

Energy Accounting and Audit : The path to better energy conservation and energy management.

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Key concepts : Energy Accounting, Energy Audit Energy as a resource, efficiency in use and consumption of energy and conservation of resources, energy management.

Executive Summary :

The power sector is facing a number of issues and a lot needs to be done to satisfy the growing energy demands of urban and rural India and meet the Millenium Development Goals set by UN. Energy Accounting and Audit are effective tools which can help economize on consumption of power as well as saving wastage and misuse of energy, thereby reducing energy costs making existing energy resources go a longer way and reducing the environmental damage/footprint caused by energy generation harnessing and use

The author introduces the concept of energy accounting and explains how it can be effectively used for better Energy management.

Energy Accounting :

Energy Accounting in simple terms, is a system (whether computerized or not), to record, analyze, report and act on energy consumption and energy costs of an organization on a regular basis.

Energy Accounting thus enables an organization to collect data regarding power consumption and usage, power costs and associated expenses over a period of time. This data serves as an effective tool for analyzing energy usage patterns, optimization and load balancing, identifying and minimizing energy losses, monitoring energy costs and thereby ensuring better energy management.

The information collected is understandable and useful for decision making in terms of improving performance, identifying leakages, deciding on staggering, selective switching off and prioritizing capital improvement projects.

Need for Energy Accounting :

Recording and Accounting for energy consumption and cost:

Energy costs are directly proportional to the amount of energy consumed and the cost per unit of energy. Recording and accounting energy costs is necessary to account for, compare and monitor energy usage.

Energy Leakages and abnormal costs:

Energy accounting enables organizations to identify excessive energy consumption, abnormal energy usage and excessive billing and errors or mistakes in billing thereby ensuring better control and management.

Capital Budgeting decisions :-

Energy optimization and management program and projects entail incurring heavy capital costs. The resultant benefits can be recorded and monitored by Energy Accounting. This enables organizations to rank and help select projects on the basis of return on investment and payback period rather than on mere guesswork, thereby improving the decision making process.

Evaluating energy efficiency programs and energy conservation efforts:-

Energy accounting enables organizations to put in place a system of evaluating the ongoing efforts at energy conservation and effectiveness of efficiency programs in terms of reduction in energy usage and savings in energy costs.

In fact savings can be recorded, determined and communicated to the concerned stakeholders and decision makers for each individual program, initiative, capital expenditure or energy saving step, separately.

e.g. If it is decided to switch off the glow signs at 11.00 p.m. instead of 12 p.m. at night what will be the resultant energy and cost saving would be easily determined and reported with energy accounting in place.

If alternate tube light in the corridor in an office facility is not lighted, the resultant energy and cost saving can similarly be identified and reported.

If an old worn out electric motor of a booster water pump that lifts water into the overhead storage tanks is replaced with a new energy efficient pump, the resultant energy and cost saving can similarly be determined.

In fact it is possible to calculate the actual savings and compare them with manufacturers claims, projections by the organization, and case studies of other units/organizations enabling a bench marking for better implementation.

Rewards and deterrents:

Energy management requires that energy saving and efficiency is rewarded and promoted and wastage of energy and inefficiency is penalized and discouraged.

Energy Accounting enables organizations to create a framework of incentives to reward management and staff who effect tangible energy and cost savings.

Projecting demand and energy requirements:

Having an energy accounting system in place enables organizations to predict and project energy demand over the year at different points of time, enabling them to obtain/lock in adequate supply at best prices.

Energy Accounting ranges from manual accounting – suitable for small organizations typically having less than 50 employees and operating from one premises to computerized spread sheet programs, suitable for larger organization, to the use of commercial energy accounting software for large organizations with many facilities at multi location with multi activity, dynamic units.

There is no one size or solution that is a best fit. The choice depends on each organization, the depth to which they wish to go and the objectives behind the exercise.

Energy Accounting Methods:

- 1) Variations in energy consumption, usage and associated costs are generally caused by changes in and effect of weather – heat, cold, humidity, winds, seasonal changes, localized phenomenon, global climatic changes etc.
- 2) Variations also occur due to changes in location or area of the buildings/premises used by the organization eg. Acquisition of a new office premises or changing the location are bound to affect energy consumption and billing.
- 3) Change in schedules, timings of operation and nature of services and activities also affect energy usage.
Eg. Changing of office timings to start and end the day early in winter will reduce energy use and costs in respect of ambient lighting needs/requirements in an office facility having access to natural light.
- 4) Changes in and modifications to processes equipment, machinery and infrastructure also affect energy use.

Eg. Moving from local air conditioning to central air-conditioning is one example.

The different methods used for energy accounting enable organizations to understand record and analyze the basic data relating to energy costs.

At one end it measures energy – natural gas, electric, coal, steam, other fuels that may be used by the organization.

The other end is to account for measure and report the variations in energy consumption due to factors discussed above.

The commonly used methods are :-

Comparison with historical data :

The energy use is recorded every month. The same is compared with the same period – day, week, month, quarter, half year, year of the previous periods.

Multiple year averages :

The energy use of the current period is compared with average energy use of same period over past three, five or more years. Thus rather than comparing the figure with immediately previous period it is compared with an average, which evens out variations due to climatic and other local conditions.

Square footage and temperature corrections :

The data is adjusted for temperature variations between current data and the reference data with which comparison is being made. For this the weather data is also required to be compiled and change in energy usage due to change in weather (temperature) is eliminated before comparison is made.

Similarly, change in area/building space covered/used is also eliminated before comparison is made to get accurate results.

Future Outlook:

Sophisticated commercial software that attempts to capture and incorporate data re: organization, site, physical locations and infrastructure, climatic records and other inputs based on tracking of usage within facilities and departments by using meters for a drilled down view, will enable better accounting and monitoring leading to more meaningful comparisons of energy usage between periods leading to better energy management.

Such packages provide data regarding changes in fuel/energy consumption, changes in energy costs, rupee cost per area, rupee cost per person, per facility and so on

These outputs/results enable the organization to verify savings from energy efficiency measures, motivate staff to manage energy costs, enable setting cost saving and energy consumption goals, help troubleshoot abnormal usage/costs, identify and remedy billing mistakes and plan and negotiate for energy deals over future time periods.

Data is also presented in the form of graphs and charts which helps quicker, better appreciation and helps in decision making due to user friendliness.

Examples of Energy Accounting Software currently available and in use are FASER (Fast Accounting System for Energy Reporting), METRIX, THE UTILITY MANAGER, etc.

Epilogue

With energy supply becoming irregular at times, looming energy shortages on the horizon and given volatile energy prices, energy has become a key resource creating a need proper energy accounting and reporting.

The key is to understand that improper accounting would lead to poor energy management, hence the need for proper resource accounting as outlined above.

Emerging Issues :

The use of energy accounting has thrown up issues and revealed significant aspects like anonymous energy consumption, energy leakages and pilferage and implementation issues.

Implementation issues include question relating to accuracy of energy estimation on the accounting side and people issues on the implementation side.

The most important stumbling blocks in implementing energy accounting is the failure to obtain employee buy-in. Without staff commitment and time, energy usage and relevant data never goes into the system leading to failure of accounting. Similarly, results once obtained need to be communicated to the right people at the right time for taking appropriate steps to make required change in schedules, timings, activities and operating procedures as well as for capital budgeting.

Used in this manner energy accounting will enable the organization to understand and plan energy usage and take appropriate steps both in the short and long term to significantly reduce energy consumption and costs and promote better energy management.

Future Outlook :

Energy accounting will have to grow beyond gathering of actual financial and operational data into a comprehensive model that looks at relationships between resources (energy), cost drivers and cost objects.

It will also have to look at resource capacity, resource costs, resource alternatives and resource inter dependencies between departments, units, locations and organizations. One final word of caution is that the solution will always have to look at capacity and its utilization more than managing the cost, as in case of energy as a resource, the key to effective energy management lies in capacity management.

Energy Audit :

Energy Audits involve a survey, review and analysis of energy using systems within an organization and is a logical extension and a next step after implementing an energy accounting system.

Both these when implemented will support an energy efficiency, conservation and management program that will promote energy efficiency at all levels and provide a systematic approach to realize long term energy and cost saving benefits in an organization.

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