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Case study: 3M Canada's Brockville plant achieves ISO 50001 certification

As a result of the work performed to achieve the SEP and ISO 50001 certifications as part of the implementation of an energy management system, the Brockville plant realized \$350,000 in energy savings between September 2011 and September 2013. It is anticipated that these savings will increase annually with 3M's continued efforts in energy management.

An established energy management program, a company's prior International Organization for Standardization (ISO) experience and good timing resulted in 3M Canada's Brockville, Ontario, tape plant receiving one of the first ISO 50001 certifications in North America.

The Brockville plant was established in 1992 and manufactures high-volume masking tape, ranging from low-cost bundling and hold tapes to high temperature, fine-line automotive masking tapes. It employs about 170 people.

3M's global corporate energy management program has been in place since 1973, and worldwide, the company has cut its energy use by more than 40 percent since 2000.

The Brockville plant had already achieved ISO 14001 (environmental management) and 9001 (quality management) certifications. It also employs an energy management information system (EMIS), which includes metering and submetering of all processes, data collection and reporting.

Why ISO 50001?

In 2010, a meeting on clean energy between Natural Resources Canada (NRCan) and the United States Department of Energy (DOE) proved to be good timing for 3M Canada.

The DOE was interested in supporting a pilot project for the Superior Energy Performance (SEP) program with an American company that had an international presence.

SEP was launched by the DOE in 2012. It is based on ISO 50001 and has additional requirements. It provides industrial facilities with a roadmap for achieving and documenting energy performance improvements.

"It became apparent to us that if we wanted to move away from short-term successes to a more systematic process, we had to move from energy projects to a management system," explains Earl Taylor, 3M Canada's Plant Engineering Leader.

3M's Corporate Energy Manager in St. Paul, Minnesota, saw the value in the pilot and recognized Brockville's experience with ISO standards and authorized the Brockville facility to proceed.

Getting to ISO 50001

The pilot began in January 2011, six months before ISO 50001 was published. But with a draft of the standard, Brockville worked concurrently with SEP and ISO, both of which had energy management system requirements.

In January 2011, Brockville obtained a draft copy of the standard and struck a committee to review the standard, identify energy gaps in the plant, then develop and implement a plan to close those gaps. They also updated 3M's corporate energy policy and wrote a system manual that explained how Brockville would achieve ISO 50001 compliance. Utility bills and EMIS data provided production, process and energy consumption records that Brockville used to set their baseline.

Taking action

The Brockville energy team includes Taylor, internal corporate auditor Alan Polk and Energy Manager Andrew Hejnar. Six months into the process, as the team's Energy Management Coordinator, Tyler Blakely oversees most of the plant's energy projects, corrects problems and identifies any new issues. Individual projects are then carried out by operating teams of up to eight people.

Training

Employee training was a key part of Brockville's road to ISO 50001 certification. The team prepared an energy awareness training package and, using NRCan's Dollars to Sense workshops, offered energy management training to all employees; engineers received specialized training.

To simplify the implementation, 3M Brockville leveraged existing plant systems to meet the requirements of ISO 50001. Brockville's existing safety reporting system was modified so that staff could easily report energy concerns or share ideas with Taylor or Blakely.

In one instance, an employee noticed that two similar products had different oven temperature settings and recorded his concern. Products are often developed independently of each other, and it was only because the operator was in a position to notice the difference that the Brockville facility was able to find the opportunity to save energy.

Selected projects

ISO 50001 and SEP require a periodic energy review to ensure that regular monitoring and verification (M&V) is performed, but also to generate new project ideas.

For example, Brockville's energy review found that air compressor cycling was not optimal. Compressed air accounts for 12 percent of the overall plant energy consumption. By sequencing its air compressors, the plant reduced energy use by 23 percent.

Heating, ventilating and air conditioning (HVAC) systems, boilers, compressors and chillers were often not commissioned properly in the past or performance had degraded, and they were not running at optimal efficiency. The team will consider recommissioning some of that equipment to get back to the manufacturers' designed performance levels.

Other energy-saving projects included

- lighting retrofits
- oven optimization
- HVAC heat recovery and improvements
- chilled water heat recovery and improvements
- make-up air optimization
- non-production shutdown procedures
- insulation

The team is also investigating sustainable energy systems, such as cogeneration and solar.

Financing and partners

To achieve ISO 50001 certification, 3M Canada invested \$190,000 in the Brockville plant, most of which went toward consultants and certification audits.

NRCan offered some financial support and helped the team understand the social, business and political context of the standard. Enbridge provided financial and technical support, particularly in terms of measurement, metering and targeting. Hydro One helped with certification funding and expertise in carrying out certain projects. The Brockville plant also retained EPS Canada Inc. to help them understand the ISO 50001 standard and prepare the gap closure plan.

Staff time

Hejnar estimates that staff spent 28 person-weeks on ISO 50001 certification. In terms of the ongoing resources needed to maintain certification, Taylor says that, as a management system, ISO 50001 is built into everyone's job. "There's no energy department, per se; every single job at the plant has energy as part of its role."

Challenges

The main challenge faced by the Brockville plant was that they were working from an early draft of the standard and did not have any other



industry examples to follow. This added several weeks to the certification process.

Finding a registrar also proved challenging. When the facility was ready for final certification, their chosen registrar, Dekra, did not yet have approval to certify companies for ISO 50001.

“We had to sequence our activities and clarify the standard in certain areas,” says Taylor. “We were ultimately successful but it could have held us up.”

The team also had to train its internal auditor for the new standard. Although Polk was familiar enough with M&V protocols, validation and modeling to understand the SEP and ISO 50001 requirements, he had no direct experience with ISO 50001. EPS Canada worked with Polk to overcome this challenge and to develop procedures and a plan for the internal audit.

Results

As a result of the work performed to achieve the SEP and ISO 50001 certifications as part of the implementation of an energy management system, the Brockville plant realized \$350,000 in energy savings between September 2011 and September 2013. It is anticipated that these savings will increase annually with 3M’s continued efforts in energy management.

As a result of a thorough review of all service contracts for the Brockville facility now asks its service providers to achieve higher energy performance for its HVAC, chillers, compressors and other high-energy use equipment.

In the past, service contracts focussed on uptime and run ability. No one checked whether a system was performing to its energy standards. Taylor and his team are now writing that requirement into the contracts and monitoring to ensure that their service providers are achieving those levels.

The ISO standard also helped improve Brockville’s engineering practices. For all future capital projects, engineers must show how the initiative will impact energy consumption and what steps will be taken to make the project more efficient.

From an operations point-of-view, Taylor recalls a turning point during the internal audit. Part of the auditor’s work was to interview employees on the shop floor, unscripted and unprompted. “The answers they gave him showed that they knew what the procedures were. Our employees expect us to be leaders in energy management so there has been a cultural benefit to the management system.”

Hejnar says that ISO 50001 allows the plant to monitor energy usage easily and to quickly assess new problems. He points to the air compressor example. “Without the system in place, those compressors would still be running inefficiently,” he says.

Additional benefits

- Brockville’s energy management system is sustainable and will continue, regardless of staff turnover.
- 3M can showcase its corporate sustainability and environmental achievements to other industry players and its customers.
- Energy use is “visible” for management and staff.
- ISO 50001 leverages other systems, e.g. ISO 9001 and 14001, EMIS, SEP, Six Sigma, etc.
- ISO 50001 is scalable and flexible, allowing companies to develop their own performance criteria.
- Independent certification and independent review prevent backsliding.

“If nothing else,” says Taylor, “the biggest benefit of our energy program is that it highlights what was often ignored – energy lost through inefficiencies.”

Advice and lessons learned

Although having an energy management coordinator is not required under ISO 50001, Taylor says that the biggest mistake he made was not involving Tyler Blakely early enough.

“In my experience with other standards, it is valuable to have a coordinator,” he advises. “Busy managers do not have enough time to work on some elements of the system, so I recommend appointing someone with the aptitude and education to understand the system.”

Having an EMIS proved to be a major asset. 3M’s prior investments in metering, submetering and electronic data collection and reporting provided the baseline data that supported ISO 50001.

Taylor also recommended reusing or modifying existing systems, as Brockville did when they modified the safety reporting system to allow energy concerns to be recorded. “Do not generate a whole new system if you do not need to, and try to make it as straightforward as possible for employees.”

As part of a pilot project, Brockville could access additional government and utility funding; Hejnar says, therefore, other companies should expect to pay more than 3M did to achieve ISO 50001 certification.



Taylor and Hejnar offer some additional advice:

- Obtain senior management commitment and support.
- Build a robust system that will keep working over the long term.
- Allocate the necessary resources (people, money, time) and set expectations at all levels.
- Use project management techniques to set deliverables, achieve milestones, develop and implement action plans, assign responsibilities, and perform follow-up.

Next steps

Brockville will continue working on projects identified during the energy review and will develop a new training plan to see where additional improvements can be made.

“As we move on, we expect training to focus on specific activities, skills and knowledge for our most intensive areas,” says Taylor.

The Brockville team also plans to share its experiences to bring ISO 50001 to its other Canadian and American facilities.

Recap of the steps leading to ISO 50001 certification

1. Obtain senior management commitment and support.
2. Establish a team.
3. Perform a gap assessment and develop a work plan.
4. Establish an energy baseline (EMIS, utility records).
5. Execute a work plan (projects).
6. Monitor and measure energy use.
7. Verify energy use.
8. Conduct an internal audit.
9. Perform an ISO 50001 independent assessment.
10. Receive certification.

ISO 50001 – Energy Management Systems standard

ISO 50001 – The Energy Management Systems standard provides organizations with a structured framework to manage energy more efficiently, reduce costs and improve energy performance by integrating energy efficiency into management practices. The standard is based on elements found in all of ISO’s management systems standards, assuring a high level of compatibility with ISO 9001 (quality management) and ISO 14001 (environmental management). ISO 50001 has been available on the [ISO Web site](#) since June 15, 2011, and has been adopted as a Canadian national standard.

Contacts

3M Canada

60 California Avenue
Brockville ON K6V 5W1
Web site: 3m.com

Canadian Industry Program for Energy Conservation

Office of Energy Efficiency
Natural Resources Canada
Fax: 613-992-3161
E-mail: info.ind@nrccan-rnccan.gc.ca
Web site: cipec.gc.ca

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