Plant review

With increasing regulatory scrutiny and rising energy costs, plant engineers need to review and reduce consumption. Simon Ellam suggests a three-phase approach, based on process automation technology

After raw materials, energy is the second largest cost for most plants operating in the process industries – and prices are only going one way. So improvements in energy efficiency are essential, if plants want to remain competitive and viable for the foreseeable future. But it's not easy, because there are challenges.

That's why the picture of progress among UK plants is at best patchy. Indeed, according to the 'Green League' study, undertaken by Siemens across a range of industry sectors, while 69% of energy managers believe their organisations are taking energy management seriously, just over one fifth (22%) don't even know what they spend on energy. Also, although 40% say they are making good progress, in terms of energy management targets, fully half of senior managers and directors are apparently unaware of their firms' emissions.

On a fairly positive note, 70% of organisations say they plan to invest in energy efficiency measures over the next three years. However, what relatively few plant managers seem to realise is that one of the key opportunities for meeting energy-saving targets may well be right under their noses – in the form of their intelligent process automation systems. In fact, best estimates put available energy savings from the knowledge embedded in these systems at 15%.

That said, the term 'energy management system' encompasses both the organisational structure and information systems – not just the system that gathers, analyses, documents and visualises energy data, as well as regulating and monitoring plant energy consumption. In that sense, energy management should be thought of as a process of improvement, comparable, for example, with quality.

Hence, when it comes to improving energy efficiency and plant sustainability, it makes sense to adopt an holistic approach to the plant itself and its product lifecycles, in terms of energy consumption. And for that to work, managers need to consider a three-phase approach of identification, evaluation and finally implementation.

The identification phase is a matter of using relevant automation equipment and systems to detect energy flows, looking for areas of high energy consumption. It's about recording energy data as process parameters, starting with information from the sensors and actuators, then proceeding through the control level and on up to management control. Then, in the evaluation phase, potential savings are calculated ahead of implementation, which speaks for itself. Note that motors account for around two thirds of industrial energy consumed, so these should be a major focus.

But it doesn't stop there: moving on to energy management then enables lasting productivity improvements – through energy saving and continuous load management, with load shifting and energy demand planning to mitigate expensive peaks. The point is that productivity cannot be optimised by means of efficiency improvement projects alone. Energy consumption, as seen via the automation systems, also needs to be considered.

Improvement practice

So, starting at the plant level, the objective is to record energy, taking into account both electrical and other forms, while also moving to minimise usage by installing devices such as high efficiency motors, variable speed drives and soft starters.

Then, at the controls level, it's not only about collecting and aggregating energy data, and churning out energy consumption reports from the field level. It's also about minimising energy usage by optimising the plant processes themselves, harnessing, for example, advanced process control, but also plant asset management systems.

As for the operators concerned with regulatory control and monitoring, the issue is partly providing graphical energy consumption data, but also energy history data by, for example, batch or plant area.

Finally, at the management level, what matters is planning and procuring energy, and taking advantage of visualisation to regulate its use through a combination of load management and time- or load-dependent tariffs. PE

Simon Ellam is with Siemens Industry Automation