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Recommendation to improve the working relations with Energy Auditors and to over come the associated barriers

(C. Sethuraman, CSIO)

This paper deals with the barriers associated with the energy audit services and the ways to overcome the barriers by improving the working relations with the energy auditors.

It is a right time to say thanks to Bureau of Energy Efficiency for bringing the barriers associated with energy audit services through its www.energymanagertraining.com website and seeking the suitable inputs to overcome this problems. In my opinion, all the energy auditors might have exposed almost all these barriers. In fact, they are looking for a suitable place or forum to express their feelings to find out the common acceptable solution.

The detailed energy audit study requires the depth and reliable data collection, i.e., collection of equipment's specifications; production, energy consumption, fuel consumption, associated costs, actual reached demand, permitted demand and maintained power factor over a period of time.

It also requires continuous monitoring of process and energy related parameters for identifying the suitable control mechanisms. It requires to use proper range of calibrated instruments. The length of continuous measurement is depends upon the type of energy saving proposals; information required for better analysis and its quantum of savings.

Energy Audit is a banner under which one can do so many things. Now the question is, what is that so many things and it is to be defined by whom. Is it either by the company personnel or by energy auditor himself. Suppose, both sides are missing to define the specific tasks involved under energy audit banner, what will be the quality of outcome and how best the company will make use of energy audit reports.

In this competitive world, every energy auditor is putting more effort to get work order from the companies. When company invites auditors to assess the saving potential, the

percentage of saving is highly varying from one auditor to others and each audit firm is claiming their service is superior than others. It has been observed, auditors will commit saving upto 30%. Some auditors may claim more than 30% and some may say “No saving No money”.

When the specific tasks are not defined, it is upto the consultant to decide what kind of tasks he has to do. Since, time is one of the major limiting factor, auditors would rather prefer to choose some low profile tasks instead of selecting the area which calls for continuous monitoring of process related parameters like temperature, pressure, flow, speed, air velocity, relative humidity, consistency, gsm, deg. SR, pH, conductivity, and in flue gas O_2%, CO in ppm, CO_2%, SOx, Nox, Solid Particulate Matter, CH4, etc

Another reason for avoiding the critical area, the auditors may not have sophisticated instruments setup to take up complete measurements and if at all he is arranging; it may call for plant shutdown which in turn leads to production loss.

Besides, consulting firm having the capability of doing the energy study in depth manner, it is not in a position to do because of two main reasons, one is because of low quoted value and another is because of not having a common understanding / agreement with œompany about the testing procedure to be adopted during the time of detailed energy audit study especially on major energy consuming equipments.

Under this circumstance, the prepared final energy audit report will be having less information on how to implement the energy saving proposals, detailed saving calculations which includes process variations, climate change, variation on loading patterns, operating hours, name of suitable energy saving devices, its costs, facility required to implement the proposals and supplier addresses.

The energy manager who is responsible to implement the suggested proposals, often finds difficult on implementing the proposals due to time delay or process change or lack of information available in energy audit report.

It is wonder to see the attitude of few companies of their having full expectation and forcing energy auditor to bring out all hidden energy losses by putting a condition in very first day itself as “Sir, our company is not ready to invest on energy saving proposals, so please you suggest us with out any investment how to get all hidden energy losses”

The condition laid by the company on energy auditors put them under embraced situation. It is all happening only because of that the company feels, energy auditors are not having any power and they can be moulded in preparing the report as per the companies interest. In order to overcome this kind of problems, BEE has to sent a circular to all companies concerned; by explaining the power vested with energy auditors and if company is not supportive the punitive action taken against them.

Without any investment energy auditors are bound to give the following simple proposals:

- Switch of Motors, Fans, ACs and Lighting when it is not in use.

- Arrest the leakage of air, oil and steam.
- Reset loading and unloading pressure settings on air compressors.

Of course, no one can deny the saving potential existing in above mentioned proposals, but the point is, for doing this kind of small jobs, what is the need of appointing external consulting firm, the plant personnel themselves can do the same.

The success of energy audit study is fully depends up on accurate measurement and reliable input data given by the company. If the data given by the company is not correct, then the arrived energy saving conclusion based on erratic information has no value. For example, small scale industries are normally hide their actual production in order get some meager benefit from the income tax department. The production figures given by them will be less than the actual. The energy auditor can not demand from them to give the actual production. Arriving the specific energy consumption values by using the erratic production will not solve any purposes.

It may be noted that in some industries the coordinator will play double role. He gives assurance to the external consulting firm that he will provide all supports and necessary help to prepare comprehensive energy audit report. But, the same person will give indirect instruction to the plant operators who are in field not to give any information to the consulting firm.

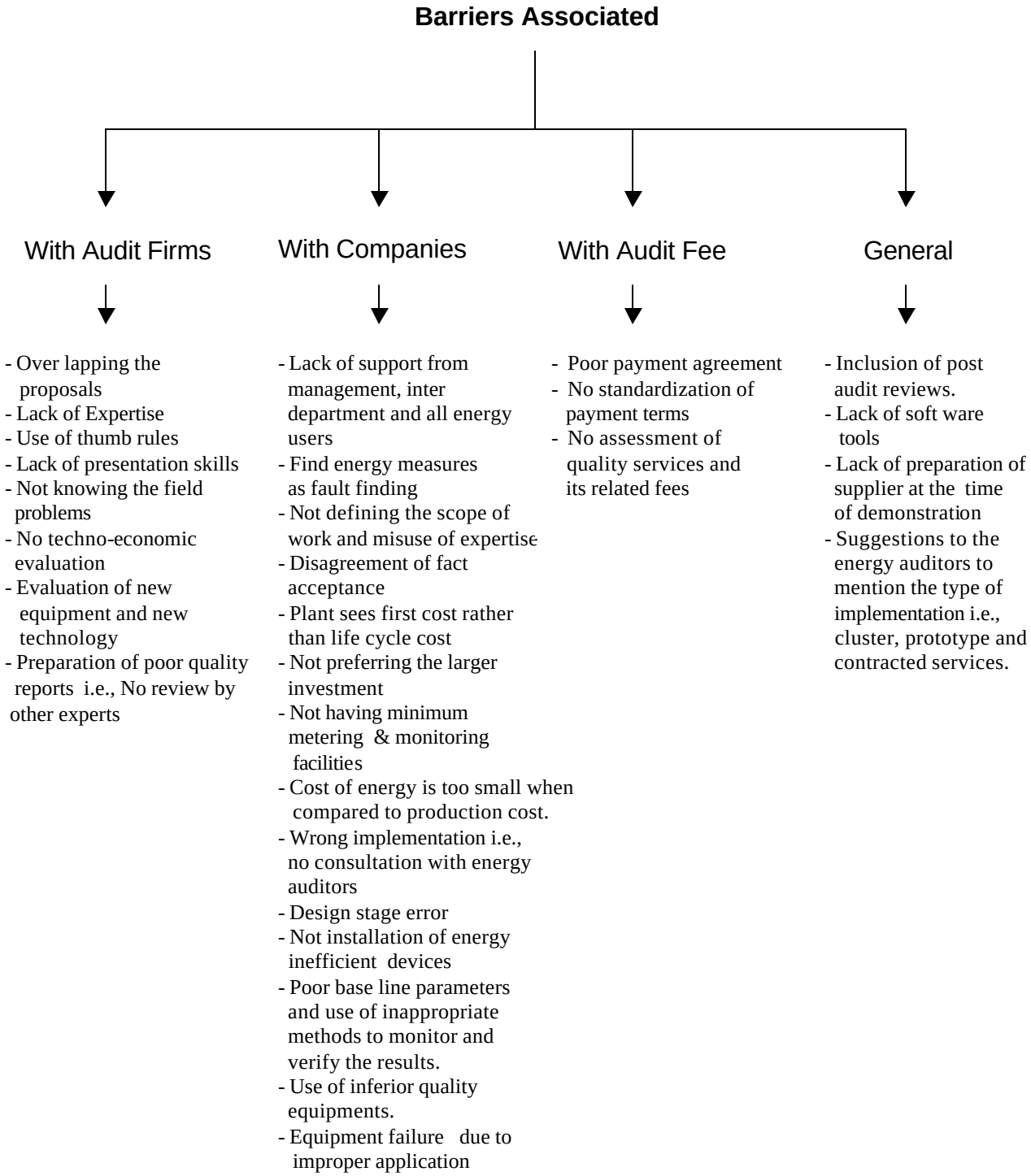
When company is not cooperative, not ready to invest money on energy saving proposals and not understanding the gravity of work involved under energy audit banner; appointing external consultant will merely be waste time to all those involved in it; of course it may fulfill the mandatory requirements.

Here the noticeable point is most of the companies are very serious in saving energy and their support to the auditors is excellent.

Barriers always be there in any field, it is applicable to the Energy Audit services also. Now, what is required is helping hand to over come these barriers to give maximum benefits to the companies and to our nation as a whole to reduce the supply and demand gap, since, “Energy Saved is Energy Produced”.

The listed barriers 28 nos. given in the energymanagertraining.com website can be broadly classified as four categories such as barriers associated with i) Energy Audit Firms ii) Companies iii) Non standardization of audit fee and iv) General categories.

The barriers listed in the web site and its appropriate categories is given in the following line chart.


Barriers Associated
With Audit Firms
- Over lapping the proposals
- Lack of Expertise
- Use of thumb rules
- Lack of presentation skills
- Not knowing the field problems
- No techno-economic evaluation
- Evaluation of new equipment and new technology
- Preparation of poor quality reports i.e., No review by other experts
With Companies
- Lack of support from management, inter department and all energy users
- Find energy measures as fault finding
- Not defining the scope of work and misuse of expertise
- Disagreement of fact acceptance
- Plant sees first cost rather than life cycle cost
- Not preferring the larger investment
- Not having minimum metering & monitoring facilities
- Cost of energy is too small when compared to production cost.
- Wrong implementation i.e., no consultation with energy auditors
- Design stage error
- Not installation of energy inefficient devices
- Poor base line parameters and use of inappropriate methods to monitor and verify the results.
- Use of inferior quality equipments.
- Equipment failure due to improper application
With Audit Fee
- Poor payment agreement
- No standardization of payment terms
- No assessment of quality services and its related fees
General
- Inclusion of post audit reviews.
- Lack of soft ware tools
- Lack of preparation of supplier at the time of demonstration
- Suggestions to the energy auditors to mention the type of implementation i.e., cluster, prototype and contracted services.

In my opinion, to over come the barriers listed above and to improve the working relations with energy auditors the following procedures or guidelines are to be adopted:

Procedures to be followed by Energy Auditors themselves to improve the working relations with other auditors and with user companies

- Energy Auditors should avoid degrading the others services and telling to the user companies that other auditors are not having that much capability as you have.

- Energy Auditors should avoid sending the ready made questionnaire having 20 to 30 pages to all type of industries. They should see that the prepared questionnaire is most relevant to the concerned company only. It is better, auditors can visit (i.e., preliminary energy audit) to the company to prepare the suitable questionnaire and frame out the scope of work. Whatever terminology, company is using, the same terminology should be used in the questionnaire.

- Energy Auditors should keep calibrated instruments set up with data loggers.

- They should carefully evaluate the proposals which are over lapping in nature.

- They have to consider the field problems. If the expected saving from the particular proposal is very attractive and because of field conditions it can not be implemented, auditors can sit with plant personnel and try to understand the field problems to find out the suitable alternative solutions for the same.

- Some of the energy auditors in the auditing team may have lack of expertise, it should not be treated as very seriously, since, energy audit requires knowledge from different fields and more practical experience. Expertise will come by experience. The consulting firm must have more industrial experienced persons with them.

- Energy Auditor has to acquire the knowledge of different industrial process, functioning of controls, equipments used, type of energy saving devices available in the market, its working principles and its price information, identification of suitable agency to assist the plant personnel at the time of installation etc.

- Use of thumb rules; assumption and consideration is unavoidable during the time of report preparation, but it should be realistic, acceptable and it should be based on the previous results obtained by adopting systematic and standard procedures.

- Submit the draft report to the company; asking their comments on your findings.

- Their comments are to be considered carefully and if there is a doubt or readings are not reliable, better to repeat the measurement exercise.

- Care should be taken to give techno-economic analysis considering interest on investment, taxes associated with investment, depreciation etc.

- Prepare the report in such a manner that the message should reach all concerned and keeping in mind that it will be read by technical, non technical and financial background persons.

- All energy auditors working in the same consultancy firm should go through the report before finalysing it.

- The methods of implementation and procedures of taking measurement before installation is to be clearly mentioned in the report to create authentic base line data.

- Final presentation should be given by the senior persons who having powerful communication skills.

Tips to the Energy Auditors

1. Very first day in the field, call for meeting with all top level persons who are the in charge of section wise process, total production, utility, electrical, maintenance etc.

2. Tell them very clearly that you have been appointed to serve to their company to bring down the tangible and intangible energy losses and you are in need of their full support and help to achieve the same.

3. Tell to the company that the out come of the findings should not be treated as fault findings and management should not blame anybody for the present energy losses.

4. Divide the entire plant in to different sections as they named and identify the suitable person from each section to coordinate. He will be named as the champion of that section. When ever audit team visits to his section, the champion has to coordinate and make all necessary arrangement to take the reliable measurements. The champion of each section should work with audit team till the audit team brings out some useful energy saving proposals from his section.

5. Prepare the energy saving concepts and get approval from the management.

6. Tell to the management to make an announcement that if the concept brings very attractive energy saving proposals, company will not hesitate to implement the same. If the proposals are implemented and saving achieved, the company will suitably reward the champions who have associated with the energy auditors to

bring out such useful proposals. It will really boost the field persons to extend his full support to the audit team.

7. Interact with plant personnel to understand the factors which contribute for excess energy consumption.

8. Draw the line chart of Production Vs Energy for a whole plant / each section / major energy consuming equipments over a period of time to find out the level of excess energy consumption at the time of no production or low production.

9. Discuss with them, of various methods to be attempted to bring down the level of excess energy consumption at the time of no production or low production.

10. Understand the existing instruments used for energy recording and its present working conditions if they are not showing the correct readings, ask company to replace them immediately. For your study, use the calibrated instruments.

11. Identify the proper measurement locations, if the proper location is not available inform to the company for the arrangement.

12. Work out the procedures to be adopted to evaluate the performance of each major energy consuming equipments.

13. Identify the suitable energy saving devices after doing thorough study and evaluate the new equipments or new technologies available in the market before recommending their use.

14. It is required to do the proper analysis before giving the proposals, for example, to give the proposal on "How to assess the financial attractiveness of switching to a variable speed drive" energy auditor has to follow the 6 steps procedures given by Dr. A. Kaupp in www.energymanagertraining.com web site. This kind of approach is needed for all energy saving proposals.

15. Involve the energy saving supplier at the time of preparing the proposals but don't be biassed.

Procedures to be followed by the Companies to improve the working relations with Energy Auditors

- The company has to support the energy auditors at all level to conduct comprehensive energy audit study.

- The Chief of the plant has to circulate the internal note to all departmental heads to provide necessary support and help to the external audit team and the management will not treat energy audit measures as fault findings.

- If possible, try to define the scope under energy audit banner. Since, energy audit is a vast area, please, don't give the chance to auditors to decide themselves. Otherwise, they may visit your plant for shortest period and do the selected easy jobs. Since, they know the art of preparing the report, they can prepare in a nice way without putting much effort and the result produced by them will not solve any purposes. If the specific task under energy audit banner is not defined, company may have to loose the working relationship with the energy auditors.

- If company is not defining the scope of work, it can consult with local auditors to help them. It is up to the company to release the work order either to local auditors who have helped the company to define the scope of work or to the new auditors. But, the company should bear the expenses of local auditors to meet their TA/DA expenses. It will boost your working relationship with the auditors.

- Try to accept the fact and provide the genuine information to the auditors, please note that the auditors are working for your benefits.

- It is better to see the life cycle cost instead of first cost. If the cost of energy efficient motors or other energy efficient equipments is slightly higher than the energy inefficient equipment better to go for energy efficient equipment.

- Consider the installation of energy efficient equipments at design stage itself.

- The energy cost may be too small when compared with production cost in some of the industries or building establishment, it does not mean that the company or building establishment should not go for energy audit study. Energy audit services will certainly benefits the industries or building establishments when compared with production cost.

- Before doing any implementation, consult with your auditors and find out the decision taken is correct or not. Avoid using inferior quality equipments and using at improper applications.

- At the time of designing the equipment, don't give enough margins. It is always better to consult the design engineers who are in the field of energy conservation.

- To quantify the saving, company should have the minimum metering facilities.

- Company can opt for On-line Energy Monitoring System (EMS). It will help both the company and auditors to use the information obtained from EMS as base line reference. Having on line energy monitoring system will really boost the working relationships with the energy auditors.

- It is very much important to have the accurate and authentic base line data to evaluate the system performance or to quantify the saving benefits before and after

implementing the proposals. It will help plant personnel to quantify the saving achieved and there will not be any contradiction on the procedures adopted.

It is worth to point out my personal experience here to understand how the monitoring system will play a vital role to justify the savings achieved. Tamil Nadu Water Supply and Drainage Board (TWAD Board) has done the Corro coating on vertical turbine pumpsets installed at Pillur CWSS. There are totally 12 pumpsets (i.e., 435HP and 400HP 6Nos each) are installed at head works and in treatment plant. The corro coating work was given to the reputed pump manufactures and TWAD board has spent about Rs. 25.0 lacs for this purpose. Pump manufacture has assured minimum 2% energy saving. In order to see the performance before corro coating, the flow, Voltage, Current, Power in kW measured at one time i.e., not in continuous basis.

When they have measured power after corro coating it was higher than the previous. The supplier has claimed, it may be because of more flow / higher frequency / changes in suction and delivery heads and due to some other unknown facts. The site engineers are feeling that pump performance is improved after coating, but they found difficult to justify to the board on why pumps are taking more power after inner coating.

In my opinion the above problem could have been averted if the arrangement would have been made for data logger to monitor i) Flow ii) Suction Head iii) Delivery Head iv) Voltage v) Current vi) Power v) Frequency and vi) Operating hours for at least one day before and after corro coating.

- Company should not put any condition on energy auditors by asking them to identify only those proposals which are not calling for investment.

- Give full freedom to auditors to work out all possible proposals. If a proposal are attractive and requires larger investment, no need to bother about the larger investment, it can be implemented at appropriate time and even with the help of some ESCO companies. The State Bank of India has come forward to help the industries by providing the loan upto 100 lacs for implementing the energy saving proposal calls for larger investment. The information is available in www.energymanagertraining.com website.

- In order to improve the working relationship with energy auditors, company should provide the good working setup to the auditors (i.e., providing a small working room

with tables, chairs, computer with safety logger to keep their instruments. If internet facility is available this facility also may be given to the auditing firms. It will really help the auditor to work more for you.

Tips to the Companies

1. Identify the suitable energy auditing firm by knowing their previous experience, qualification of each team members and their achievement in the field of energy conservation.

2. Selection of energy auditing firm based on lowest quotation does not mean that the selected firm will deliver the same output as of others who have quoted more than selected firm.

3. It may happen some time that the auditing firm quoted for lower value might have deliver more output then that of others who have quoted higher. The result of energy measures is fully depends upon the analytical skill of individual team members involved in it.

4. The auditing firms, supported by the government normally charge less than private firms and deliver the good results.

5. Some auditing firm may fluff the company that they are having all the instruments to be used for comprehensive energy audit study. But, company should not believe it at all. Company should ask the list of instruments available with auditing firms and its working range and the status of calibration.

6. Company should note that the energy audit charge is mainly depends upon the instruments to be used in the field. If consulting firm has given lower offer but not having the required instruments setup, it is better to the company that it should not engage such consulting firm.

7. The selection and designing of the measuring devices by the energy auditors is mainly depends upon the input given by the company personnel and hence give more reliable information to the auditors.

8. If the given input information is wrong; then the auditor may be selecting the wrong measuring devices and the readings taken by the wrongly selected instruments will be in confuse nature and it will be very difficult to arrive the right conclusion.

For example, if company wants to measure the flue gas quantity, it has to specify the name of the fuel used, parameters to be measured, rate of fuel consumption, temperature range, pressure range i.e., DP value, chimney height, chimney dimension, wall thickness, height of the measurement point, size of hole to be used to insert the probes, location of dampers if any etc. The above information will help the auditors to choose right instruments with suitable temperature probes. If the temperature is more than 1000^{o}C and available DP is about 3 mm H_2O, the company has to indicate this figures to the auditors, it will help them to bring the suitable temperature indicator with

digital micro manometer range upto 10 mmH_2O with 0.01mm accuracy. If the information is not given the auditor may choose some other temperature indicator; its probe can not withstand at the higher temperature and pressure meter having higher range of up to 10000 mmH_2O and some time he may bring the pressure meter which is not showing pressure reading in mmH_2O.

9. Company may choose the local consulting firm as an external agency, it will be more convenient to the auditing firm and the company in many ways.

10. Company should always try to maintain the good working relationship with energy auditors.

Procedures to be followed by Energy Auditors and Companies on audit fee to improve the working relations with each other.

- As it has been rightly pointed out in the www.energymanagertraining.com web site, there is no standardization on energy audit fee. Of course the rate will vary from one consultant to another consultant and it depends upon many factors such as i) No. of persons involved ii) Type of instruments used iii) Man day charge iv) No. of days required to be spent at site and office v) TA/DA boarding and lodging vi) Other incidental expenses etc.

- The company should not adopt the procedure of selecting the consulting firm who has submitted the lowest offer. Irrespective of the rate, company should select the suitable consulting firm.

- Here, I would like to forward my suggestion to all energy auditors to avoid preparation of poor payment agreement. Mentioning as, some % of saving will be collected as audit feel will really complicate the issue. The auditors should adopt simple procedures. There should not be any ambiguity in understanding the terms and conditions.

- Energy auditor has to clearly mention the type of work he is going to do and cost involved on it. It will help the company to assess the quality service and differentiate one from others.

- Energy Auditor may consider the following simple procedure at the time of preparing terms and conditions.

Sample terms and conditions

- ***The total energy audit fee in lump sum is Rs. 1,00,000 (Rupees One lakh only). The service tax 8% will be charged extra.***
- ***50% of the study fee to be released in advance by DD or Local cheque in favour of the Director, CSIO, Chennai along with the work order.***
- ***Balance 50% of the amount is to be released after submitting the final energy audit report in two copies.***
- ***We will depute two of our scientists for the detailed energy audit study; company has to provide local conveyance, lodge and boarding facilities to them.***
- ***Train Tickets IIAC (from Chennai to Dhanbad and back), for the scientists deputed shall be arranged by the company.***
- ***Company has to nominate one senior person as a coordinator and the necessary support and help is to be provided to our staff at the time of measurement.***
- ***The date of visit to the company shall be mutually decided after receiving the work order. The report will be submitted with in a month from the date of completing the measurements at site.***
- ***All correspondence should be addressed to Scientist-in-Charge, CSIO, CSIR Madras Complex, Taramani, Chennai - 600 113***

Guidelines to over come the barriers associated with general categories.

- As per the survey, 20% of the energy saving measures is not implemented due to various reasons such as change in process parameters, increased capacity, sizing & sourcing, operational problems etc. The suggestion is given in barrier # 27 regarding the inclusion of post audit services is really well appreciated and it can be treated as a guidelines to over come the non implemented proposals. It will really help the consultant to become more practical and increase the business potential.

- The use of software tools will significantly reduce the report preparation time. The problem associated with the present available software tools is giving input. It is really time consuming and most of the information it asks is very difficult to get from the plant personnel or not easily obtainable from the outsource. The software available in the market is highly theoretical in nature.

- Instead of having two general software tools i.e., one for electrical application and another for thermal application for all type of industries i.e., Textile, Cement, Sugar, Dairy, Pulp & Paper, Steel, Petrochemical, Pharmaceutical, Glass, Ceramics, Solvent Extraction etc, it would be more appropriate and effective to have a separate software tools applicable to individual industrial sectors OR applicable only to that identified company.

- The software developer should consult with both energy auditors and energy manager appointed by the company. The developer should keep in mind that the required data to be given as input should be easily obtainable either from plant personnel or outsource. In case, if the required data is not obtainable, what are the alternative methods auditors have to do should be clearly mentioned in the software itself.

The lack of preparation by the supplier of energy saving devices

Though, it is not in the list of barriers, I feel, it is also a barrier associated with energy audit services. To justify, I give the following personal experience.

One of the suppliers of energy saving devices approached us to demonstrate their product. We have arranged the demonstration at Ranipet based engineering industry. Our energy audit team went earlier to site, the next day the supplier has brought two energy saving devices along with other installation engineers. After reaching the site, the supplier has informed to us and company that the device is not suitable for slip ring induction motors and it is suitable only for squirrel gauge induction motors. In fact, the company has so many slip ring induction motors. Later, we have identified one squirrel gauge induction motor in 7.5 TR packaged AC unit.

Our energy audit team has installed Power Analyser to record all the electrical parameters such as Voltage, Current, kW, kVA, kVAr, P.F, Hz. After recording the data for an hour, we have asked the supplier to install their energy saving device. Only at

that time, the installation engineers noticed, the available coil in the starter is 440V range, but they need 220V coil to connect their device, unfortunately there is no 220V coil available inside the plant. The whole day went for searching 220V coil, since they could not get it, the supplier has returned to Chennai along with his installation engineers.

Here, the message learnt is there is lack of preparedness by the supplier, i.e., when he is bringing the costly products with all difficulties to the site, he should have brought the required accessories to be used at the time of installation. He should not have expected that the required accessories will be available at site itself OR he should have informed about his requirement to the energy auditors or to the company before he proceeds to the site.

- The success of any energy audit depends up on the implementation of measures and realization of energy savings. Since, the energy audit services do not cover the various implementation strategies which in turn result in poor implementation. The energy auditors may apply the various types of implementation strategies such as i) Cluster implementation ii) Prototype implementation and iii) Contracted services.

- For example, if a small unit wants to conduct energy audit and approaches a reputed consulting firm then the audit charges may be pay more. If, group of same type of units get together and approaches the consulting firm to take up the energy audit services of all units by charging suitable amount from each. The consulting firm may come forward. This kind of cluster approach give benefits to energy auditors as well as to the companies.

- Now the small and medium industries are realizing the importance of cluster programs. Due to globalisation, cluster will only provide sustainability to small and medium industries of developing countries.

- The Small Industries Service Institute (SISI), Chennai is working for the promotion of small and medium enterprises is working in the Cluster Development Programme along with United Nations Industrial Development Organisation (UNIDO).

- This kind of cluster approach in business will benefit all and implemented not only for energy audit services but also for any services, it may be for implementing the proposals / use of contract services / purchasing raw materials etc. In Tamil there is a proverb “Koodi Vazhnthal Kodi Nanmai”. The simple meaning is if you live together, you will get more benefits.

Conclusion

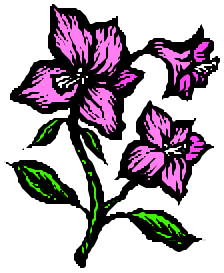
- In order to improve the working relations with Energy Auditors, there should be a complete transparency between auditors and user industries.

- Company should nominate a senior person for coordination as well as responsible persons from each section (champions) to facilitate uninhibited interaction with energy auditors.

- The energy auditor should document the approach to be adopted for conducting the energy audit and it should be circulated to the coordinator and other nominated persons.

- The energy auditor should prepare the format for data collection in such a way that it can be easily understood by the user industries and the format should contain the user industries specific terminology.

- Terms and conditions should be clearly spelt out and there should not be any ambiguity in understanding it.



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