

Encouraging Development of Sustainable Energy Management Systems in the Manufacturing Sector

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ABSTRACT

Many government and public programs aimed at increasing industrial energy efficiency focus on technology as a means for positive change. These programs provide tools and guidance on how to make use of available technical opportunities and are important to the industrial energy efficiency marketplace. In the late 1990's, the Environmental Protection Agency (EPA) revitalized its ENERGY STAR[®] program to better address the efficiency of U.S. manufacturing sectors. EPA began by examining the numerous efficiency offerings for industrial companies. Missing was a program that encouraged companies to strategically manage their energy. To create an environment supportive of energy management and the use of energy-efficient technology, EPA decided to base the program's work with manufacturers on a strategic approach to corporate energy management providing energy managers the tools required to sustain productive programs. Corporate energy managers also were offered access to the successes of their peers and practices. Individual industries were provided a detailed concentration on energy, or focus, and were given a means for measuring energy performance in their plants and buildings. Technology that was applicable to a specific industry was summarized for all focus industries along with practical details for implementation. In 2002, EPA worked directly with four manufacturing sectors. Overall, this approach has the potential to achieve EPA's long-term vision for ENERGY STAR's work with manufacturers, that is to have manufacturing companies institute goal-oriented, productive energy management systems with demonstrated and sustained improvement in environmental and energy performance across the business.

This paper reports on EPA's experiences and lessons learned in extending ENERGY STAR's corporate energy management program to the manufacturing sector. The program was first reported on at the 2001 Summer Study on Energy Efficiency in Industry.

Introduction

ENERGY STAR is a voluntary government program that helps individuals and organizations identify the best in energy performance. In doing so, the program enables decision-making that is cost-effective and good for the environment. Additionally, commercial and industrial organizations are able to address energy costs while establishing themselves as environmental leaders. These organizations are encouraged to embrace a strategic approach to energy management, one that will provide the organization with sustained improvement in energy use. In 2001, we reported on a new direction that the program was taking to better work with industrial companies to enhance their corporate energy management programs. Since that time, two years have passed and a great deal of work has transpired. The following is an overview of the progress made and lessons learned in implementing the program enhancements.

Working with the Manufacturing Sector

ENERGY STAR strives to institutionalize strong energy management in the companies it impacts. Companies are encouraged to adopt good practices that will help them elevate energy management to the same level of other operations in the business. Plainly stated, success is possible if companies “manage energy with the same expertise as they manage other areas of their businesses” (Schoeneborn, 2002).

A key term is “management”. Since most industrial companies are involved in implementing the International Organization for Standardization (ISO) quality or environmental standards, these companies understand what a management system is. The standards promote a system that centralizes the principle of continuous improvement. Continuous improvement means that a company maintains an active system to measure, improve, plan, and evaluate performance changes in the organization. If implemented properly, such an arrangement should encourage regular, positive change and continue forward successfully regardless of the personnel involved. ENERGY STAR encourages the application of basic management systems to energy management.

Institutionalizing energy management also can be thought of as creating a sustainable energy management program. ENERGY STAR works with companies to accomplish this in several ways. First, a company that chooses to be a partner in the program must submit a partnership letter stating that the company makes a fundamental commitment to continually improve its energy performance. A request is made that the Chief Executive Officer or Chief Financial Officer sign the letter. A commitment from an executive at this level is not trivial. To secure a signature, the corporate energy manager may have to demonstrate how the company will meet the goals of the partnership and how the company and energy program will benefit. It also draws attention to the point that energy management is not without cost; personnel and funds may be necessary to meet program goals. All of these must be justified in the language of the business.

Second, companies’ efforts are supported with a strategic approach to energy management as EPA has learned from the program’s commercial and industrial partners over many years. In our experience, companies that are successful at managing energy well have programs that set goals, have corporate policies, have a dedicated director backed by a company-wide team, maintain systems to measure and benchmark energy use for all facilities and operations, implement plans for improvement, use networks for communicating results and necessary information and receive the support of upper management. Formalizing these key management elements helps to ensure the energy management program can sustain progress regardless of changes within the company.

The program provides all partners support in improving their corporate energy management programs, and, the strategic approach is central to that effort. In addition, a strong network of energy managers has been created to enable interaction, sharing of experiences, and development of professional connections. Two settings for networking exist: web-based and partner-hosted. The web-based networking generally takes place on a monthly basis, while regional, partner-hosted meetings of the ENERGY STAR partners occur annually. Regardless of the setting, the meeting content is based on the steps to implement a strategic energy management program and is strengthened by presentations made by the program’s partner companies.

Through the program's web site, energy managers are connected with technical resources to help them meet their information needs. Important links are made to programs that offer valuable and accurate information such as the Department of Energy's tools for cross-cutting technologies developed by its Best Practices program and results from more industry-specific research as is provided through Industries of the Future.

Annually, ENERGY STAR works with a limited number of manufacturing sectors in what is called a focus. A **focus** is a concentrated effort to improve energy performance within a sector. Its goals are to create momentum for continuing performance, provide energy management tools, and encourage the sharing of ideas and opportunities. In a focus, the sector's energy professionals, routinely corporate energy managers with responsibility for energy management at a full collection of plants, are convened, technical opportunities for improvement are identified for the industry, and indicators of plant and building performance are provided. A concerted effort is made to convene the major companies in an industry so that the participants cover the lion's share of production. All efforts culminate in a meeting in which energy is discussed and plans for continued improvement are made.

One basic tool offered to most focus industries is the plant energy performance indicator (EPI). An EPI is a mathematical model that enables companies and plants within the U.S. to determine how their energy performance compares to that of their industry, i.e. how efficiently energy is used in reference to other U.S. plants manufacturing similar products. The model ranks each plant based on energy use patterns in the industry and relative to the best performing plants. The ranking is normalized to the specific configuration of the plant (Boyd, 2002). The EPI is developed from data reported by companies to the U.S. Bureau of Census on each plant and is, sometimes, supplemented by additional data that the companies provide. The EPI can aid corporate level managers as well as plant managers in assessing current energy performance, setting and tracking goals, and prioritizing limited resources. When conscientiously used on a regular basis, it can be an important tool to monitor the ongoing progress of an energy program and is part of ensuring a program's continuing success.

Providing an overview of the technical opportunities for energy efficiency is another key component of the focus. For each industry, a technical opportunities guide is prepared. These reports are written based on information in the literature and in consultation with the industry in the U.S. and abroad. They consider cross-cutting technologies, as in those options that impact many industries like compressed air, motors and so forth. The reports also look at specific improvements that affect the particular industry's plants and processes. The reports offer corporate energy managers a means for contributing to implementation plans at many plants and plant managers the opportunity to quickly identify additional energy savings that may not have been considered. When combined with the EPI, the report can help to identify opportunities for energy improvement.

After working directly with the companies in the sector, preparing the EPI, and producing the opportunities assessment, ENERGY STAR organizes a meeting of the industry in which energy efficiency issues are shared, energy management tools and their expanded uses are explored, and helpful support is provided. Open, nonconfidential discussion of energy management challenges in the particular industry is encouraged as is problem-solving. Tools and reports are housed on the ENERGY STAR web site located at www.energystar.gov.

Experiences and Lessons Learned

Overall, the program has been well received. Many industrial partners have taken advantage of the offerings and guidance. Many more participate regularly in the scheduled networking meetings.

The focus process has been accepted as well. Having implemented the first focus in late 2001, ENERGY STAR held the initial focus meetings in 2002. Focuses were offered to two industries, auto manufacturers and brewers. These companies had not experienced working with their full industries to improve energy performance. Each company's corporate energy manager was invited to participate in the planning and development of the industry energy efficiency focus. Several conference calls were held over the course of a year to develop the EPI, the opportunities guide, and a detailed agenda for the focus meeting. Each company was encouraged to comment and to help shape the development of the focus.

EPA originally intended the focus to be confined to a period of one year. However, based on the request of one of these industries, the auto industry, it has been decided that an annual meeting will be held to benefit the industry's energy efficiency efforts. The industry also is interested in ongoing improvements to the EPI. The experience in the auto industry shows there is value in maintaining a continuing relationship with a focus industry on a regular basis to support the management system and tools in place when the industry clearly embraces them. ENERGY STAR plans to follow this model for future focuses.

The EPI is a new concept to many of the industries; therefore, they have no means of comparing the tool to something similar. As a result, at the outset, many industries have been skeptical of its value but have agreed to support its development and test the tool. For the first EPI fully completed in the past year, the auto assembly EPI, the results were positive. The industry believes the tool has value in its periodic use and can aid them in setting benchmarks. One corporate energy manager said the EPI provides the first opportunity he has had to externally benchmark his plants against those of his competitors. Another, who was skeptical of how the EPI could help him improve his energy management program, has expressed wholesale support for the EPI and a desire to help other industries understand its value.

On the downside, the difficulty the program experienced in obtaining the necessary approvals and clearances for access to the Census data has been extremely limiting in the amount of work that was accomplished in 2002. Additionally, the nature of the Census data sometimes requires the industry to consider supplementation of the data set to produce a more meaningful indicator. These two factors made it difficult to maintain a smooth flow. Further, some industries may not be well suited for an EPI, especially where one company dominates an industry by owning a large number of plants. Such a company may have limited interest in supporting development of an EPI for its industry.

Another observation about how much support may be given to a focus by a company involves the type of person that a company assigns to participate. Some companies believe the environmental, safety, and health staffs are the correct people to be involved. Unfortunately, too often these employees may not have a direct contact with actual energy management in the company. Many of them serve in data tracking roles but have no ability to suggest use of the EPI as a powerful management tool. In our experience, the most successful person is a corporate energy manager connected to manufacturing operations and utilities and supported by an organization-wide energy team.

Word has spread about the ENERGY STAR focus process among ENERGY STAR's industrial partners. Several leaders in their industries have taken the initiative to request that their industry be placed in the queue for a future focus. The program is now working on schedules to accommodate their participation.

The technical opportunities guide has found its place in supporting the industries as well. Response to this product has been supportive. One company calls their guide the "lessons learned" document. Such a remark demonstrates the value of the offering in providing a compilation of technical opportunities that an industry can use to improve its performance.

Future Directions

EPA is interested in seeing real, sustained improvements in energy efficiency. ENERGY STAR will make a concerted effort to work with its partner companies to compare and improve the elements of their energy management systems to those that support a sustainable, strategic program (i.e. policies, goals, measurement and benchmarking, etc.). The momentum created through the focus process will be maintained to ensure the environmental benefits are achieved. Time delays experienced in accessing Census data for development of the EPI are beyond the control of the program; however, the impacts such delays can cause will be minimized in the future by ensuring the requested approval periods for access to the data are as long as possible decreasing the number of times approvals are required from the Census Bureau and the Internal Revenue Service.

Working with the appropriate personnel in a corporation is important to the success of the program. Those with backgrounds in energy management, responsibility for utility management, or experience in operations will be sought out and offered the opportunity to participate.

With the extension of the focus to an annual event, new opportunities present themselves for creating positive change in an industry. ENERGY STAR will work with the focus industries to establish long-term goals that the industry and the program can work together to formulate and achieve. Not fully conceptualized at this time, the goals will be designed to challenge the industry and its individual companies and will be monitored based on their progress in improving individual plant's EPI scores. Additional focuses, begun last year, are under development with the cement and corn milling industries for the coming year. Energy savings coupled with effective recognition for the environmental benefits achieved are expected to provide greater incentive for future industry participation in ENERGY STAR.

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