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MANAGING BARRIERS TO ENERGY EFFICIENCY SERVICES

1. Introduction

The growing competition in open market scenario has compelled industries to adopt cost control as one of the strategies for sustaining profitability in the competitive environment. The pie of energy cost is up to 40 % of total operating cost depending upon the nature of industry. This makes sense for many organisations to look into the aspects of energy conservation and hire energy auditors for identifying opportunities of energy conservation.

The intention of energy conservation for a company begins with change in economic environment, direction of top management, regulatory compulsions from Government and stakeholders.

The process of energy audit kicks off with good intention but many a times the findings are sealed in the bounded copy of audit reports. The factors that affects are organisational, technical, environmental, cultural and the people. The icebergs of barriers to energy services need to be addressed delicately for achieving the goal of energy conservation.

Iceberg of barriers to Energy services

2. Barriers to energy services

The process of energy services involves initiatives by industries which is generally top driven, search for suitable energy auditing firms, selection of energy auditors, initial briefing to plant personnel, process of auditing, submission of audit report by auditor, validation and acceptance of report, presentation of audit findings by auditors, payment terms contractual obligations, proposal for investment and its financial approval, lining up of designer, review of design by energy manager or experts of the company and lining up of agency for implementation, implementation of scheme. Finally it ends with test run and close out reports. The barriers of the process has been categorised and briefed as under.

2.1 Economic Environment

The economic environment is dynamic and governed by political decisions of the country and influenced by international economic environment. Since the process of implementing suggestions by auditors is time consuming for certain section of industry, many a times it happen that the good recommendations become obsolete due to change in configuration of an industry. For example a cogeneration power plant designed with naphtha and diesel as fuel during government control regime becomes economically less attractive as compared to the same system operating with gas in deregulated regime.

2.2 Organisational

The organisational barriers experienced in the industries are briefed as under.

- Non-existence of energy policy for an organisation
- Most of the companies have formal energy policy but it remains bounded in documents.
- No integration of energy management system with over all management structure of the organisation.
- Lack of top management commitment on energy management.

- The energy conservation activities are mostly investment oriented and it lacks involvement of people.
- Lack of long range strategic planning for implementing findings of energy audit
- Interdepartmental conflict within the organisation
- Difficulty in identifying clients intention before energy audit by auditors
- Exploitation of Energy Auditors
- Lack of management support for implementation of energy saving schemes
- Poor acceptance of findings of energy audit
- Post audit reviews of Energy Audit services

2.3 Technical

The technical barriers for implementation of energy audit findings are:

- Technology absorption
- Modernisation
- Retrofitting of energy saving equipments and modifications
- Operational flexibility, reliability and redundancy
- Inadequate metering system for assessing the energy consumptions level
- Lack of minimum instrumentation for metering and monitoring system
- Techno economic evaluation
- Design inefficiency leading to high cost of replacement and high payback period
- Failure or poor performance of energy saving retrofits
- Failure of energy saving schemes due to lack of expertise during implementation

2.4 Financial

- Error in estimating the potential energy saving
- No scale to estimate the professional fees of Energy Audit Services
- Contractual complications and payment terms
- The investment needed for implementation of energy saving scheme is very high.
- Lower payback period of investment
- Nature of cost benefit analysis adopted
- Saving estimated was more than the consumption
- Lack of knowledge on life cycle cost
- High investment is not considered as attractive option for energy efficiency
- Poor payment terms
- Cost of energy saving too small as compared to production cost

2.5 Cultural

The prevailing work culture and ethics at the shop floor has significant impact on the implementation of energy saving schemes.

2.6 The People

Industry experience reveals that technological solution alone do not achieve sustained energy savings in long run. Installation of high efficiency equipment does not yield desired result unless operated and maintained by the people involved. Thus the focus on people, awareness of people on energy efficiency, their values and attitudes towards use of energy and their skill and knowledge related to use of energy system has significant impact on implementation of energy saving schemes in an industry.

- Energy Audit findings treated as fault finding
- Difficulty in convincing plant personnel about findings of Energy Audit
- Exposure of operational mistakes and Design defects during Audit
- Exposure of investment decisions made in the past during the audit
- Lack of cooperation during the plant study
- Lack of Motivation in the organisation and the operating personnel
- Inadequate knowledge about the energy saving action plan by the plant people
- Resistance to change
- Poor acceptance of findings of energy audit

2.7 Energy Auditor

Some of the weaknesses of energy auditors also act as barrier to the implementation of findings during energy audit. The salient points are given below.

- Lack of expertise and resources of energy auditor
- Use of short cuts, thumb rules, assumptions and approximation in analysis leading to error in estimation of savings.
- Lack of analytical and simulation software tools
- Impractical approach for convincing plant personnel
- Comprehensiveness of report

3. Managing the barriers

The parties involved in the process of energy audit are the organisation, energy auditing firm, the people of the organisation and energy manager of the organisation who acts as co-ordinator for the energy audit. The followings are the suggestions for overcoming the barriers as above.

3.1 SWOT analysis

SWOT analysis by Organisation

The organisation intending to carry out energy audit must analyse the **strength and weakness** of the energy-auditing firm. Some of the strengths of the energy-auditing firms are proven experience, number of energy audit carried out, portable instruments and software packages used for energy audit. The success factor of energy auditor can

also be gauged from the number of successful projects implemented from the earlier audit expressed in terms of percentage success.

The weakness of energy auditor can be noticed from the analysis of failures and feed back of organisations where similar audit was carried out.

SWOT analysis by Energy Auditor

In line with the above the auditor must analyse the **opportunities and threat** in the organisations to be audited. Besides assessing the technical opportunities, the others need to be looked into are analysis of economic environment, human aspects and financial aspects. The identifying scope of energy saving is definitely an opportunity but **turning out of energy audit findings as fault finding mission would be a threat to the auditors**. The payment terms if not put forward carefully would lead to threat by blocking money for payment. The auditor must look into the balance sheet of the organisation for taking preliminary note of financial strength.

3.2 Organisational and management issues

- The **energy manager** of the organisation has to play the role of co-ordinator and need to make a presentation involving people from operation and management before start of energy audit. The intention of energy audit is to be spelt out clearly before starting of audit by auditor.
- Any audit process is looking ones face in mirror in front of others. Therefore intention need to clarified to all concerned in the plant before start of energy audit by **energy manager**.
- The organisation must have strategic planning for minimising energy consumption and the message must be propagated through out the organisation. This is the role of **top management and energy manager**.
- The energy consumption target may be included in the mission statement of the organisation and displayed at various locations and in bulletins of the organisation. This is the role of **top management and energy manager**
- Brain storming session on energy conservation may be carried out at least once in six months by involving operating and maintenance personnel of the organisation. This must be one of the key performance area of **top management.**
- Adoption of **DMAIC** principle for energy management would be helpful in minimising the barriers. This is top driven approach.

  Define the problem (area of high energy consumption)
  Measure the energy consumption in energy units and financial terms and bring into the knowledge of people at shop floor
  Act on the problem to bring down the level of energy consumption and review for further improvement.
  Improve by comparing performance (benchmarking).
  Control and sustain it after achieving optimum level.

- The organisational and management issues can be dealt by presenting opportunities to top management of organisation **by the auditor**.

- The clients intention need to be captured precisely

3.3 Technical Issues

Metering system

Check the existing metering system for adequacy and accuracy. It is better to calibrate the instruments before carrying out energy audit. The portable instruments used during energy audit should also be calibrated prior to energy audit. The essence is the thing, which cannot be measured, cannot be managed.

Simulation software
Use simulation software for validating the results of metering system.

Technology absorbed

The technology already absorbed by the organisation cannot be replaced easily. It is time consuming and need investment. Hence this fact needs to be considered during suggesting energy saving measures. Retrofitting in stages is one of the options.

Techno economic evaluation must be made before suggesting new technology. The guiding factors need to be considered are internal rate of return, NPV, payback periods.

Retro fittings and modifications

The retro fittings and modifications suggested should be practicable and financially viable.

Operational flexibility and redundancy

The redundancy should be minimised for lowering energy consumption.

Project Management Consultant

Project Management Consultant may be lined up by the organisation for successful implementation of energy saving opportunities.

Validation of Design

The ENCON projects designed must be validated by expert designer for minimising failures.

3.4 Financial and contractual issues

- The proven performance indicators like IRR, NPV must be used for economic viability of proposed ENCON schemes.
- Concept of total life cycle cost need to be applied for evaluation.

- Double accounting in estimation of saving must be avoided for mutually exclusive opportunities.

3.5 Tackling the issues of human interface

- Involvement of plant people during energy audit.
- Demonstration of leadership by energy manager and energy auditor during the audit.
- Courage of conviction by auditor and energy manager
- Presentation skill of energy auditor

3.6 Enhancing Competitiveness of Energy auditing firm

- The energy-auditing firm must demonstrate competitiveness through success story.
- Energy Servicing Company is one of the ways for demonstrating worthiness. The service provided by ESCO may include all in one umbrella like energy auditing, designing of proposed system, Project Management Consultancy and commissioning of the project on turn key basis.
- Use of software is must for attaining accuracy in estimation of energy saving potential.
- Relationship Management may be considered as one of the long term solution by the energy auditing firm.

4. Conclusion

- Both the organisation and energy-auditing firm have roles for successful implementation of opportunity identified during the audit.
- Strategic planning by organisation aiming for energy conservation is of utmost important for attaining long-term gain of cost competitiveness and environment protection.
- Involvement of people, company wide campaigning on energy conservation, awareness, accepting reality are some of the steps for spearheading implementation of energy saving schemes.
- Resistance to change need to be managed for avoiding barriers of human aspects on the way of implementing energy saving schemes.
- The energy-auditing firms have to come out with innovative ideas like team contracting and providing services under one umbrella for sustaining their business opportunities.
- Presentation skill and reporting by energy auditing firm must be specific and comprehensive.
- Energy auditing firm should be involved till successful completion of the identified projects.
- Use of **ENNEAGRAM** system for self-assessment by both the auditing firm and the organisation for self-assessment. The enneagram system is a tool, which provides insight into ones own thinking which helps in improvement in relationship and performance.