

Plant Services

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Energy management and the CMMS

David Berger, P.Eng., contributing editor, says what it represents will be here long after "Green" is gone.

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One of my favorite questions to pose to participants of the many conferences and seminars for which I'm asked to speak is, "Do you think Green is the latest flavor of the month, or is it here to stay?" For the past few years, about 50% of participants in this informal survey are convinced that Green is a passing fad, and will no doubt be eclipsed by some other business concept with a fancy buzzword or three-letter acronym. Perhaps they are right about the term "Green," but I would strongly argue that what this term represents is definitely here to stay. For example, energy management, a key component of Green, continues to grow in importance. Consider:

- MRO spending: U.S. companies spend about \$100 billion annually on capital equipment and services
- Energy spending: U.S. companies spend about \$400 billion annually on energy, and that number is climbing
- Next to personnel, the single greatest cost for a typical manufacturing facility is energy
- Tighter regulations regarding greenhouse gas emissions are likely in the near future — in anticipation of this, some companies are viewing efficient and effective energy management as a strategic imperative to stay competitive

“This begs the question as to whether many companies are truly focused on the right things.”

– David Berger, P.Eng.

This begs the question as to whether many companies are truly focused on the right things. Many operations and maintenance managers aren't reporting regularly on simple measures such as energy consumption for key assets. Utility bills for electricity, water and fuel tend to aggregate costs so they are difficult to identify and manage for individual loads, production lines or assets. Additionally, invoices arrive and are analyzed long after the fact. Relevant tools such as your CMMS aren't being used optimally to monitor and analyze usage and condition data. This means opportunities for improvement are most certainly missed.

Areas of potential improvement

HVAC

- Are temperatures managed throughout the day to reduce demand during peak hours?
- Are temperatures balanced throughout the building?
- Is there a cheaper energy source for heating, for example, can waste heat from production be used to heat fresh air intake in the winter?

Lighting

- Are old light bulbs being replaced with energy efficient ones?

- Are lights kept clean?
- Are photocells and dimmer switches used?

Motors and pumps

- Are old motors/pumps being replaced with energy efficient ones?
- Are motors/pumps receiving regular preventive maintenance?
- Are motors/pumps optimized for their application as opposed to the original purpose, for example, they might now be running at less than 50% of capacity because of a change in the production process or product mix?

Building envelope

- Is there sufficient wall and ceiling insulation (eg, is there condensation or frost build-up)?
- Are windows double glazed, properly sealed, and coated with reflective material for all but northern exposures?
- Do entranceways minimize heat loss with door seals, double doors, etc.?

Production lines

- Is instrumentation adequate to measure heat fluctuations and losses?
- Are there time controls or automatic sensors to detect inactivity and shut down systems whenever possible?
- Is heat, air, water, and steam recovered and used elsewhere?

Rework, re-feed, waste, scrap, and other production losses

- Are losses tracked and analyzed to determine root cause so they can be minimized?
- Can waste/scrap be recovered or used for other purposes that might help reduce energy consumption?

Storage areas (eg, dry, cooler, freezer, battery, chemical)

- Are temperatures monitored accurately in the storage areas to ensure even distribution (eg, coolers and freezers)?
- Are doors sealed properly?
- Can lighting levels be reduced, or eliminated when not in use?
- Are batteries charged during off-peak demand periods?

Mobile Equipment

- Is fuel consumption carefully tracked by vehicle, vehicle type, fuel type, season, time of day, vehicle use, etc., to identify savings potential?
- Is tread wear and tire pressure tracked to maximize fuel economy?
- Is regular maintenance performed on time, including thorough inspections?

Conduct an audit: A useful first step in identifying and capitalizing on improvement opportunities is to conduct an audit of your operations and facilities. Many third-party companies specialize in this and might even be willing to base their fees on savings identified and realized. As well, energy product vendors (eg, lighting or power generation equipment suppliers) might be willing to conduct a more limited audit as it relates to their product lines, at no cost to you.

Whether performed by internal or external resources, the audit typically begins with examination of your consumption and spending for electricity, water, steam, gas, air and liquid fuels. Other areas investigated for improvement potential as part of the energy audit are detailed in the accompanying sidebar.

In many cases, a modern CMMS can provide some of the data. Audit results are then compared against industry and universal benchmarks to determine the gap, both qualitatively and quantitatively.

Monitor usage and analyze data: Energy consumption can be monitored using automation tools such as programmable controllers, SCADA, building management systems or specialized monitoring equipment the OEM built into the asset. Of course, sophisticated CMMS packages have features and functions that can aid in data collection and analysis from all sources. The CMMS can act as the central depository of enterprise-wide asset management information, to support more strategic decisions based on an asset's complete lifecycle. Features to look for in a CMMS include:

- Ability to track energy use by asset and asset type, for electricity, water and gas, including rate detail at the meter level and consolidation of data along the asset hierarchy for the enterprise
- Ability to analyze use data to determine patterns and identify anomalies for an asset type, age, location, product/process being run, maintenance program in place and so on
- Condition-based monitoring functionality to ensure process variables remain within user-defined limits, thereby optimizing energy consumption
- Notification, alarming or alerts to draw attention to when an asset is trending out of control, for example, an asset that is overheating, fuel consumption rising beyond expectation or a component moving out of alignment
- Nested and hierarchical problem, cause and action codes to assist in diagnosing a problem such as excessive energy consumption, and determining what action to take, ie, what action codes are applicable to which root causes, and in turn, which cause codes to which problems
- Analytical tools such as Pareto capability to determine the most frequent or costly problem codes (eg, power surge) associated with an asset or asset type; correlation capability to determine if the problem code relates to environmental conditions, asset characteristic, equipment age, etc.; and root cause analysis to determine why the problem is likely occurring (eg, faulty installation)
- Ability to establish performance measures and targets for improvement (eg, asset performance, energy consumption) and track progress against the targets
- A library of standard reports, such as electricity consumption by asset, that can be filtered, sorted and easily configured, as well as a report and graphics generator for customized reports and *ad hoc* queries
- Sophisticated reporting tools such as a user-definable dashboard for getting the big picture on asset condition, quickly identifying areas that need management attention and drilling down on data for determining root cause

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