Lightening the Load at Staples

Staples, Inc. is the world's largest office products company. With 2005 sales of $16.1 billion, Staples serves consumers and businesses ranging from home-based businesses to Fortune 500 companies in 21 countries throughout North and South America, Europe and Asia. Staples operates more than 1,250 stores in the U.S. and 1,786 worldwide and also serves its customers through mail order catalog, e-commerce and contract businesses.

The company's retail and delivery operations are supported by a network of facilities that distributes products to stores and fulfills delivery orders nationwide. Because this network's facilities and equipment consume a significant amount of energy, the company had many opportunities to become more efficient. To this end, Staples' Energy Management Solutions (EMS) team has cut costs and greenhouse gas (GHG) emissions by upgrading to energy-efficient equipment and incorporating best management practices.

Case Background: An essential part of Staples' U.S. supply chain is its four distribution centers for its North American Retail business, and 30 fulfillment centers for its North American Delivery business. Many of these facilities are upwards of 500,000 square feet and house the conveyor systems that handle and route Staples' merchandise. An individual conveyor belt can be as long as 400 feet, and the total length of a single facility's conveyor system can measure six to seven miles. Managing and maintaining these facilities thus can be a challenge. Staples' EMS team constantly monitors the distribution centers' operations and always is looking for new ways to improve their performance in order to keep supply lines running smoothly and efficiently. For example, the EMS team found that the conveyor systems could account for as much as 58 percent of a facility's electric load and that the lighting systems added another 15 to 20 percent. Because of these systems' huge use of electricity, the team targeted them for efficiency and cost-saving improvements. The system the team put in place was also able to improve the operational efficiency of these facilities' air-handling systems.

Case Description: To reduce power consumption while maintaining performance, the EMS team used a combination of two technologies, automated energy management systems and motor efficiency upgrades. The team first installed a new sensor-based system to automate the management of the conveyor belts and the lighting and air handling units. The system monitors the conveyors, and if it does not detect any packages on the belt, it automatically shuts down the unit until activity resumes. The system's occupancy sensors also manage the facility's modular lighting and fan controls and deactivates them if an area is not occupied. All the automated controls for these systems are programmed and can be overridden by on-site personnel.

Besides automating their management, the EMS team further improved the conveyors' efficiency by retrofitting them with highly efficient, variable-speed motors that complement the sensor system by adjusting their energy consumption according to the volume and weight of the material on the belts. The variable-speed motors include a "soft start" feature that reduces the mechanical shock to the conveyor belts when restarting, significantly cutting maintenance costs. In addition, the "soft start" alleviates the motors' high draw of current during a restart. Neither the sensor system nor the variable-speed motors compromise the distribution centers' operational efficiency. Instead, they significantly cut the overall operating costs by reducing energy use while maintaining the same level of reliability, thereby ensuring the optimal movement of products through this critical point in the supply chain.

The personnel at these facilities did, however, have to learn how to operate the new automated systems properly. For instance, when the initially promising efficiency gains began to decline, the EMS team discovered that employees were inadvertently blocking the sensors

by placing objects at key locations, which interfered with the monitoring system. After some simple education, the team was able to maintain the initial efficiency gains.

Achievements: One example of these efficiency measures involved replacing more than sixty conveyor motors and implementing the sensor-based automated energy management system at one of Staples' California facilities. The company expects the project to reduce energy consumption from lighting, fans, and conveyors by as much as 80 percent, saving the facility nearly $100,000 in annual energy costs in an expected payback time of just under a year. Staples estimates the average payback for these energy efficiency projects to be between ten and twenty two months, after which the systems will be saving money on Staples' utility bills. At another facility, Staples secured a rebate for its reduced peak-load demand from the local utility after showing the utility's engineering team the improvements it had made. Though the rebates reduced project costs, all of these efficiency projects met the company's internal hurdle rate requirements.

Finally, these projects reduced Staples' indirect GHG emissions from purchased electricity. At just one of their facilities, the efficiency gains expected each year will cut emissions by nearly 300metric tons of carbon dioxide. These reductions will help Staples meet its voluntary goal of reducing, by 2010, U.S. corporate GHG emissions by 7 percent below 2001 levels. By using a combination of automated system management and energy efficiency improvements, Staples has lowered its demand for energy and improved its environmental performance. The company has cut its operational costs and reduced the climate impacts of its facilities without interfering with the operational efficiency of its supply chain.

Reference: www.climatenortheast.org