

Energy Intelligence Report: You're Being Audited

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This article first appeared in IMPO's [August 2012 \[1\]](#) issue.

Our third annual iteration of the IMPO Energy Intelligence Report has followed an industry all the more hungry for cost savings. As industrial manufacturers work to propel their businesses forward, they must choose between investing in the equipment they need, or falling behind in the face of fierce domestic and global competition. This annual report has been designed to help nurture ideas on energy savings, as well as provide education on purchasing habits, available technologies, and practical applications of the products and equipment that keep manufacturing companies running Lean and green.

Keep an eye out for part three in our September issue, culminating with our Energy Incentive Guide – a state-by-state breakdown of the available tax rebates, credits, and other financial incentives to help manufacturers invest in energy efficient products and alternative energies.

According to ENERGY STAR, the government-backed program designed to help businesses and individuals protect the environment through superior energy efficiency, plant energy audits are comprehensive evaluations of the actual performance of a plant's energy-using systems and equipment compared against the designed performance level or the industry best practice. In fact, ENERGY STAR Partners have found that conducting plant audits is vital to a strong energy management program; without audits it is difficult to continuously improve energy efficiency and demonstrate savings.

For many in the industrial sector, the demonstrated savings part of the equation takes the most precedence, and audits allow for a regimented approach to assessing and documenting energy use over time.

The Right Equipment

One of the first critical steps — before you can assess your usage itself — is assessing your needs in terms of the equipment and devices required for adequate energy measurement and management.

According to Onset Computer, a Massachusetts-based supplier of data loggers, the beauty of data logger technology is that it can offer a high level view of overall energy use, all the way down to looking at very discrete pieces of equipment, its energy use, and its runtime profiles. The variety of products range from standalone models that measure energy parameters and store measurements on the device, to a range of wireless devices to allow access to the energy being logged on the

internet or on a centrally located PC. "While much of the energy market is focused on kW and kWh used, Onset's products also offer options for measuring things like airflow or CO₂ or all the way to how long the lights are left on," says Jessica Frackelton, Senior Manager of Product Marketing for Onset.

When it comes to obtaining granular, floor level data, other, more mobile technologies come into play as well. According to Fluke Corporation, the two best handheld tools for energy management are a thermal imager for waste detection and a power quality logger for waste quantification. "Combined, the two tools allow a technician or electrician to determine where and how much energy is being consumed by various facility operations," says Fluke power quality expert Wade Thompson.

The biggest - and easiest - energy savings opportunities, he says, typically lie in steam systems, compressed air systems, lighting, and HVAC/building automation. "Following that, plants can log energy consumption at the main utility entrance and at large loads and identify waste due to power quality factors such as power factor, harmonics, and unbalance, as well as inefficient operation."

Adds Frackelton: "There are several common issues we see quickly diagnosed once data loggers are introduced. One of the most common is spotting critical leak points in compressed air systems within a particular step of the process. Compressed air leaks cost our customers a lot of money and can lead to compromised product quality. Trending data to show when the compressed air is insufficient is the most effective way to track down leaks." Another common issue Onset sees with process equipment is when sensors permanently installed in the equipment fall out of specification, leading to a change in the control points for the equipment. In this case, a data logger can offer up indications as to when it might be time to change a sensor or re-calibrate a particular control point. Finally, "We hear a lot of stories about identifying wasted energy through an over-cycling or under-cycling associated with a particular motor-driven piece of equipment. Not only does the on/off nature of cycling equipment cost money in energy use, but it can also lead to early end-of-life for that equipment which will drive unnecessary capital expenditures for the replacement cost. Proactively detecting cycling problems can drive the right diagnostic investigation to a true root cause."

Control Opportunities

Equipment is a major factor, to be sure, but the human element - use and abuse, more specifically - is often the area that needs the most light shone on it. A targeted look at this, combined with controllable equipment and other usage factors, becomes key to the user obtaining accurate data.

"Many production facilities monitor overall water, air, gas, electric and steam (WAGES) use and costs associated with available sources. However, they often overlook the controllable factors inside their plants or production operations that would enable them to manage consumption in a way that brings meaningful value to the business," says Phil Kaufman of Rockwell Automation. This becomes especially critical in a tight economic environment where every expense is closely

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Published on Industrial Maintenance & Plant Operation (<http://www.impomag.com>)

scrutinized and manufacturers need to think beyond traditional cost-cutting tactics to achieve their financial goals, Kaufman explains.

Rockwell stresses a holistic approach, one where manufacturers look at the individual, energy-intensive processes within their facilities to truly control energy costs for the facility as a whole — including operations, utilities, and building envelope. Much of this comes down to leveraging a manufacturer's current automation investments to begin to visualize, control, and optimize their resource usage. Whether the results indicate an equipment or utility problem, or a fix in employee behavior, it's creating viable solutions that's key.

For many manufacturers, it's an issue of making sure common sense best practices are being utilized by their employees — a critical area of focus, especially for those who are not currently highly automated. Whether it's turning off lights, not wasting or leaking compressed air, and avoiding running energy-intensive machines and processes at half loads, there are many ways plant floor employees can make the most sustainable choice. Whether or not these strategies are systematic in the culture of most plants is questionable, however.

A 2011 IMPO survey on employee behavior relative to energy use uncovered that a mere 29 percent of plant management level respondents had employee training and/or signage in place that reminded plant personnel to make the more energy efficient choice. Ultimately, it's the holistic approach that allows for manufacturers to evaluate the full force of factors in play in their energy portfolio — a critical step in creating an accurate picture of the relevant variables. Without this type of information, any audit of equipment or building envelope shortcomings alone can fall flat.

Actionable Data

So, if knowing is half the battle, what's the other half? Action, according to Kaufman. "When an organization has visibility into usage data, they can begin to become a strategic manager of WAGES resources, instead of a passive user, and they can implement strategies that will allow for consumption of resources in a way that reduces operating and maximizes profits."

Say's Fluke's Thompson, the quantification element is absolutely essential, as it drives the business case for investment in energy-savings initiatives.

"In many cases," Thompson adds, "ROI may be less than a year." However, he cautions, "Until you have the data to plug into an ROI equation, most facilities can't or won't prioritize energy-related improvements."

For more on this see page 28 of [IMPO's August issue \[1\]](#), where Mike Huber, P.E., gives details about embarking on the energy audit process in his own facility.

Source URL (retrieved on 09/23/2014 - 1:04pm):

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Published on Industrial Maintenance & Plant Operation (<http://www.impomag.com>)

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