ALLIANCE TO SAVE ENERGY
Creating an Energy-Efficient World

Margins for Profit, Not Error:
Corporate Energy Management at DuPont
A Corporate Energy Management Case Study
Sponsored by the U.S. Department of Energy, Industrial Technologies Program

Contact: Christopher Russell, Director of Industrial Sector, (202) 530-2225 crussell@ase.org

OVERVIEW

Corporate Energy Management (CEM) practices at DuPont are supported by two top-level strategies. The first is designating energy conservation as a high priority corporate issue. The other is applying "Six Sigma" quality control methodology to the energy management process. Through 2002, DuPont merged these strategies to identify and implement over 75 energy improvement projects across its global operations. The average DuPont Six Sigma energy project is estimated to save over $250,000 per year.

What was the desired outcome of the CEM effort?

By using the Six Sigma methodology, DuPont intended to implement a managing process that would result in lower manufacturing costs, less variability in monthly energy costs, and the establishment of best practices that could be used across the company to uniformly manage energy costs. In addition, using Six Sigma ensured that all sites and all businesses were applying the same approach and tools to address this issue.

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

In prior years, energy management at DuPont was practiced on an *ad hoc* basis at individual sites. There was no system to tabulate results. Fuel price spikes and constant volatility underscored the need to take more coordinated action. In addition, new concerns emerged regarding potential environmental regulation.

What technical, managerial, and behavioral elements were developed?

In September 1999, DuPont established a series of energy-use goals to be achieved by 2010. These goals are (1) hold total energy use flat using 1990 as a base-year; (2) supply 10 percent of total energy needs from renewable resources at a cost competitive with fossil-derived alternatives; and (3) reduce greenhouse gas emissions by 65 percent (CO_2 equivalent basis) using 1990 as a base year. Six Sigma methodologies were applied to achieving these goals. Over 75 energy-related projects have been accomplished and archived for search and review by DuPont employees. DuPont also communicates its success stories throughout the organization by conducting distance learning seminars called "virtual workshops." These workshops allow worldwide DuPont staff to view presentations over the Internet while listening to audio accompaniment over the phone. A typical workshop may cover four or five recent projects and normally lasts two hours.

How are empowerment and accountability addressed?

Also in 1999, DuPont began implementing Six Sigma in its manufacturing, transactional, and management processes. This DuPont strategic decision has had wide operational impacts. The use of Six Sigma significantly improves the probability of approval for strong energy project proposals. Among other requirements, analysis of energy efficiency must be demonstrated in the approval process for new projects. In addition, to ensure that employees use and implement the Six Sigma methodology, promotions at DuPont are contingent upon achieving various levels of Six Sigma proficiency.

FACTS & FIGURES

DuPont: A Fortune 500 manufacturer operating in more than 70 countries, offering a wide range of products and services to markets, including agriculture, nutrition, electronics, communications, safety and protection, home and construction, transportation and apparel.

Revenues: $27.0 billion in 2003.

Scope of operations: Over 100 plants, including major locations in Texas, Delaware, Tennessee, Virginia, West Virginia, North Carolina, and South Carolina. Many plants are outside the U.S.

Annual energy use: About 1/4 Quad; 6 percent below 1990 levels.

Key energy professional: Kelly Byers, consultant manager, DuPont Energy Engineering Technology.

Ann Gualtieri, Vice President of Investor Relations, DuPont:
"Why would sustainability practices be a proxy of good management? Because it shows that a company keeps an eye on the far horizon and long-term growth…in some instances, trying to reduce the environmental footprint creates innovation that provides more bottom-line effects."

What were the barriers to implementation, and how were they overcome?
The biggest challenge to achieving corporate-wide energy management at DuPont has been the company's size and complexity. With broad scope comes a mix of professional cultures. Top managers usually gain experience through a variety of technical and engineering assignments. The traditional power and utility functions, however, tend to retain staff who have been proven successful in maintaining reliability. In addition, limited travel budgets meant that opportunities to network and share business solutions were increasingly more difficult to pursue. Six Sigma emerged as a philosophy common to management, process, and utility staff. This commonality facilitates greater interaction among these functions. In addition, the DuPont Energy Technology Network fosters broad communication and knowledge sharing among all energy professionals throughout the company.

How are results monitored and communicated?
Progress toward accomplishment of energy goals is tracked corporately through an annual sustainability report. Internal peer networking is accomplished via the Energy Technology Network and the online database of documented projects. This network serves over 600 energy technologists.

What are the tangible results to date (consumption, emissions, financial, etc.)?
A sample of the most successful DuPont energy projects achieved with no capital investment include:

- condensate return to powerhouse
- boiler and chiller optimization
- lowering dew-point of plant air
- improved boiler soot blowing
- water treatment optimization

A sampling of 12 projects similar to the ones above has a combined savings potential of $4.9 million in annual energy costs. The potential average annual savings identified across the 75 projects documented in the Six Sigma database is $250,000 per project. Data indicate that DuPont has achieved a 68 percent reduction of greenhouse gas emissions since 1990, thus already exceeding its target level (65 percent) and target date (2010). Global energy consumption has been essentially flat since 1990, despite a 35 percent increase in production.

Who is the audience for the results?
Energy performance results are included in the DuPont annual sustainability report that accompanies the annual shareholder report. DuPont representatives participate in professional associations such as the Council of Industrial Boiler Owners and the American Chemistry Council. Internal DuPont staff have access to virtual workshops, a database of project profiles, and templates that serve as a starting point for new projects. A two-and-a-half day, in-house energy conference hosts approximately 150 people biannually.

How do awards and recognition play a part?
Six Sigma application in DuPont encourages organizations to reward its successful participants. Successful project team members are rewarded via recognition plaques, "night on the town" awards, or, in some cases, cash awards based on the amount of project savings.

In what way have Best Practices and related U.S. Department of Energy resources contributed to energy management? Some plants have used the AirMaster and MotorMaster+ software tools, which give plant managers a summary of compressed air system improvement opportunities, prioritized by the estimated volume of electricity and dollar savings. DuPont is also examining opportunities to collaborate with DOE in conducting a two-hour virtual workshop to introduce DuPont personnel to the overall set of Best Practices resources.

What are the threats to the durability of the CEM effort, and how are these addressed?
The biggest challenge to the DuPont energy management initiative will be the restructuring of operations to meet changing market needs. These restructurings normally include consolidations of the workforce, requiring an engineer to perform functions that were once covered by three or four individuals. In addition, restructuring also includes renewing the work force as new people are brought in with new skills. Both instances will require additional training of a heavily tasked workforce. The virtual workshop approach was designed specifically to address these challenges.

What remains to be done?
To ensure continued success in the energy management process, DuPont is fortifying Six Sigma by developing project templates for common, repetitive opportunities. DuPont is maintaining its high-profile energy emphasis by continuing to train employees in the Six Sigma methodology and by encouraging them to identify new projects, including energy-related projects. The database of projects is evolving commensurately. Energy workshops can be similarly enhanced to cope with a changing workforce.