Improving Energy Management in Industrial Facilities

Understanding the process context of energy and implementing a solution approach for greater efficiency

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Challenges in Industrial Energy Management

The Case for Integrated Energy Management

With new standards and initiatives in place for continuous energy management, sustainability, reporting and more, industrial facilities are looking for ways to gain more control of their energy use. Isolating areas of energy waste and improving energy management capabilities allows facilities to achieve efficiency, cost savings, improved operations, and sustainability. But with so many processes, equipment, and systems in an industrial facility, achieving a holistic and integrated energy management program can be challenging.

Disconnected Silos of Energy Data

Traditionally, energy management has often gathered energy data in "silos," disconnected from other production systems. Integration with other systems like MES, automation systems, and building management systems to provide valuable contextual data such as process data, machine state etc. can be haphazard and piecemeal. Consequently, managing continuous energy management programs without the process context becomes ineffective.

More "things" collecting more data

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These "things" are increasingly connected

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Creates pressure to answer energy questions in the context of critical processes

Market Innovations

Energy Analytics

With new, powerful analytics software tools, facilities can now understand and analyze energy use and costs in great depth. Thus, the increasing importance of "big data" in unlocking significant energy savings. The mere availability of such software tools is now creating pressure to improve data integration mechanisms to **share data seamlessly between "process" and energy management systems.**

The Internet of Things

In addition, the fast-moving landscape of innovations in the "industrial-internet-of-things" is hastening the pace of convergence between the Information Technology(IT) and Operations Technology(OT) worlds, making contextual data more easy to consume by energy management systems. IoT is creating increased connectivity between industrial information systems and the factory floor.

Industrial Energy Management Needs

Energy Visibility

With so many operations and systems in place, energy management in industrial facilities is challenging, and process data can be easily lost in the details. Some typical concerns and energy management needs listed below are not easily achieved.

Typical industrial energy management concerns:

- Isolate and categorize the cost of energy during various non-production periods.
- Relate energy costs more accurately to production costs.
- Allocate energy costs to units of production, and report metrics on departmental energy usage, separating production from facility energy usage.
- Gain plant floor visibility into manufacturing processes, and their relationship to energy waste.
- View metrics valuable for ISO50001 programs, such as processes idled, starved, or blocked, etc.

How Can These Needs Be Met?

Historically, energy data has been gathered at the facility and sub-feeder levels, providing an incomplete plant view. But a solution approach, one that integrates the machine assembly system closely with the facility energy and power management system (EPMS), can provide improved data, process, and energy control.

Process level energy management:

- Correlation of manufacturing processes to energy usage (e.g. energy consumed during process idling, process starved of parts etc.)
- Detailed energy analysis and alarms help to isolate energy wasted during non-production periods.
- Granular view of process energy usage to uncover opportunities to increase efficiency.

Schneider Electric Solution Approach

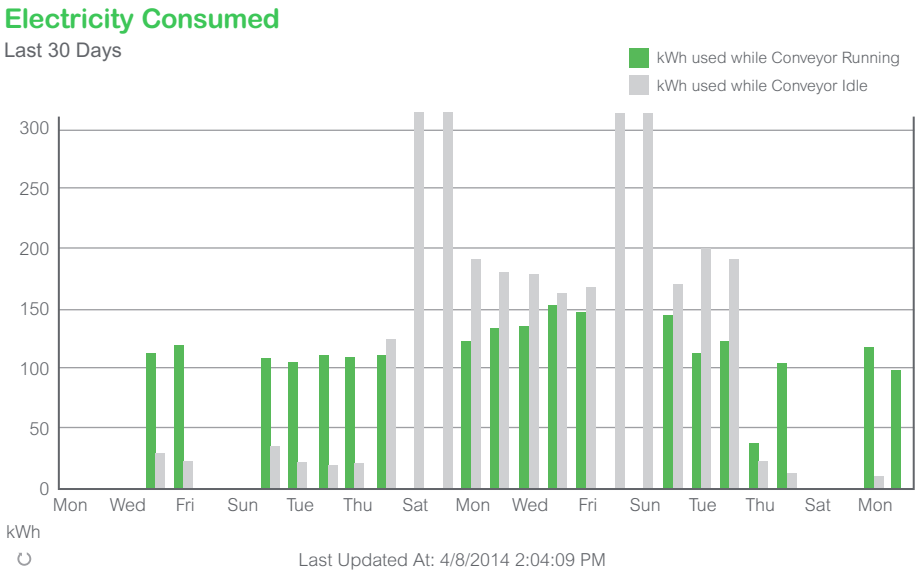
Integrating the machine assembly system of an industrial plant closely with the Energy and Power Management System can provide improved energy management capabilities. With a combination of metering hardware and integrated software, a process-level, solution approach to energy management can be implemented.

- Simple, cost effective solution for retrofit metering at the process control level, to evaluate energy costs relative to production.
- Dashboards, reports and visualizations provide easy-to-understand metrics for facility managers, electrical engineers, and energy analysts, to offer quick return on investment and compliance with energy efficiency programs.

Case Study: Square D by Schneider Electric Manufacturing Plants

The Solution

A test project was implemented at the Square D Lexington, TN manufacturing plant. PowerLogic ION power quality meters combined with simple energy meters and Power Monitoring Expert allowed energy and power quality data to be measured from the paint process line. Process inefficiencies and energy waste were identified, allowing the plant to decrease energy use and increase cost savings.

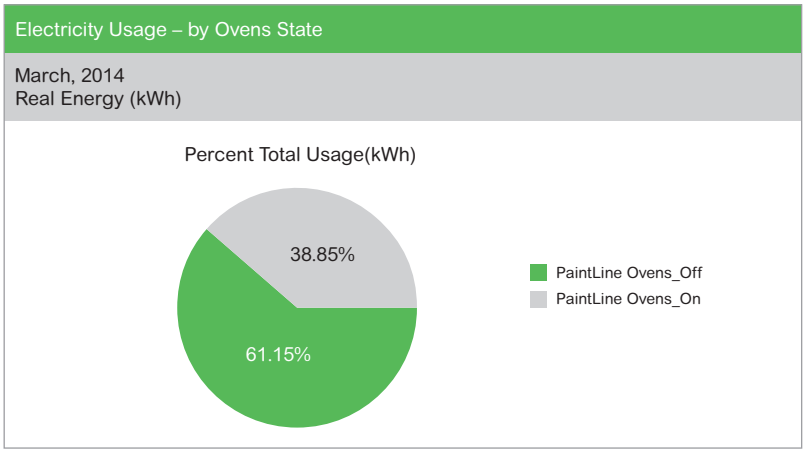


Consumption vs. Process Energy Usage: Energy consumed during idle conveyor time was unexpectedly high, uncovering a process inefficiency .

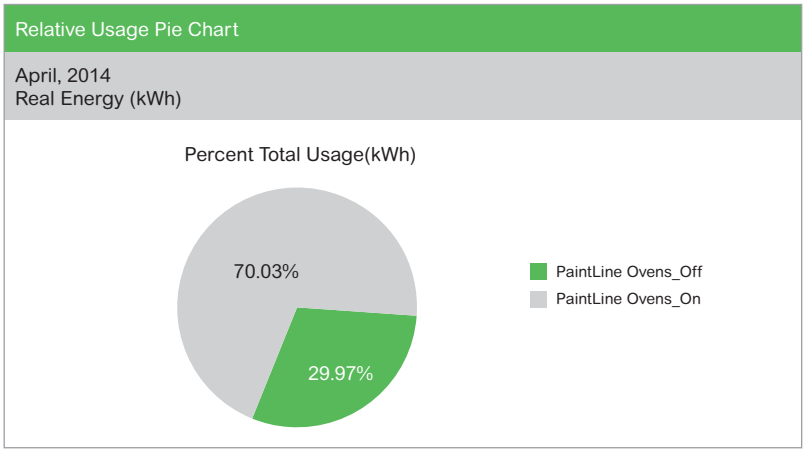
The Results: Smyrna, TN Manufacturing

Identifying energy usage and specific events at the “process” level, the manufacturing plant was able to gain a clearer, more comprehensive view of energy use and identify hidden sources of energy waste. With this information in hand, they could make operational changes in order to improve energy efficiency and achieve cost savings.

31% Energy savings over a one-month period!



31%
Energy savings



Energy consumed when paint line ovens were off was unexpectedly high, uncovering a procedural issue with personnel.

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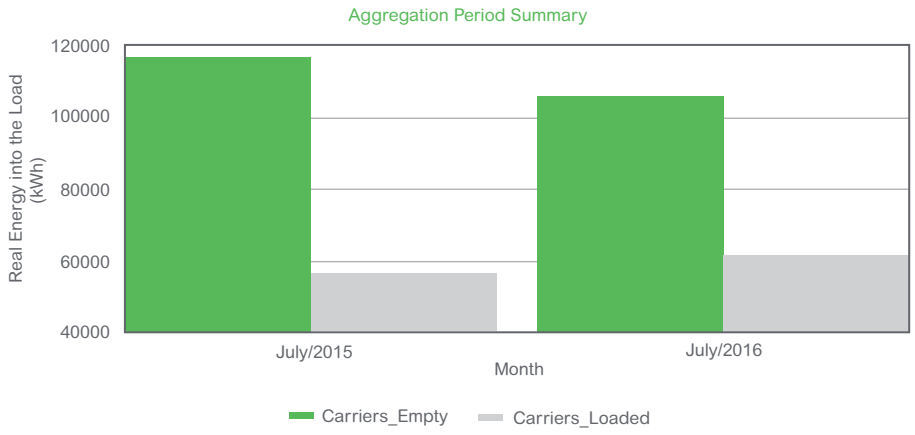
The Results: Lexington, KY Manufacturing

- Cost savings
- Increased “loaded” production
- Reduced production overtime
- Eliminated Saturday production
- Increased equipment life-span and reliability
- Increased up-time
- Process optimization
- Increased ownership by stakeholders – individual departments now have tools to monitor energy usage
- Measure & Verify (M&V) for energy efficiency
- Facilitated ISO50001 compliance verification (Plan, Do, Check)



Ratio of energy consumed when carriers were running empty vs. loaded was improved significantly, increasing throughput .

Achieve Maximum ROI

When energy costs are optimized at a process level, significant ROI can be achieved. By isolating “process” and “facility” usage, new savings opportunities can be identified. ROI payback for the Square D manufacturing plant project was less than 4 months. Repeating this process for larger scale motors could achieve even more energy savings and a faster payback. Viewing energy use by process, as well as by facility and “slicing and dicing” it into individual pieces gives greater intelligence and control, more comprehensive energy management, and increased cost savings.

For a free industrial energy management assessment and program plan, please contact powersolutions@schneider-electric.com.

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