th National electricity plan, 2018
- [4] Safety audit/inspection manual – OSU Chemistry
chemistry.osu.edu
- [5] beeindia.gov.in
- [6] bis.gov.in
- [7] www.researchgate.net ("Investigation of the energy audit practice in India", a research paper by Pankaj Sharma, Rewat Mahajan and Yogesh Sharma) (2018)