FEATURE

A Holistic Process Helps Brown Printing Go Green

"Successful energy management is about having good systems and procedures in place..."

By Erin Mathe, Xcel Energy

The staff at Brown Printing in Waseca, Minn. was always conscious of energy conservation. Over 50 years of serving premier publishers, catalogers and retailers across the United States taught them that efficiency matters.

In the fall of 2007, with a $6 million energy bill, rising energy prices and a softening economy, they went looking for the right partner to help them consume less energy. The goal was twofold: save energy and money, and position Brown as a leader in environmental responsibility among world class publishers.

"We weren't looking for a consultant to give us a list of recommendations and walk away," said Dean Veldboom, CPE (Certified Plant Engineer), the company's facilities manager. He interviewed three entities and chose to partner with his utility, Xcel Energy, to come up with a holistic solution. "We liked that their Process Efficiency program was comprehensive, long term and that they'd help us through the process," said Veldboom.

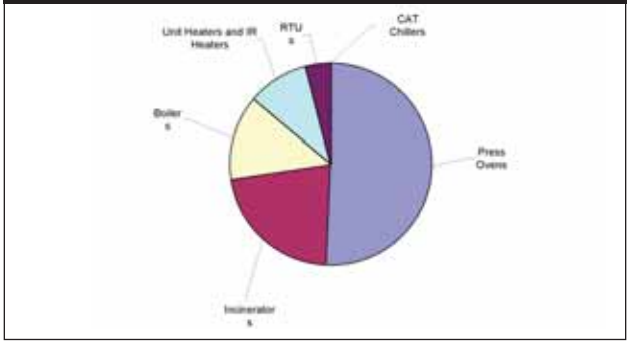
Choosing a Team

It often takes a village to figure out the best comprehensive answer to energy conservation. Xcel Energy hired on several organizations:

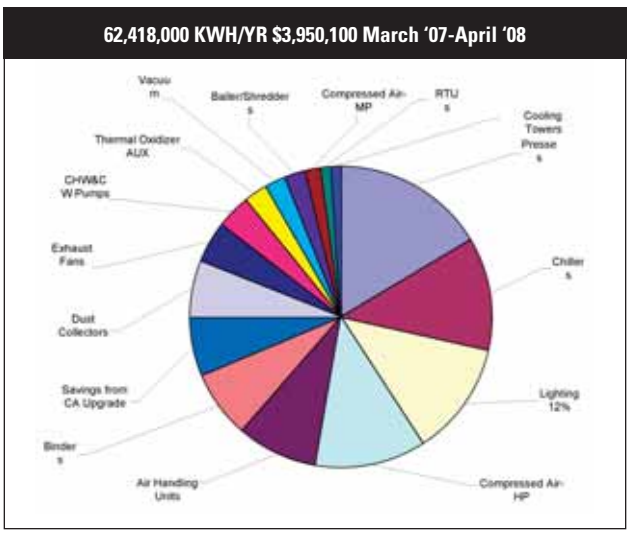
- **Graphet Inc.**, a data mining organization, helped gather detailed energy usage information for the heating and cooling systems, compressed air, lighting, motors and drives, chillers, boilers, production equipment, press drying ovens and pollution control equipment.
- **Sebesta Blomberg** reviewed the company's mechanical and electrical systems.
- **Johnson Controls** possessed existing data on the Metasys building management system.
- **CenterPoint Energy,** Brown's natural gas supplier, who had also worked with Brown for years.

Monitoring all of these systems told Veldboom and the management team what they already suspected: there were various areas where they could reduce their energy consumption. It became a big enough priority that they hired Jack Johnson (CPE) as their Environmental/Energy Engineer to lead and coordinate the energy effort on a full time basis. Johnson prioritized projects by return on investment and energy savings.

$1,961,851 per year and 250,492 mcf/year - Feb '07-Jan '08



62,418,000 KWH/YR $3,950,100 March '07-April '08



Adding Energy Star

From there, Johnson partnered with the U.S. Environmental Protection Agency's Energy Star Program. Energy Star helps commercial, industrial and institutional organizations improve their energy performance through targeted tools such as the Energy Star Guidelines for Energy Management.

"Successful energy management is about having good systems and procedures in place," said Elizabeth Dutrow, director of Energy Star's Industrial Sector Partnerships. "Since we started Energy Star back in 1992, we've incorporated the best management practices we've learned from energy managers into our guidelines. From there, we update the guidelines to keep them fresh and current."

In partnership with Energy Star, Brown has agreed to:

- Measure and track the energy performance of its facilities by using tools offered through Energy Star;
- Develop and implement a plan consistent with the Energy Star Energy Management Guidelines to achieve energy savings;
- Spread the word about the importance of energy efficiency to its staff and community;
- Support the Energy Star Challenge, a national call-to-action to help improve the energy efficiency of America's commercial and industrial buildings by 10 percent or more;
- Highlight the achievements with recognition offered through Energy Star.

The Energy Star model and assessment grid along with the Xcel Energy Process Efficiency program provided the framework to ensure success. "The synergy of all of these companies and groups working together helped us set goals and come up with a strategy," said Johnson. "The results were listed on an all-inclusive chart and that was our guiding document."

Creating Priorities

Five primary areas of focus quickly rose to the top:

1. Brown's compressed air systems, which were using 17 percent of the overall energy.
2. Conservation practices though employee engagement.
3. Electrical related issues such as power monitoring, peak demand control, chillers and lighting.
4. The drives in both the HVAC Bindery and new equipment.
5. The natural gas applications (specifically, thermal oxidizers) including pollution control equipment, boiler burner controls, temperature setbacks and operating sequences.

Compressed Air —A Better Match to Their Needs

This wasn't the first time Brown had taken a closer look at efficiency. A review of the compressed air systems had revealed a need years ago.

Brown had been using the standard 90-pound compressed air for the bulk of its printing operations. Parts of the binding and page feeding equipment required a lower operating pressure, in the 30 psi range, and the 90 psi air was being regulated down to this pressure.

"It takes a lot more energy to make 90 psi air so we knew there were inefficiencies," said Veldboom.

After evaluating the compressed air usage in the Bindery, Veldboom realized that about 40 percent required the lower pressure. A new medium pressure air system was installed which could serve the lower air pressure needs.

"With that system in place, we turned the high pressure compressor off and it resulted in a net power reduction of 3 percent," said Veldboom. "The overall electrical savings was 3.75 million kWh. That's enough power to supply 365 homes and reduces our carbon dioxide output by 995 tons."

Engaging Employees

Energy Star offers many tools and resources to educate and motivate employees on energy management. Taking a page from that model, Brown engaged its employees with an "Air Leak Challenge" contest. They asked employees to find and point out leaks in the system by examining both technologies and practices. Johnson helped review them, fix them and put procedures in place to ensure the leaks didn't come back. As a bonus, the employees enjoyed both the challenge and the education the findings provided.

A second employee-themed component was pointing out how much electricity was used in the facility's lighting. Johnson made some charts that told employees how many dollars it cost to light a particular fixture for an hour, a day, a week, or longer. He welcomed and encouraged suggestions for improvements. The results included new motion sensors and a reduction in lighting certain areas. The savings were a whopping $20,000.

> "BROWN PRINTING HAS LONG BEEN ONE OF OUR MOST PROGRESSIVE CONSERVATION IMPROVEMENT PROGRAM (CIP) PATRONS…"

HVAC Bindery Drives

The second initiative involved the possibility of employing Variable Frequency Drives (VFDs) on the Bindery's Heating Ventilation and Cooling (HVAC) system. Fans run constantly to heat and cool the plant. VFDs were installed to reduce the speed of the motor to match the requirement for air. This dramatically reduced the amount of natural gas required to heat the outside air drawn into the system and the amount of electrical energy required to run the fans.

"There's a rough rule for these applications," said Marcus Hendrickson, Xcel Energy account manager. "If you decrease the motor speed by 50 percent, the energy consumption is 1/8th or 20 percent. The key here is to have a control system which monitors the airflow and backs down the motor speed according to the needs." Hendrickson says the payback period on the VFD alone was just over a year after rebates and energy savings.

The Brown Printing Company's facility in Waseca, Minn. *Credit: Courtesy of Brown Printing Company.*

BROWN PRINTING EFFICIENCY PROJECTS	
Electric Projects	**Gas Projects**
• Lighting occupancy sensors • Compressed air equipment • Variable Frequency Drives	• Regenerative thermal oxidizers • Thermostat setbacks • Revised burner control strategy
Xcel Energy Rebates: $185,000 $510,000 Saved 7.3 million kWh saved	CenterPoint Rebates: $190,000 $571,000 saved 766,000 therms saved
Total Rebates	**$375,000**

Natural Gas and Thermal Oxidizers

"Brown Printing has long been one of our most progressive Conservation Improvement Program (CIP) patrons," said Russ Wagner, key account manager for CenterPoint Energy. "Gas has the lowest carbon footprint of all the fossil fuels but they still wanted to use less."

So Johnson looked at their printing process next. They use "heat set" printing which uses inks dissolved in an oil-based solvent. It's then dried off the paper and burned in a thermal oxidizer to reduce pollution. Natural gas is used to burn off the solvent in the large volume of exhaust air from the presses at around 1,600 degrees Fahrenheit.

Over the course of several years they replaced three older recuperative thermal oxidizers with newer regenerative thermal oxidizers (RTOs.) The old ones recovered 74 percent of the heat required while the new ones recovered 91 percent. It turned out that the heat recovery with the new oxidizers was so effective that the solvent began to provide all of the heat necessary for oxidation.

The RTOs and other upgrades will reduce Brown's natural gas energy consumption by 766,000 therms per year, which is enough to power roughly 850 homes. It also reduced carbon dioxide emissions by 4,500 tons per year.

A New Level of Efficiency for the future

The program has done two things for Brown Printing: it's given them direction and a streamlined process. "It gave us a focus on energy and a tangible list of projects and priorities," said Johnson. "Once you have your goals and supporting data written out in front of you, it's easy to start tackling the issues one by one."

"Rebate dollars are always good incentive," said Hendrickson. "But we've made the rebate process a lot easier which is important to customers."

The Next Round

With those projects finished, Brown is now beginning the next generation of efficiency by upgrading the building management system (BMS).

The BMS will expand and update existing building controls to a modern, real time, open protocol control system with state of the art web-based interface. The BMS will also include a comprehensive Electrical Metering System (EMS) which is fully compatible with the BMS system. The ability to tie electrical usage with equipment control is a cornerstone of their initiative to reduce costs and usage of utilities while conserving natural resources.

Xcel Energy is also funding several studies to help Brown determine further savings in the areas of building air flow balance, scrap collection, compressed air, vacuum cooling and chiller water control.

The Big Picture

The holistic process to a more efficient plant has served Brown Printing well by ultimately helping them save 10 percent of a $6 million dollar energy bill.

The utility and Energy Star partnership tools are helping Brown to look to a future of continuous energy savings and environmental responsibility. Johnson says reducing energy usage is the best way to reduce their carbon footprint. And achieving that twofold goal through one grand plan makes the return well worth the effort.

- For more information on Brown Printing's efficiency efforts, please visit BPC.com/environmental.
- For more about Xcel Energy's rebate programs, please visit www.xcelenergy.com.
- For more information on the Energy Star Partnership Program please visit energystar.gov/industry. FEJ

Erin Mathe *is a media relations representative at Xcel Energy and joined the company in April 2008. Mathe promotes the company's efficiency programs designed to help residential and business customers to save energy and money. She writes press material for mainstream media, as well as articles and information for trade publication in the eight western and midwestern states that Xcel Energy services.*