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Energy efficiency – it's a journey, not a destination

The UK Government has for many years used a carrot and stick approach to promote energy efficiency in companies and other organisations by introducing legislation and offering tax breaks or other incentives. Here Jeremy Shinton, Product Manager – Business Solutions at Mitsubishi Electric, looks at some of the current initiatives.

Before the end of this year all “large enterprises” will need to be in compliance with the Energy Saving Opportunities Scheme (ESOS). A business qualifies as a “large enterprise” essentially if it employs more than 250 people or has a turnover of more than 50 million euros. Further, smaller organisations are also encouraged to follow the ESOS programme on a voluntary basis.

Put simply, ESOS requires that you undertake an energy usage audit to account for 90% of the total energy use or spend. There are large fines for non-compliance so it is essential that qualifying companies act quickly before the 5th December 2015 audit deadline. Officially it is not mandatory to follow up and implement energy saving measures; the assumption is that the audit will highlight energy wastage and this will encourage managers to act of their own accord to address

the issues.

The theory is that by keeping obligations to a minimum, organisations will be free to develop an energy saving plan that best suits them. Reducing energy bills means businesses become more profitable and competitive; the ESOS assessment is one step in the process.

Responsibility for the ESOS programmes lies with the Environment Agency, which will work with other relevant government agencies and departments as necessary. Larger organisations may execute their audit using internal resources and personnel; however others may prefer to bring in outside experts to help.

The ESOS audit must be overseen by an approved Lead Assessor and calculate the total energy consumption, use per production process (industrial, commercial, etc), use per employee, the use in each separate building and the energy cost of transport.

Energy data collected under other schemes, such as the Green Deal Assessments, that is less than four years old can be used as part of the ESOS audit. Further, organisations that are fully covered by ISO 50001 (Energy management systems – Requirements with guidance for use, 2011) are exempt from the assessment but do need to notify the Environment Agency that they are compliant with ESOS.

However, after 2015 a new audit will have to be completed at least every four years. It is estimated that the scheme will reduce the overall national energy bill by £1.5 billion to £2 billion pounds per year. This will make a significant contribution to the reduction of greenhouse gases such as carbon dioxide and also improve the country's competitiveness in international markets.

Ecodesign equipment

Since 2009, some products and equipment that consume energy have had to meet the



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requirements of the Ecodesign of Energy Related Products Directive. This is a framework which primarily sets minimum requirements for certain products, including those that have a market demand of more than 200,000 units per year across Europe.

The objective of the Directive is to reduce greenhouse gas emissions and other adverse environmental impacts across the life-cycle of a product. This places the emphasis on the design and development stages of a product so that it is energy efficient. However, it is notable that there may also be energy costs associated with transportation, installation and maintenance.

Opportunities

Naturally every energy audit will be unique but there are several common themes that will arise in many of them. So let us look at these and draw some general guidance principles:

1. Switch off something

During the 1973 energy crisis, Edward Heath's government came up with the slogan 'Switch off something' and that instruction is as valid today as it was 40-plus years ago. Anything that is 'on' is consuming energy; anything that is 'off' is not!

- It is often the case that things that are not switched off remain on for long periods. For instance it is not unusual for lighting, heating, air conditioning, extract fans, etc to be left on almost permanently in commercial, industrial and business premises. Often the rooms are in use for less than eight hours a day and are not used at all during weekends and bank holidays. So, as a first estimate, it would appear that their energy consumption is about four times higher than necessary!
- This type of energy wastage can be addressed by reminding people to switch things off - by changing the culture within

an organisation so that people become energy conscious - and by automation.

- Simple technologies like timers and presence detectors can be very effective. Further, they can be integrated into building management and process control systems that use computers and logic controllers to make relatively sophisticated decisions about operating equipment and machinery.
- In an industrial environment, it is fairly common to see plant and machinery running yet not producing anything. However, idling machines consume energy (possibly a very considerable amount) so if they can be switched off – partially or altogether – energy can be saved. This is particularly true with pumps and fans.

2. Electric motors

Something like 70 per cent of all the electricity generated in the world is used to power electric motors, so the potential for motor related savings is enormous. There are several opportunities to look at:

- The electric motor was developed well over 100 years ago, so has had plenty of time to go through many refinements and become a mature technology. Initially they were not at all energy efficient but started to become so probably 50 years ago. By around 1980, they were very efficient and since then the increasing awareness of environmental issues has led to regular further improvements in their efficiency. We can now say that a motor more than 10 years old may be of suspect efficiency and should be considered for swapping out.
- Motors need to be installed and



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maintained properly for maximum efficiency. They also need to be size-matched to the load they are driving.

- Motors tend to have long working lives, meaning that the cumulative energy cost of operation may easily exceed the initial purchase cost by a factor of 100 or more. Monitoring their efficiency will help mitigate this ongoing cost.
- In the past it was considered best practice to fit oversized motors, so that they had a bit of extra power in hand for overcoming friction, 'sticktion', and blockages. However, it is now recognised that an oversized motor is constantly drawing more power than is necessary and that there are more energy efficient solutions for providing that bit of extra 'umph' when required.
- Large motors are often rewound rather than replaced. Unfortunately a rewind motor may not be as energy efficient as possible, so they should be checked and considered for replacement if necessary.

3. Variable speed drives

Variable speed drives, or inverters, are something of a wonder product. They are used to control the speed of a motor and thus save energy. In fact, they save so much energy that their purchase cost is usually recouped within 6-18 months, after which they are saving money and saving the environment. Importantly, a VSD allows you to fit motors sized to their typical duty and can be set so that they provide the 'umph' referred to above when required.

Energy efficiency is now a prime consideration for machinery designers, plant engineers and finance directors. Fortunately there are many technologies that will help organisations reduce their carbon footprint; the apparently-constant stream of new

legislation is designed to encourage their take up.

Mitsubishi Electric offer ESOS approved audits and energy saving technologies across their range of automation solutions.

About Mitsubishi Electric

With over 90 years of experience in providing reliable, high-quality products to both corporate clients and general consumers all over the world, Mitsubishi Electric Corporation is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, as well as in products for the energy sector, water and waste water, transportation and building equipment.

With around 124.000 employees the company recorded consolidated group sales of 39.3 billion US Dollar* in the fiscal year ended March 31, 2014.

Our sales offices, research & development centres and manufacturing plants are located in over 30 countries.

Mitsubishi Electric Europe, Industrial Automation – UK Branch is located in Hatfield, United Kingdom. It is a part of the European Factory Automation Business Group based in Ratingen, Germany which in turn is part of Mitsubishi Electric Europe B.V., a wholly owned subsidiary of Mitsubishi Electric Corporation, Japan.

The role of Industrial Automation – UK Branch is to manage sales, service and support across its network of local branches and distributors throughout United Kingdom.

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