

# The Energy Quest

A Solutions Unleashed Whitepaper

If you could save the planet, reduce costs, increase efficiency and improve your competitive edge wouldn't you do it? So why have so many manufacturers been slow to implement an energy strategy?

It is hard to ignore energy costs and energy usage; to many companies the cost burden of the increased energy bill is the difference between profit and loss, to others it dramatically reduces profitability. All industries are volume energy users, so why are there so few continuous energy saving schemes, and why is it seen either to be difficult or "someone else's problem"? The cost of energy is clearly everyone's problem yet, as in all aspects of continuous improvement, energy saving needs structure, processes, technology and ownership. The introduction of an energy saving programme would typically not be a new initiative but making a programme both effective and sustainable in providing ongoing savings, would be.

*'The cost of energy is everyone's problem...'*

#### A phased approach

Early day measures are important, such as turning out the lights (when not needed), using low energy lamps etc. are all things that an embryonic Energy-Saving Working Group will seize upon as initiatives. These are effective and easy to undertake. However, sustaining this is a full time job and working beyond this stage is increasingly difficult. This technology produces good bottom line savings even allowing for the capital cost of the inverter and the cost of installation work. The capital cost can be helped by the ECA (Enhanced Capital Allowance) programme from the government in the UK.

*'However, this is just the beginning of the energy-saving quest, not the end'.*



The phased approach is to undertake all of the above and then move on to applying technology that will let you see and act upon what cannot be directly observed. Effective use of energy is a complex proposition. However, efficient use of energy can be broken down into particular initiatives according to the energy type. Taking electrical energy as an example, it is more than energy usage that can produce savings but also Power Quality. Power Factor, neutral currents and harmonics all combine to make sure that you will pay more for electrical energy.

#### Technology that can help and provide energy insight

Many issues in manufacturing rely upon data acquisition and this is the case when trying to control the energy bill. Many SCADA schemes will have accurate monitoring of temperature, pressure, volume, flow and other physical quantities. Energy should be added to this. Thus energy becomes a Production issue, not simply a Building Management System (BMS) issue, or even something that is buried within the "manufacturing overhead". Integrating energy measurement sensors within production systems produces readily available information that will also be stored as part of the data set for a particular production batch.

*'Energy is a Production issue, not simply a Building Management System (BMS) issue'*

By doing this the 'energy per batch' is immediately available to the entire management team. This provides opportunities to question, measure and improve – just as in a quality or process problem, the problem now being energy cost. Visualisation of energy information with production information and making it available to the management team allows crucial if not critical questions to be answered:

- How can we turn down the agitator speed without affecting product quality or yield
- Can we reduce energy consumption by rescheduling, for example, maximise use of chillers in the evenings, running pumps at off peak rate reducing cost and use less intensively as external ambient temperature is already low so reducing energy consumption

By integrating this information into a planning schedule, energy efficiency can be added as a production constraint. Production schedules can then be optimised not just for customer delivery and production but also for energy usage.

### Energy on display

Once Energy cost is displayed, say on the process SCADA or HMI, then it becomes human nature to try to drive it down and keep it down. This is very similar to on-board car computers that have consumption information – high scores are possible with care! SCADA and other MES systems provide information displayed throughout the plant – a far better place for energy information than being limited to a niche BMS console.

On a wider basis; energy usage is thus within the manufacturing information system. Where an Historian is used it will also be date-time stamped, thus the production history will have Gas, Water, Steam, Compressed Air and Electricity information just as it has other process variables. The Historian will generate reports that can be seen by a wider audience across the manufacturing business, and globally using web portal technology if required.

### Recorded Cases

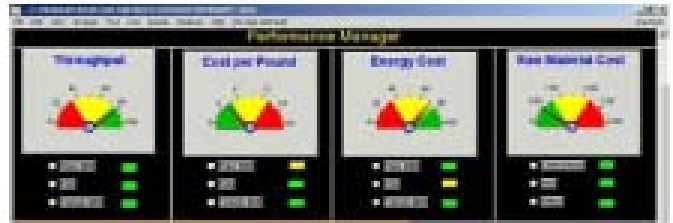
The resolution of such data can be often very revealing. Water leaks are the most visible of all the energy losses, as long as there is someone to see them! A well recorded case at a food plant showed a mysterious and expensive plant water loss at the weekends. It showed in the manufacturing data trend, so was unarguable, but equally unobservable. The solution was to retire the main tank float value and replace with a sensor driven stop valve. The savings here completely offset the cost of the manufacturing information system – payback in two weeks (and out of the blue in terms of justification).

Another documented application has shown that a bulk chemical company was able to make £1M+ per annum savings utilising extra sensors and instrumentation with the existing manufacturing information system. The mainstay of that success was the completely auditable fine resolution energy data that not only proved savings but in turn, delivered significant reductions in the Climate Change Levy (CCL). A case of collecting enough evidence to prove the point!

Once energy measurements are within a manufacturing information system then there is an additional benefit of taking a step closer to the true cost of manufacturing operations – with consequent better management decision making.

### A New KPI

The energy 'Key Performance Indicator' (KPI) could be the final tool that is needed to be competitive. "Energy cost per batch" is possible with careful placement of energy measurement sensors (as above). Placing sensors as a "ring fence" around a particular process will ensure that all the energy used by that process will be accounted for. From experience this can show alarming seasonal variation and also per differences per shift (especially "from cold start" extra shifts).



A recommended technique, once a system is deployed, is to produce an energy budget for each production area set by the energy manager. This can be reinforced with incentives delivered for keeping within targets and making further savings – much can be done if £1M per annum is to be saved. This saving is on the bottom line and therefore directly affects plant profitability.

### Summary

Energy efficiency, energy saving and sustainable continuous improvement are all connected. Start with the obvious, the visible and the easy; but to make savings sustainable, ongoing and continuous requires automatic monitoring. To reveal unobservable energy, sensors and instruments are required. Utilising an existing manufacturing information system to hold and manipulate the energy data has many advantages. The energy demand when integrated with production data in production systems makes energy use very visible and when visible something can be done to effect improvement. With energy costs rising and expected to continue to do so then action must be taken – and what better way then by getting more out of an existing investment – the manufacturing information system?

The energy quest has begun –so energise your systems now – worst case scenario is you save money and help the planet!!

*'energy savings directly affect the bottom line'*

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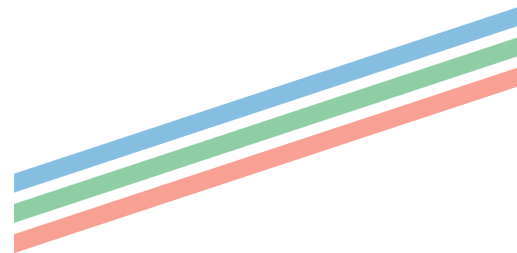
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