A

Seminar report

On

Energy Management System

Submitted in partial fulfillment of the requirement for the award of degree
of MBA

Acknowledgement

      I would like to thank respected Mr…….. and Mr. ……..for giving me such a wonderful opportunity to expand my knowledge for my own branch and giving me guidelines to present a seminar report. It helped me a lot to realize of what we study for.

Secondly, I would like to thank my parents who patiently helped me as i went through my work and helped to modify and eliminate some of the irrelevant or un-necessary stuffs.

Thirdly, I would like to thank my friends who helped me to make my work more organized and well-stacked till the end.

Next, I would thank Microsoft for developing such a wonderful tool like MS Word. It helped my work a lot to remain error-free.

Last but clearly not the least, I would thank The Almighty for giving me strength to complete my report on time.

Preface

I have made this report file on the topic **Energy Management System**; I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude to …………..who assisting me throughout the preparation of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

Introduction

An **energy management system** (**EMS**) is a system of computer-aided tools used by operators of electric utility grids to monitor, control, and optimize the performance of the generation and/or transmission system.

The computer technology is also referred to as SCADA/EMS or EMS/SCADA. In these respects, the terminology EMS then excludes the monitoring and control functions, but more specifically refers to the collective suite of power network applications and to the generation control and scheduling applications.

Manufacturers of EMS also commonly supply a corresponding dispatcher training simulator (DTS). This related technology makes use of components of SCADA and EMS as a training tool for control centre operators. It is also possible to acquire an independent DTS from a non-EMS source such as EPRI

Energy management systems are also often commonly used by individual commercial entities to monitor, measure, and control their electrical building loads. Energy management systems can be used to centrally control devices like HVAC units and lighting systems across multiple locations, such as retail, grocery and restaurant sites. Energy management systems can also provide metering, submetering, and monitoring functions that allow facility and building managers to gather data and insight that allows them to make more informed decisions about energy activities across their sites.

What is energy management?

"Energy management" is a term that has a number of meanings, but we're mainly concerned with the one that relates to saving energy in businesses, public-sector/government organizations, and homes.

The energy-saving meaning

When it comes to energy saving, **energy management is the process of monitoring, controlling, and conserving energy in a building or organization**. Typically this involves the following steps:

1. Metering your energy consumption and collecting the data.
2. Finding opportunities to save energy, and estimating *how much* energy each opportunity could save. You would typically analyze your meter data to find and quantify routine energy waste, and you might also investigate the energy savings that you could make by replacing equipment (e.g. lighting) or by upgrading your building's insulation.
3. Taking action to target the opportunities to save energy (i.e. tackling the routine waste and replacing or upgrading the inefficient equipment). Typically you'd start with the best opportunities first.
4. Tracking your progress by analyzing your meter data to see how well your energy-saving efforts have worked.

To confuse matters, many people use "energy management" to refer specifically to those energy-saving efforts that focus on making better use of *existing* buildings and equipment. Strictly speaking, this limits things to the behavioural aspects of energy saving (i.e. encouraging people to use less energy by raising energy awareness), although the use of cheap control equipment such as timer switches is often included in the definition as well.

The above four-step process applies either way - it's entirely up to you whether you consider energy-saving measures that involve buying new equipment or upgrading building fabric.

Why is it important?

Energy management is the key to saving energy in your organization. Much of the importance of energy saving stems from the global need to save energy - this global need affects energy prices, emissions targets, and legislation, all of which lead to several compelling reasons why you should save energy at your organization specifically.

The global need to save energy

If it wasn't for the global need to save energy, the term "energy management" might never have even been coined... Globally we need to save energy in order to:

- Reduce the damage that we're doing to our planet, Earth. As a human race we would probably find things rather difficult without the Earth, so it makes good sense to try to make it last.
- Reduce our dependence on the fossil fuels that are becoming increasingly limited in supply.

Wind turbines can only do so much - we humans use a *lot* of energy!

Controlling and reducing energy consumption at your organization

Energy management is the means to controlling and reducing your organization's energy consumption... And controlling and reducing your organization's energy consumption is important because it enables you to:

- **Reduce costs** – this is becoming increasingly important as energy costs rise.
- **Reduce carbon emissions** and the environmental damage that they cause - as well as the cost-related implications of carbon taxes and the like, your organization may be keen to reduce its carbon footprint to promote a green, sustainable image. Not least because promoting such an image is often good for the bottom line.
- **Reduce risk** – the more energy you consume, the greater the risk that energy price increases or supply shortages could seriously affect your profitability, or even make it impossible for your business/organization to continue. With energy management you can reduce this risk by *reducing* your demand for energy and by *controlling* it so as to make it more *predictable*.

On top of these reasons, it's quite likely that you have some rather aggressive energy-consumption-reduction targets that you're supposed to be meeting at some worrying point in the near future... Your understanding of *effective* energy management will hopefully be the secret weapon that will enable you to meet those aggressive targets...

How best to manage your energy consumption?

We identified four steps to the energy-management process above. We'll cover each of them in turn:

1. Metering your energy consumption and collecting the data

As a rule of thumb: the more data you can get, and the more detailed it is, the better.

The old school approach to energy-data collection is to manually read meters once a week or once a month. This is quite a chore, and weekly or monthly data isn't nearly as good the data that comes easily and automatically from the modern approach...

The modern approach to energy-data collection is to fit interval-metering systems that automatically measure and record energy consumption at short, regular intervals such as every 15-minutes or half hour. There's more about this on our page about interval data.

Detailed interval energy consumption data makes it possible to see patterns of energy waste that it would be impossible to see otherwise. For example, there's simply no way that weekly or monthly meter readings can show you how much energy you're using at different *times of the day*, or on different *days of the week*. And seeing these patterns makes it much easier to find the routine waste in your building.

2. Finding and quantifying opportunities to save energy

The detailed meter data that you are collecting will be invaluable for helping you to find and quantify energy-saving opportunities. We've written an article that explains more about how to analyze your meter data to find energy waste.

The easiest and most cost-effective energy-saving opportunities typically require little or no capital investment.

For example, an unbelievable number of buildings have advanced control systems that could, and should, be controlling HVAC well, but, unbeknown to the facilities-management staff, are faulty or misconfigured, and consequently committing such sins as heating or cooling an empty building every night and every weekend.

*(NB "HVAC" is just an industry acronym for **H**eating, **V**entilation and **A**ir Conditioning. It's a term that's more widely used in some countries than others.)*

And one of the simplest ways to save a significant amount of energy is to encourage staff to switch equipment off at the end of each working day.

Looking at detailed interval energy data is the ideal way to find routine energy waste. You can check whether staff and timers are switching things off without having to patrol the building day and night, and, with a little detective work, you can usually figure out who or what is causing the energy wastage that you will inevitably find.
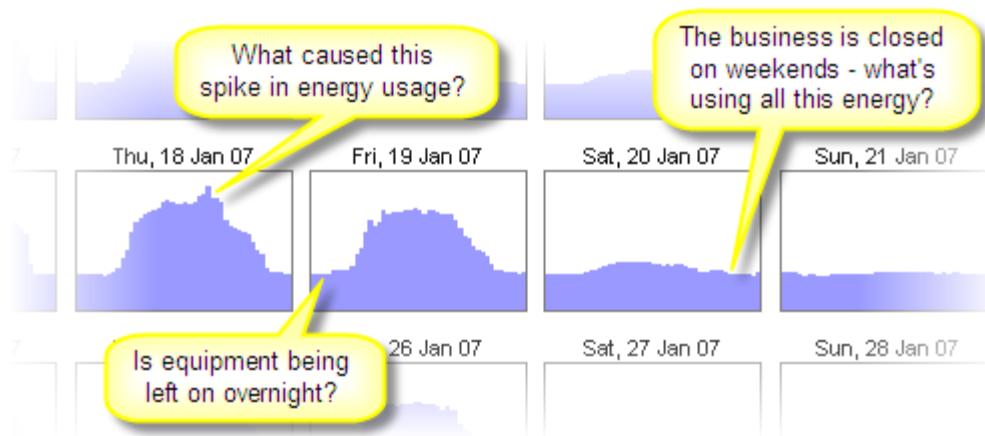
Detailed energy data is the key to finding the easiest energy savings
(chart created using Energy Lens software)

And, using your detailed interval data, it's usually pretty easy to make reasonable estimates of how much energy is being wasted at different times. For example, if you've identified that a lot of energy is being wasted by equipment left on over the weekends, you can:

   a. Use your interval data to calculate how much energy (in kWh) is being *used* each weekend.
   b. Estimate the proportion of that energy that is being *wasted* (by equipment that should be switched off).
   c. Using the figures from a and b, calculate an estimate of the total kWh that are wasted each weekend.

Alternatively, if you have no idea of the proportion of energy that is being wasted by equipment left on unnecessarily, you could:

i. Walk the building one evening to ensure that everything that *should* be switched off *is* switched off.

ii. Look back at the data for that evening to see how many kW were being used *after* you switched everything off.

iii. Subtract the *target* kW figure (ii) from the *typical* kW figure for weekends to estimate the potential savings in kW (power).

iv. Multiply the kW savings by the number of hours over the weekend to get the total potential kWh energy savings for a weekend.

Also, most buildings have open to them a variety of equipment- or building-fabric-related energy-saving opportunities, most of which require a more significant capital investment. You are probably aware of many of these, such as upgrading insulation or replacing lighting equipment, but good places to look for ideas include the Carbon Trust and Energy Star websites.

Although your detailed meter data won't necessarily help you to *find* these equipment- or building-fabric-related opportunites (e.g. it won't tell you that a more efficient type of lighting equipment exists), it will be useful for helping you to *quantify* the potential savings that each opportunity could bring. It's much more reliable to base your savings estimates on real metered data than on rules of thumb alone. And it's critically important to quantify the expected savings for any opportunity that you are considering investing a lot of time or money into – it's the only way you can figure out how to hone in on the biggest, easiest energy savings first.

3. Targeting the opportunities to save energy

Just *finding* the opportunities to save energy won't help you to save energy - you have to take action to target them...

For those energy-saving opportunities that require you to motivate the people in your building, our article on energy awareness should be useful. It can be hard work, but, if you can get the people on your side, you can make some seriously big energy savings without investing anything other than time.

As for those energy-saving opportunities that require you to upgrade equipment or insulation: assuming you've identified them, there's little more to be said. Just keep your fingers crossed that you make your anticipated savings, and be thankful that you don't work for the sort of organization that won't invest in anything with a payback period over 6 months.

Insulation - it usually works well, even when it looks like this...

4. Tracking your progress at saving energy

Once you've taken action to save energy, it's important that you find out how effective your actions have been:

- Energy savings that come from behavioural changes (e.g. getting people to switch off their computers before going home) need ongoing attention to ensure that they remain effective and achieve their maximum potential.
- If you've invested money into new equipment, you'll probably want to *prove* that you've achieved the energy savings you predicted.
- If you've corrected faulty timers or control-equipment settings, you'll need to keep checking back to ensure that everything's still working as it should be. Simple things like a power cut can easily cause timers to revert back to factory settings - if you're not keeping an eye on your energy-consumption patterns you can easily miss such problems.
- If you've been given energy-saving targets from above, you'll need to provide evidence that you're meeting them, or at least making progress towards that goal...

- And occasionally you might need to prove that progress *isn't* being made (e.g. if you're at your wits' end trying to convince the decision makers to invest some *money* into your energy-management drive).

Our article on energy-performance tracking explains how best to analyze your metered energy data to see how well you're making progress at saving energy. Like step 2, this step is one that our Energy Lens software has been specifically designed to help with.

How Does It Work?

Honeywell has deep expertise in process technology, process control and energy efficiency along with solid methodologies, best practices and work processes to assure that the value from energy efficiency projects is achieved and maintained.

Energy savings are realized through enhanced awareness of energy efficiency and the impact of activities on productivity and cost. Awareness drives appropriate energy efficiency behaviors in achieving organizational objectives. Operational improvements in monitoring, process control and real-time optimization combine to provide the vehicle for delivering sustainable energy efficiency and GHG reduction solutions.

Energy Management Systems measure actual performance against dynamic targets to identify deviations and to ensure the operation is being managed and controlled to deliver the most energy and emission efficient level of productivity.

Benefits Of Energy Management System

Such a certification would prove that your business is a responsible one and keeps energy management as its most important target. You would be able to grow better and also increase profits easily.

What is the difference between ISO 14001 and ISO 50001?

ISO 50001 can be used in isolation or in conjunction with ISO 14001. Whilst ISO 14001 will help you identify and manage the generic environmental aspects, ISO 50001 offers a very specific focus in the area of energy.

ISO 50001 will help you to implement the processes necessary to understand your baseline energy usage and establish an energy policy, action plans, targets and energy performance indicators for reducing energy consumption.

So if energy is a significant cost to your business then ISO 50001 may be an appropriate first step or a valuable addition to your existing environmental management system.

Specifically ISO 50001 will:

- Significantly reduce energy costs through measurement and management of energy consumption
- Reinforce good energy management behaviours throughout the business
- Promote energy efficiency throughout the supply chain
- Evaluate and prioritise new energy-efficient technologies
- Increase your range of new business opportunities and meet contractual obligations
- Increase stakeholder confidence and enhance reputation
- Integrate with existing management systems such as ISO 9001 & ISO 14001

More Specific Benefits

- Significant Savings.
- Improve overall performance to cut energy consumption and bills
- Reduced carbon emissions and meet government reduction targets
- Mitigate effects of future legislation.
- Open opportunities for energy innovation.
- Measure and monitor energy use to identify where to improve efficiency

Certification Procedure

The Certification Procedure is a multiple-step process. The certification cycle is described briefly:

- Application for certification from client
- Offer from IRQS India
- Offer acceptance from client and order confirmation by IRQS India
- Pre audit (optional)
- Certification audit - (Stage 1 + Stage 2)
- Issue of certificate on successful completion of certification audit
- Surveillance audits at defined period
- Recertification audit after 3 years

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