NDUSTRIAL ENERGY MANAGEMENT THE ENVIRONMENT THE PROGRAM

OBTAIN MANUFACTURING ENERGY SAVINGS NOW AND IN THE FUTURE



- Broader adoption than formal energy management systems such as ISO 50001
- May be included in existing continuous improvement, cost control, green marketing, or environmental programs
- "Project" oriented to work with existing tracking systems and practices



INDUSTRY IS A BIG ENERGY USER



THREE PARTICIPATION OPPORTUNITIES

ENERGY FORUM

- Luncheon event with a presentation on a tech topic such as compressed air, energy management, or motors and drives
- Displays program staff competency
- Discover and recruit candidates for the program

TRAINING

- EMS Training and Level 1 Assessment (1/2 day)
- Site must form an energy team
- Training presents EMS principles and discusses plant operations. A plant tour follows.
- Report describing potential opportunities is sent

THERE IS NO FEE TO THE COMPANY FOR ANY OF THE SERVICES

ASSESSMENT

- Level 2 Assessment
- Site must commit to ISO 50001 or sign up for the Energy Star Challenge for Industry (10% reduction in the energy metric in five years)
- Assessment quantifies specific recommendations
- On site for one day with four engineers
- Provides a starting point for the site's energy effort



RANIR, LLC healthcare products.

MARCH 2015

Attended compressed air forum

> We have done a lot of things, but we couldn't have done it without Consumers Energy's help. This has been a motivating experience.



THE RESULTS



Consumers Energy Industrial Energy Management Program

Abstract

For 2017, the State of Michigan increased energy efficiency goals from 1% to 1.5%. In addition to meeting a more aggressive savings goal, the Consumers Energy Commercial and Industrial energy optimization program must also cultivate significant savings from sources other than lighting, as those savings will decline as conversions are completed over the next several years. Obtaining savings from the industrial sector is crucial now and in the near future.

This paper presents how the Industrial Energy Management (IEM) program guides manufacturers to obtain energy savings, and tells a story about one company reaching the 10% savings goal established by the ENERGY STAR[®] Challenge for Industry.

Consumers Energy (CE) IEM program offers three progressive activities: 1. Luncheon forums with a technical topic to introduce the program to industrial companies. 2. After a company forms an energy team, CE staff provide training on energy management principles and perform a Level 1 audit to identify prospective savings opportunities. 3. Sites that sign up for the EPA's ENERGY STAR Challenge for Industry or commit to ISO 50001 receive a Level 2 audit, which evaluates energy savings and provides 6-12 specific recommendations with explanations and all calculations.

Participation rates in Level 1 and 2 audits and incentive projects attributed to these participants will be presented in this paper, as well as a story of one company's operation, motivation, and approach to energy savings. A list of their projects and the progression in their energy metric will show how they ultimately met and exceeded the 10% savings target established by the ENERGY STAR Challenge for Industry.

The Industrial Energy Management (IEM) Program

THE ENVIRONMENT

Several utilities and federal programs have promoted ISO 50001, or Strategic Energy Management, and encouraged manufacturers to enlist. The adoption rate has been very low in the United States, though the programs and standards are based on sound, globally-accepted principles. Most US companies face much lower utility costs than those in other countries. More importantly, the utility cost at most US companies is a small fraction of total operating cost (say less than 6%). While energy may still be the largest unmanaged cost at a company, issues concerning reliability, labor availability to work on energy enhancements, quality, and employee retention dwarf concerns regarding energy costs. These conditions create an environment where energy conservation may be considered a burden rather than a worthwhile pursuit.

However, companies still have good reasons to pursue energy efficiency. One is cost control. Another is growing market pressure from customers. Some customers are asking their suppliers to be "greener," and most of the environmental impact the plant controls is through energy use. A few see energy efficiency as doing the right thing, and something that has the potential to provide a competitive advantage with costs, market position, and employee recruitment/retention by being a responsible company where people want to work.

While some companies in this environment will ignore energy opportunities, the most common approach is to push energy saving opportunities into an existing program already operating at the company. A site may have ISO 14001 certification, and an energy project may contribute to meeting the energy aspects

portion of that standard. Many plants run continuous improvement programs and may include energy projects there. Also, as companies manage their business, goals are placed on each department. The manager with responsibility for the physical plant and equipment (often a maintenance department) may perceive energy use as the one area to improve, considering limited control over his labor costs and maintenance materials.

To fit with existing programs, energy initiatives are parsed into individual projects. An overall energy management approach is generally not pursued, and may not even be welcome. Adding another management program is perceived as a burden with its own set of requirements to follow, drawing time and resources away from performing more critical functions. Each project must stand on its own merits and compete with other projects demanding capital and time from plant personnel. Project benefits beyond energy and cost savings can help sell a project, but ultimately each project must be justified.

THE PROGRAM

The primary goal of the Consumers Energy Industrial Energy Management (IEM) program is to increase industrial participation in the overall Consumers Energy program for energy efficiency. While lighting is a mainstay of the overall program, Michigan has a significant industrial base using energy for many other functions. And while lighting provides significant savings, its portion of the overall program may decline in several years as the LED revolution plays out. If manufacturers participate now and in the future, the program will be more likely to succeed – especially with projects other than lighting.

The ideal scenario is to obtain repeat business from the manufacturers. One way is the adoption of an Energy Management System (EMS) since it incorporates continuous improvement principles. However, uptake of a typical EMS program focused on the management system was expected to be dismal and high risk for the IEM program. A program designed to more closely fit with how companies already operate would be more likely to increase participation. Such a program would put resources into identifying projects the sites could execute.

The IEM program has three progressive activities:

- 1. *An Energy Forum.* A luncheon with discussion about an energy topic, such as compressed air, energy management systems, motors and drives, natural gas savings, or lighting. While disseminating information is one objective, the intent is to use these forums to recruit companies into the program. The event allows for a personal meeting with prospective sites, to show CE staff expertise, and discover sites that are candidates for the program.
- 2. Energy Management System Training and Level 1 Assessment. To qualify, a site must meet a minimum utility consumption and form an energy team. The event takes about a half day on site. The training (2-3 hours) presents the principles in an energy management system and reviews historical energy consumption. During the training plant operations are discussed. Some prospective energy saving measures are discovered during the meeting and then a plant tour spurs additional findings. These prospective measures are provided to the plant in a report, along with a description of how each measure provides energy savings.
- 3. Level 2 Assessment. Plants that commit to ISO 50001 or take the ENERGY STAR Challenge for Industry are eligible for a Level 2 Assessment. This requirement is in place to demonstrate that the plant is committed to pursuing energy projects. Since this activity consumes a significant amount of staff time and there is no fee for the service, some type of commitment is needed to screen those that are less likely to use the audit report information. Many audits end up unused simply because they were free and the company was not behind the effort. Charging a fee would be another method of screening sites that are not serious about pursuing energy savings. This assessment is modeled after the Department of Energy's Industrial Assessment Center audits. A

team of engineers is on site for a day to collect information and data needed to perform energy saving calculations, and a typical report will contain 6-10 quantified recommendations.

The assessments provide a starting point for the energy journey the companies are embarking. Most are satisfied with a Level 1 assessment. With it, they choose to pursue selected projects with their contractors and staff. Those with a Level 2 assessment generally put the projects on a list of all energy projects and prioritize them. The best projects are ones that fit with other activities and are done quickly, and the rest are reconsidered when the initial ones are complete. The audit is a starting point and ultimately additional ideas must be generated internally to continue improving. An auditor can walk into a facility and find improvements to areas where he has experience, but those that work with the process and know it best can find savings auditors may never find.

Throughout this entire process, the site staff becomes more familiar with the Consumers Energy program and its staff. With increased familiarity and comfort, they are more likely to consult with CE regarding prospective energy savings measures. This helps develop projects that are eligible for incentive payments.

The IEM program tracks performance through the delivery of services as well as the incentive program savings from all incentive projects done at the participating companies. Participants are counted when the training and Level 1 assessment is delivered. Attribution of savings includes participants from all years back to the inception of the program in late 2012. The IEM performance for 2012-2016 is shown in the table below. The Identified Savings is the amount of savings quantified in a Level 2 assessment.

Year	Participants	Identified Savings		Attributable C&I Program Impact			
		kWh/yr	Mcf/yr	kWh/yr	Mcf/yr	Projects	Incentives
2012	7	0	0	0	0	0	\$0.00
2013	9	11,673,075	138,901	616,056	5,034	8	\$121,976.00
2014	8	1,678,962	5,236	5,055,956	6,931	27	\$423,400.01
2015	9	5,639,088	37,368	3,973,067	2,345	36	\$304,370.74
2016	8	865,379	0	6,275,203	55,059	38	\$723,279.00
Total	41	19,856,504	181,505	15,920,282	69,368	109	\$1,573,025.75

The Ranir Journey

RANIR

Ranir LLC (http://ranir.com/us/) is a leading global manufacturer of oral and personal healthcare products. Manufacturing plants are in Germany, India, China, and Grand Rapids, MI, USA. The Grand Rapids site makes manual and powered toothbrushes and dental floss. Manufacturing processes cover plastic injection molding, automated cells for toothbrush assembly (bristle insertion, tip shaping, packaging), floss coating, and packaging. All product goes out in consumer packages ready for store shelves.

The major energy consuming process is injection molding, which is supported with chilled water and tower water. Other significant energy users are compressed air for automation, HVAC, and lighting. The injection molding area is not mechanically cooled, but the automated production areas and offices are air conditioned. Annual electric use is between 5-10 million kWh. Annual natural gas use for building heat is modest since the site runs continuously and generates enough process heat to keep the building warm in the winter.

MILESTONES

The Support Services Manager for Ranir first attended the CE Energy Forum in March 2015, where the topic was Savings in Compressed Air. Prior to this, the site had done one large lighting incentive project in 2010 and had recently started a smaller lighting project. There had been no involvement with the IEM program.

2015: In March 2015, the site initiated a compressed air energy audit and received an incentive. In April the site initiated an exterior lighting project and received an incentive. In October, the site started an incentive project to replace a hydraulic injection molding with an electric injection molding machine and install large compressed air storage tanks with a flow controller.

2016: In January 2016, the site had formed an energy team and Consumers Energy delivered EMS training and Level 1 assessment, which identified seven prospective areas for energy savings. Ranir then registered for the ENERGY STAR Challenge for Industry in February. The baseline year was 2015, prior to the impact of savings from the injection molding and compressed air project initiated in October of that year. ENERGY STAR sets the goal as a 10% reduction in the energy metric within five years. In March, the Consumers Energy IEM team performed the onsite portion of the Level 2 audit. The audit presented six quantified recommendations with savings analysis and four unquantified recommendations. Two of the quantified and one of the unquantified recommendations were implemented in whole or part.

2017: In January 2017, Ranir again utilized lighting incentives for an office expansion. In March, Ranir met the ENERGY STAR Challenge for Industry goal with a 16.4% reduction. As required by ENERGY STAR, a Professional Engineer was retained to review the data and prepare the application for certification, which was awarded in May. In June, IEM program engineers met with the Support Services Manager as they had an interest in further improvements. Four of the audit recommendations not yet started were highlighted to pursue, as well as two new opportunities.

PROJECTS

Ranir provided a list of the projects and actions that had been performed (below). This list includes the significant incentive projects listed above under Milestones, as well as others. It is important to note that while some individual actions may save little energy, performing many of them and keeping a culture of energy efficiency where equipment is operating optimally has a significant effect.

- Compressed air audit (with leak detection and leak repair, which has continued)
- LED lighting in Plastics and Warehouse
- New roof over offices with improved insulation
- Compressed air storage tanks and flow controller
- Lowered plant compressed air pressure
- Replaced one hydraulic injection molder with electric
- Adjusted temperatures throughout plant and offices and narrowed control window
- Machines powered off when not in use
- Improvements to lighting schedules
- Automatic lighting controls
- Exterior LED lighting
- Replacement of aging rooftop HVAC units
- Removal of air blow-offs for cleaning
- Removal of humidity controls in repurposed rooms that no longer require it

During this period production increased. That increase aided in reaching the ENERGY STAR goal, as overhead energy use (e.g., lighting) was divided among more units of production.

Conclusion

The Consumers Energy Industrial Energy Management program seeks to generate short- and long-term savings for companies and the energy efficiency program. This is done by working individually with companies to educate them about the elements of an energy management system, and to identify projects to help them reach ENERGY STAR for Industry certification. This approach meshes with the typical company practice of managing projects and obtains much better acceptance than would be expected for management system implementation.

Ranir's site in Grand Rapids was successful in reaching and exceeding the ENERGY STAR Challenge for Industry goal in about a year, the minimum time allowed by the program. The site accomplished this through a combination of large incentive projects, implementation of good operating practices, and increased production. While success ultimately relies on the site acting on recommended measures, the Consumers Energy IEM program was a key contributor through education, incentives, and project identification. The Support Services Manager remarked, "We have done a lot of things, but we couldn't have done it without Consumers Energy's help. This has been a motivating experience, and I look forward to networking with other companies to exchange ideas and keep improving."