



Where Savings Float the Boat: Corporate Energy Management at Mercury Marine

A Corporate Energy Management Case Study

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OVERVIEW

Mercury Marine has a solid foundation for corporate-wide energy management. Two powerful features provide excellent results to date: consolidation of energy management under the authority of a Central Facilities Manager (CFM), and a power monitoring system that permits electricity costs to be tracked and billed to individual cost centers. Valuable energy flow data gives the CFM leverage in gaining corporate approval of energy technology upgrades. The centerpiece of these efforts in 2004 was the installation of a new, centralized compressed air system that saves roughly half a million dollars in annual electricity costs.

What was the desired outcome of the corporate energy management (CEM) effort?

Mercury seeks continuous improvement of cost margins, which is crucial to survival in the global marine engine industry.

What were the issues (or symptoms) that led to the implementation of CEM?

Mercury Marine's plant uses a significant volume of natural gas for foundry activities and space heat. Mercury also experienced significant rate hikes from power utilities after 1999. Utility bills forced them to look at electricity and gas consumption. Since 1999, Mercury has maintained a three percent annual energy reduction goal, adjusted for price fluctuation.

Prior to the arrival of the current Central Facilities Manager (CFM), some energy consumption records were kept, but not fully exploited. Mercury began staff training in ISO 9000 and Six Sigma (quality control) in 2002. Employees began to bring back energy improvement ideas from this training.

What were the technical, managerial, and behavioral elements developed?

Mercury tends to approach energy management one system at a time, as opposed to plant-wide, day-to-day energy management. The CFM leads energy improvement initiatives by identifying potential projects with a payback of two years or less. They started with a lighting project that standardized bulbs and fixtures. Systematic improvement of compressed air (CA) started in 2001 with fixing compressed air leaks. In 2004, a collection of 21 dispersed compressors with a combined load of 4,000 HP were replaced with a new central CA network with only 1,900 HP combined capacity-- five screw compressors providing a base load and two variable-frequency drive units for trim load. Master controls, demand expanders, and a large air storage vessel allow the CA system to match power consumption to actual air usage at a consistent pressure throughout the Fond du Lac campus. This eliminates costly idle spin practices and continuous fluctuations in demand pressure.

Mercury took advantage of financial and technical assistance to achieve its compressed air (CA) upgrades. The process began with energy audits provided by Ingersoll Rand and Plant Air Technologies. The Wisconsin State "Focus on Energy" program provided 50 percent of the energy audit costs as well as scholarships for staff training from the Compressed Air Challenge, conducted in late 2002 through early 2003. The fact that CA system loads were reduced by more than half sufficiently paid for this effort within specified payback targets. Mercury also takes advantage of the Focus on Energy's "tool lending library," which gives facilities access to specialized energy auditing tools such as ultrasonic leak detectors, power meters, IR thermometers, combustion analyzers, etc.

Since 2000, the CFM has relied on a heating/ventilation/air conditioning management system that monitors zone-by-zone energy consumption across the facility. Similar controls monitor electricity consumption by process work. Monitoring data

FACTS & FIGURES:

Mercury Marine: A subsidiary of Brunswick Corporation. Mercury Marine is the world's leading supplier of marine propulsion systems, and is notable as the last surviving U.S. based manufacturer of outboards.

Revenues: Just under \$2 billion (2003)

Scope of operations: One eight-plant outboard manufacturing campus in Fond du Lac, Wisconsin. Component manufacturing is conducted at four other Wisconsin sites; four in other states and overseas. Fond du Lac campus consists of over 1.8 million square feet (roof space).

Energy management team: Currently, the Central Facilities Manager serves as the energy manager. The plant manager for each facility serves on a corporate energy management team.

Annual energy spend: \$6 million for natural gas, \$7 million for electricity.

Key energy professional: Jerry Eaton, Central Facilities Manager at Mercury. Nels Andersen of the Wisconsin Focus on Energy program facilitated Mercury's achievements with technical and financial assistance.

From the Brunswick Corporation Website: *"The Company recognizes its obligation as a good corporate citizen.... The Company's policy is to seek ways to ensure that its activities meet all applicable health, safety and environmental standards."*

allows monthly reconciliation of internal metering with the power company. Substations within the plants are back-billed for their precise electricity usage, not per artificial accounting convention.

How are empowerment and accountability addressed?

The CFM's function and authority at Mercury is like a "landlord" in that the manager charges plants for infrastructure services like waste management, roof repairs, painting, and paving. The new CFM added energy bills to the mix. There is no full-time energy management person at Mercury. The company formed an energy steering management team as the result of training and advice provided by Focus on Energy and Alliant Energy. This team consists of Plant Managers and plant engineers from each plant and is chaired by the Chief of Staff. While energy is a "part time" pursuit for each team member, this cross functional and multi-disciplinary team meets regularly to discuss ideas and implementations. There is no discrete cost function for energy management. Each plant manager simply applies an average of two hours per month for energy management to their standard cost function. The CFM applies about 10-20 hours per month to overall energy management coordination.

Mercury's top management stands behind energy management goals. Corporate leadership reinforces staff training—including the concept of equating energy with money. One popular venue for instruction is "tool-box training" conducted for five minutes before the start of each shift.

What were the barriers to implementation, and how were they overcome? Corporate financial requirements impose a two-year payback on capital projects. Mercury's compressed air system upgrade worked out to a 2.5 year payback, but this was reduced to just over two years thanks to a grant from the Wisconsin state Focus on Energy program. The Central Facilities Manager (CFM) sold the concept to an audience of top management as "the right thing to do." The CFM also sold process managers on the idea of electricity monitoring. The hooks: (1) what managers don't save on energy costs has to come out of their discretionary budgets, and (2) you can't manage what you don't measure.

How are results monitored and communicated?

The energy team develops standard operating procedures for equipment start up, shut down, after-hours protocol, etc. While the CFM is responsible for utility bills, he gets feedback from the energy team regarding potential energy improvement projects. The CFM bills each department for their direct energy usage. These internal "utility bills" are complete with consumption, demand and peak charges, reactive power, etc. Reconciling energy data this way has a big impact on departmental people. The data reflects the quality of energy decision-making down to the lowest staff levels. Now, people shut off machines at break-time.

What are the tangible results to date (consumption, emissions, financial, etc.)?

Mercury's new central compressed air system commissioned in August 2004 saves 9-10 million kWh annually. Heat recovery from those compressors is ducted into the facility during cold weather, offsetting another \$50,000 of space heating load. Other major projects included a lighting replacement program with an annual saving of 4.2 million kWh, and the conversion of roof-top heating units from electricity to gas, saving another 2.7 million kWh annually.

Who is the audience for the results? The Central Facilities Manager (CFM) wants to make energy management results visible to corporate leaders at Mercury Marine and the parent Brunswick Corporation. His strategy is to link this agenda with corporate citizenship responsibilities.

How do awards and recognition play a part?

There is currently not enough time to develop employee awards or to publish articles (this case study is a first for Mercury Marine). To raise staff awareness of energy efficiency opportunities, Mercury hosted an open house for employees that presented take-home energy-saving devices. Employees would benefit from these items personally, but the open house also reinforces energy-awareness.

In what way have Best Practices and related U.S. Department of Energy resources contributed to energy management?

Training provided by Wisconsin Focus on Energy incorporated compressed air and motor drives tip sheets from the DOE's Best Practices program. Focus supplemented DOE material with a CD ROM featuring lighting, steam, HVAC, water, waste water, and pumps improvement opportunities.

What are the threats to the durability of the CEM effort, and how are these addressed?

The key to Mercury's ongoing energy management success is putting energy responsibility in the hands of the Central Facilities Manager. Process managers have been successfully "sold" on this delineation of duties because it gives them more time to focus on production goals. For now, this arrangement supports ongoing energy management.

What remains to be done? The CFM is currently tasked with so many facility maintenance items that energy does not get the full attention it deserves. A full-time energy manager would pursue a better understanding of energy flow data and control points for remediation. This would allow greater implementation of Six Sigma and similar quality control methodologies. Remaining opportunities include selective re-lamping, task light management, many forms of heat recovery, and motor inventories and replacement protocols. Because Mercury is one of the few facilities to host state-of-the-art power monitoring, it would be an ideal showcase for hosting Compressed Air Challenge training events. Brunswick, Mercury's parent corporation, has the opportunity to replicate Mercury's results in other manufacturing units.