



TIP 333: Strategic Energy Management of Industrial Subsystems Using Emerging Hardware and Software Platforms

Context

Utility strategic energy management (SEM) programs help large customers develop a more systematic, strategic approach to energy management. As companies implement SEM programs, they begin to achieve greater energy savings.

Specifically, SEM helps companies put systems in place to allow them to achieve significant, on-going energy savings over a period of five years or longer. Strategic energy management is essentially a continuous improvement approach to energy management.

Traditionally, SEM programs have been implemented at the whole-facility level, using the utility meter as a measurement boundary.

The SEM approach addresses the energy savings potential outlined in the Sixth Northwest Conservation and Electric Power Plan (Sixth Power Plan). The Sixth Power Plan calculates one-third of the industrial energy savings potential in the region is available from strategic energy management.

Description

This project investigates the data visualizations and analytics that inform and empower operators, plant managers, demand side management (DSM) program administrators, and equipment vendors such that each party is able to fill its role in driving continual energy improvement in energy intensive industrial subsystems.

Compressed air systems are targeted in this pilot because of their ubiquity in the Pacific Northwest, the relatively small number of primary energy consumers in each system (compressors and dryers), and the potential for O&M savings via leak reduction, pressure minimization, and sequencing optimization. Many compressed air systems at large industrial facilities use between 5% and 30% of facility energy use. A 10% subsystem level savings rate can be difficult to analyze at the primary meter, but can still result in meaningful and cost effective kWh savings for a DSM program.

Project tasks include (1) recruiting participants; (2) installing data acquisition hardware at pilot sites; (3) researching best practices for notification and visualization algorithms in similar fields; (4) generating initial versions of dashboard visualizations, subsystem

specific algorithms, and alarms and visualizations based on best practices, research, and interviews; (5) coordinating with sites during an SEM engagement to gather feedback and iterate on visualizations from Task 4: Software Preparation and Delivery; (6) measuring energy savings; (7) analyzing results; and (8) preparing a final report.

Why It Matters

This model of SEM delivery is not designed to address the potential for smaller engagements focused on specific subsystems within a facility. At a large industrial facility with multiple energy-intensive subsystems, meaningful energy savings within one system may be too small to accurately measure on a facility-wide utility meter. As a result, behavioral and O&M changes are more difficult to visibly link to efficiency gains using top-down measurement. This set of factors creates risk for sponsoring DSM programs (risk of savings being lost in the noise). These factors also create barriers to SEM participation

Goals and Objectives

The project's primary objectives are:

- 1) Identify the most effective analytics, notification strategies, and data visualizations to inform and empower operators, facility managers, DSM program administrators, and equipment vendors, such that each party is able to fill its role in driving continual energy improvement in an energy-intensive industrial subsystem, and
- 2) Demonstrate how hardware, dataflow, and software technologies can improve the scalability of subsystem-level SEM via a four-site demonstration project and identify hardware packages that allow for effective compressed air monitoring and notifications at lowest cost.

Deliverables

Each project task has associated deliverables:

Task 1 Deliverables: (1) a list of demonstration sites; (2) a feasibility study for each site, outlining estimated data acquisition hardware installation costs; and (3) agreements in place between the site, the project, the utility, and the utility DSM program.

Task 2 Deliverables: completed hardware installation and validation at pilot sites, with metering diagrams for each site.

Task 3 Deliverables: an action plan for dashboard development based on research and interviews.

Task 4 Deliverables: an initial collection of visualizations, algorithms, and notifications for groups of personnel, informed by the review of best practices. These will be in the form of mathematical algorithms used to drive online visualizations, assembled into dashboards and pushed via email and/or text, and the form, content, and trigger methodologies of notifications and alarms.

Task 5 Deliverable: a memo stating the energy efficiency action items implemented and pending for each site and outlining iteration steps on visualizations, dashboards, and notifications relevant to each site.

Task 6 Deliverable: M&V report for each site documenting energy savings.

Task 7 Deliverable: summary report on project participant response and analysis identifying the most cost effective combinations of hardware and software to identify and drive energy savings at subsystem level compressed air SEM engagements.

Task 8 Deliverable: final report.

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Project Start Date: October 1, 2014

Project End Date: September 30, 2016

Reports & References

Links

Participating Organizations

Cascade Energy, Inc
PerceivIt
Rogers Machinery

Funding

Total Project Cost:	\$307,631
BPA Share:	\$151,631
External Share:	\$156,000
BPA FY2015 Budget:	\$112,085

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