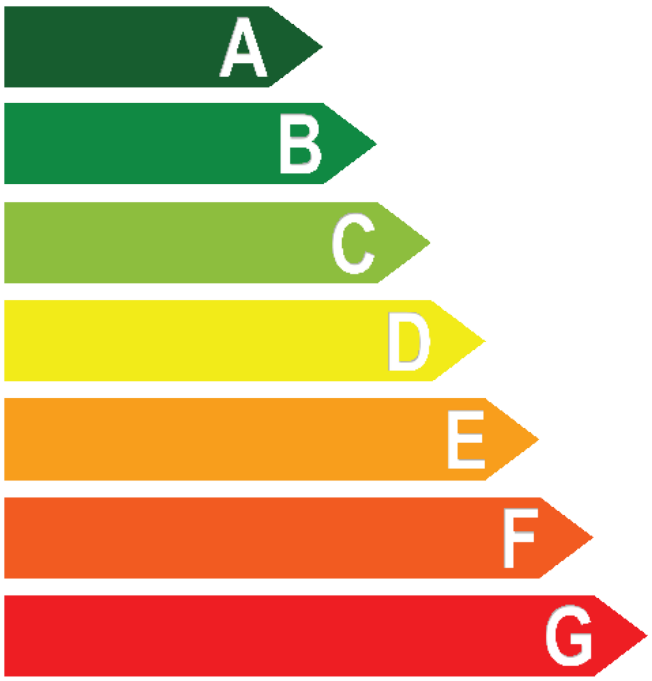
Electrocorder Applicaton Notes: Saving Energy in Industry



Data measurement - identify opportunities to save energy

Ongoing data loging - capture your energy profile

Calculate acceptable reduction and savings

Low cost investment for long term energy savings and monitoring

There are many ways to save energy, most of which cost little to implement and realise a saving.

Lighting:
Many industries work during the day (when sunlight is available), there may be an opportunity to use more sunlight. It should be noted that there are legal limits re. the amount of luminance needed in various work settings. Assess your needs, you may have too much light, if so remove some bulbs/tubes. Consider upgrading to higher efficiency units, there are now many LED options offering much reduced running costs. Where and when possible use natural light, open the blinds. Ensure you have few as possible incandescent (tungsten filament) lamps in the building, upgrade any spotlights to low energy types. One recent case of an industrial setting, the premises is a metal clad building with a metal roof, about 15% of the roof had 'roof lights', to let in natural light, these roof lights were only glass fibre and had degraded to the point of being dark. The decision was made to replace them with new ones and to to increase the number, to about 30% of the roof space, thus halving the amount of electrical light needed.

Heating:
Heating in industrial premises can be difficult and expensive, many building have high roofs with no internal ceilings to reduce the volume of air to be heated. You can ask:- Can the premises accommodate a lower internal ceiling? Can the walls and/or roof be insulated or the insulation increased? Can offices be partitioned off from the main production areas? Can we use fans to circulate the hot air near the roof? Can we use less of the factory during cold periods and therefore have to heat less? Are we heating areas that we only occasionally use, like stock rooms & stores? Can occasional use areas be grouped together, and heated minimally?

In the past industrial process efficiency has dictated factory layouts, if energy prices continue to rise, industrial layouts will be dictated by the energy needs, leading to a compromise between energy efficiency and process efficiency, clearly if you can achieve energy efficiency without detrimental effect on process you have a winning formula. Consider time switches or better still thermostatic control.

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Motors
Many industrial processes involve motors, indeed many businesses spend 80% to 90% of their electricity running motors. Some tips, use high efficiency motors, they are between 5 and 20% more expensive, you get your money back quickly though. If you are specifying a motor, do not over-size it, get the right size of motor for the job. Use variable speed drives (VSD), which will speed the motor according to the load needs. Rewinding a motor can reduce efficiency by 1% to 2%. Maintain the motor and drive train, especially the bearings and replace with good quality ones from a good source. Don't run the motor if you don't need to. Power Factor has a big impact on motor efficiency, a 0.7 PF will cause the motor to lose 30% of output power.

Power Factor Correction
Power Factor (PF) is a technical term, it is quoted as a number between 0.00 and 1.00 (unity) and can be either leading or lagging. You want your power factor to be as close to unity as possible. There are many companies offering PF monitoring and correction,you're your PF checked and corrected if needed.

Look at your Bills (electricity, gas, heating oil, petrol, diesel,... we all forget,... water)
The easiest way to assess your usage is to simply look at the various energy bills you have received from the energy providers, this will give you a feel for the energy spend compared to other aspects of your business, we'll look at benchmarking later. It may be useful to create a pie chart of the company spend on all major purchases, see where energy comes, it may be an unpleasant surprise! It may also help you to estimate the amount of time you should invest in the audit process.

Read your meters (electricity, gas, heating oil, petrol, diesel and water)
You may only get billed monthly or quarterly, so reading the meter every week preferably every day will give you a better breakdown of when the energy is used. Some sites may have only one meter, some may have many, thus making the job of reading them more frequently time consuming but does give you the chance to find out which circuits are taking the energy. If you have more than one meter you may want to look at an electrical line diagram with a electrician, this will show you the connectivity of the various meters and circuits, as well as the various loads on site.

Invest in a data recorder, we recommend the Electrocorder!
Using bills and metering will give you an overview of energy usage, it will not normally tell you where the energy went, using published rating for equipment may be misleading if the equipment is out of spec or runs more frequently or longer then you though,... you'll need to record some data.

A current logger is sufficient to tell you the rough energy usage over a week or so, this will let you compare the theoretical estimates to these actual results.

A voltage 'Duty Cycle' logger will let you analyse a pump or fan run duty cycle, which in turn can tell you when an oil or gas heating system was on. Although the fan or pump energy usage may be fairly insignificant, the overall heating energy use (gas or oil) may be very significant,... does it run when the building is empty, is the frost protection set to 15C rather than 5C?

Benchmark - kWh/widget, kWh/m2, kWh/employee
An easy way to compare your business, even with competitors is by using simple ratio figures, like is kWh per widget produced, the number of kWh per annum divided by the number of widgets your company or section produced. Another is kWh per employee, again the total number of kWh used over the year , this time divided by the number of employees on the site or in the process. Be careful, the kWh/employee figure can be deceptive, it assumes that the employees are efficient:

Producer A uses 10,000 kWh per annum, but has only three employee, produces 500 widgets, therefore has a metric of 3,333 kWh/Employee.

Producer B uses 15,000 kWh per annum, has four employees, therefore has a metric of 3,750 kWh/Employee. 50% more energy, 33% more staff, 300% more widgets.

Which is most efficient, you need to look further.

Producer A uses 10,000 kWh per annum, produces 500 widgets, therefore has a metric of 20 kWh/widget.

Producer B uses 15,000 kWh per annum, produces 1500 widgets, therefore has a metric of 10 kWh/widget.

When it is difficult to compare with other parties, you can simply compare year on year for your own company, also look at employee-widget ratios.

Compare to your neighbours, competitors, partners
If you are a pink widget producer, it can be politically difficult to compare with other pink widget producers, I therefore suggest you compare with similar non-competitive industries, sometimes that can be as simple as your neighbouring industries, use the figures above, however you may both be open to discuss actual energy figures.

Assess your energy needs
This can be difficult, however the comparison and benchmarking processes may have indicated a big difference between your usage and that of the industry, a neighbour, partner or a competitor, use companies house to see accounts of other companies, a full Profit & Loss account may detail energy costs.

Set targets for reduction
A good starting point is a 5% or 10% reduction target, perhaps to be achieved in 6 to 12 months, the sooner you implement the changes, the sooner you start to save. Energy reduction make you more competitive and gives you the edge, any money saved can be devoted to product development, process improvement or advertising. Monitor your progress towards the targets.

Implement a plan
Make an energy saving plan, then importantly, empower someone to implement it.

Authorise someone!
To what value can your cleaners self-authorise Purchase Orders on behalf of your business? People normally laugh and say ZERO, yet you may be allowing them to spend thousands per annum! If your cleaners enter your site at 05.00 and turn on all the lights, the HVAC, escalators, vending machines,..... then they are spending a considerable amount of money, on your behalf each year. Check up on them, don't say it's an energy audit. Look at what hotels do, when you remove the card-key in your room, all the lights go out.

Appoint a responsible person, to analyse and check all spending on energy.