



3M Canada's Commitment to Energy Management



SECTOR	COUNTRY	THEME	TOPIC
Chemicals	Canada	Energy management	Energy management systems

3M Company has a long history of caring for the environment. Here we document just one of its successful initiatives: the design and implementation of a successful energy management system (EnMS) at its Brockville production plant in Canada. In 2012, the Brockville plant obtained certification of the ISO 50001 global EnMS standard and is the first company in Canada to achieve Superior Energy performance Partner Platinum level.

KEY LESSONS FROM 3M CANADA ON THEIR ENMS:

- An EnMS can lead to significant operational cost savings. 3M's Brockville plant achieved a 15.2 percent improvement in energy-intensity relative to 2010 since the EnMS was formally set up.
- According to Andrew Hejnar, 3M Canada's Energy Manager, a successful EnMS comprises four key pillars:
 1. Senior management commitment of resources and responsibilities
 2. The development and implementation of energy efficiency projects
 3. Information management and performance tracking within the construct of an energy management information system (EMIS)
 4. Building staff awareness, education and competencies.
- The documentation requirements for ISO 50001 are far less onerous than that required for other ISO certifications.
- It is important to get it right the first time and build a robust system. Early investments in an EMIS can help ease the transition to a formal EnMS.
- An EnMS must be integrated within an existing corporate system. Integrating an EMIS to existing management systems can also pay off by making energy management more mainstream and by correlating energy use to production factors.
- The role of staff in implementing the EnMS needs to be clear and the necessary resources (staff, capital) should be allocated.
- Established project management techniques should be used to establish deliverables and milestones.
- The development of a robust energy baseline is essential to accurately demonstrate the opportunity for improvements and demonstrate reduced energy consumption.

Profile of the Brockville plant

People: 170 employees

Facility: Established in 1992 on 10 acre site. The plant has 140,000 sq ft

Products: Produces a range of tape products, ranging from common bundling and holding tapes to high temperature fine-line automotive masking tapes

Energy use profile: Natural gas 70%, electricity 30%

Energy operating costs: Approximately 10% of total operating costs

Energy management system(s): Certified under the Superior Energy Performance (SEP) program and the ISO 50001 Global Energy Management System Standard

Energy intensity goal: 3M's corporate goal is a reduction in energy intensity of 3 percent per year as measured in British thermal units per pound (Btu/lb (joule/kg)); and the plant has an additional goal of 15% intensity-based performance improvement relative to the 2010 baseline

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About 3M

The 3M Company has grown dramatically since it was founded in Minnesota in 1902. Starting with sandpaper, it has built itself into a global innovation company with over 84,000 employees and more than 55,000 products and 46 technology platforms to its name. 3M products include electronics, healthcare products, transportation equipment, office supplies, manufacturing and industry products, and home products.

It was one of the first major manufacturing companies to address environmental issues and develop a sustainability strategy, which encompassed economic success, environmental stewardship and social responsibility. In 1975, 3M started the initiative, Pollution Prevention Pays (3P). The goal of 3P was to reduce pollution through product reformulation, process modification, equipment redesign, recycling and reuse of waste materials. 3P was implemented at both the corporate and plant levels.¹

3M formed its Energy Management Department in 1973. Since then, the company has cut the energy consumption of its US operations by 82 percent (indexed to net sales). Further, between 2000 and 2011, it reduced the energy consumption of its worldwide operations by 59 percent (indexed to net sales).² 3M's GHG emissions have also shown a significant decrease – in 2011 they were 72 percent lower than 1990 levels.³

Its work is ongoing in this area. Its corporate goal is a 3 percent reduction in energy intensity per year, as measured in British thermal units per pound (Btu/lb (joule/kg)).

3M's environmental achievements have been recognized through various awards, including the National Environmental Performance Track Outreach Award from the US Environmental Protection Agency, and, for the eighth year running, the 2011 Sustained Excellence Award for Energy Management from the US Department of Energy.⁴

3M Canada

3M Canada is a subsidiary of the 3M Company. It is responsible for manufacturing everything from displays and graphic signs to manufacturing and industry supplies. 3M Canada operates seven facilities – including the Brockville plant featured in this case study. Overall, its facilities have 1,800 employees and generate over US\$1.2 billion in annual sales.⁵

1 <http://solutions.3mcanada.ca>

2 <http://solutions.3m.com>

3 *ibid.*

4 *ibid.*

5 Earl Taylor, 3M Canada Brockville plant engineering leader, ISO 50001 Energy Management System Project, a presentation at the Energy 2011 Conference, November 2011.

Every 3M Canada plant has an energy management team. It was the first subsidiary to employ a full-time energy manager when the position was created in 2009.

In recognition of its work in this area, 3M Canada received the Energy Excellence Award from Energy Management Magazine in 2010.⁶

Energy management at Brockville plant

The Brockville plant started looking at how it could better manage its energy use in 2005. However, it did not formally establish its energy management team until 2008. Today, the team comprises two key positions: an energy management system representative and an energy management system coordinator. Additional members are brought in on a case-by-case basis.

Over the past few years, the energy management team has helped implement a number of projects, including a lighting retrofit, oven optimization, HVAC heat recovery, compressor air leak reduction and replacement, chilled water system improvements, makeup air optimization, and non-production shut-down procedures. These kinds of initiatives must compete for capital against other projects using similar business case metrics.

From 2008 to 2011, the energy management team developed an energy management information system (EMIS) that was to provide an important foundation for subsequent work in this area. It involved the installation of sub-meters, which collected and stored energy-use data on a common energy management platform at 15-minute intervals. The energy-use data was then correlated to production output. Software was also used to establish a formal energy monitoring system for analyzing energy intensity, identifying energy-use drivers, and developing energy saving targets. Through these efforts, the plant was able to develop operational problem-solving and non-production shut-down procedures that led to additional operational energy savings.

Getting started on an EnMS

When the US Department of Energy (DOE) and Natural Resources Canada (NRCan) asked 3M Canada to participate in a pilot of the Global Superior Energy Partnership Initiative (GSEP) in 2011, Brockville plant's energy management team had been facing several roadblocks.

6 *ibid.*

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They had found that:

- The introduction of energy management measures was being limited by the cycles and timing of equipment replacement and the availability of capital and resources.
- Energy management opportunities could not be sustained by individual energy champions alone.
- Despite the success of some of their measures, these energy efficiency performance improvements had a limited impact on overall business decisions in support of energy management.
- Substantial gains were being made but, without a management system in place, these improvements were often not sustained.

By joining GSEP, the team was able to deal with these challenges. By way of background, the GSEP initiative is part of a broader certification program (Superior Energy Performance) that provides industrial facilities with a roadmap for improving their energy efficiency while maintaining competitiveness.⁷ Participants can either become a partner or a certified partner under the program, depending on the degree of data verification desired by the company and plant. Both options require conformance to ISO 50001, with additional requirements to achieve and document energy performance improvements. The Brockville plant chose to become a certified partner.

Management at 3M Canada selected the Brockville plant as the site to pilot GSEP and ISO 50001 in Canada because it had the most advanced energy management information system. 3M worked with Natural Resources Canada part of the Government of Canada on the initiative and Enbridge Gas Distribution and Hydro One Networks – both local energy providers – provided financial support.

3M's corporate decisions to implement a formal EnMS included:

- expected energy and cost reductions, which would provide a competitive advantage in the global market (including cost reduction that does not necessarily require capital investment)
- provision of an energy management structure, which would help sustain and maintain performance improvements
- promotion of ownership of energy management across the company
- inherent measurement and verification systems, which are designed to assess and track key performance indicators.

⁷ www.superiorenergyperformance.net

TABLE 1: The SEP program categories for certification

Performance Characteristics		Silver	Gold	Platinum
Energy Performance Pathway	Energy Performance Improvement	Meets 5% energy performance improvement threshold over the last 3 years.	Meets 10% energy performance improvement threshold over the last 3 years.	Meets 15% energy performance improvement threshold over the last 3 years.
Mature Energy Pathway	Energy Performance Improvement	Demonstrates an energy performance improvement of 15% or more over the last 10 years		
	Score on Best Practice Scorecard (Includes credits for energy management best practices and energy performance improvements beyond 15% over the last 10 years.)	<ul style="list-style-type: none"> • Meets a score of at least 35 and up to 60 out of 100 total points for Best Practice Scorecard • Minimum of 25 points required for the energy management best practices. 	<ul style="list-style-type: none"> • Meets a score of at least 61 and up to 80 out of 100 total points for Best Practice Scorecard • Minimum of 25 points required for the energy management best practices and 10 for energy performance. 	<ul style="list-style-type: none"> • Meets a score of at least 81 out of 100 total points for Best Practice Scorecard • Minimum of 25 points required for the energy management best practices and 10 for energy performance.

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Implementation and certification

Once 3M Company's management agreed to proceed, a formal team was assembled to drive the development and implementation of the EnMS at the plant. It comprised:

- the 3M Canada energy manager, who was responsible for overseeing the overall implementation
- the Brockville plant engineering leader as the EnMS representative (required by ISO 50001)
- a master technologist as the EnMS coordinator⁸
- the 3M corporate lead auditor
- additional support from the engineering and maintenance groups
- an external consulting team.

The first step towards certification for both the ISO 50001 and the SEP commitments was the development of a baseline of the Brockville plant's energy use. An ISO 50001 gap analysis was also conducted, which identified significant room for improvement in the involvement of the plant's management as well as in planning, operational control, training, competencies and awareness.

The plant was able to meet most of the ISO 50001 requirements simply by building on existing components.

The ISO 50001 implementation strategy was to:

- build on the existing energy management information system (EMIS)
- integrate the EnMS into plant operations and culture
- leverage existing management system components, 3M business and operations systems, where possible.

In order to adopt the ISO 50001 framework, the following adjustments were made:

- Energy Policy was modified to satisfy ISO 50001 requirements
- Energy planning (energy review, energy baseline, energy performance indicators and objectives, targets and action plans): In recognition that the SEP certification required a greater depth of energy-use analysis than required for the ISO 50001 certification, the Brockville plant retained consultants

to conduct the initial analysis. This knowledge has now been acquired internally.

- Implementation and operations (competence, training and awareness, communication, documentation, operational control): Most of these procedures were already in place and just needed to be updated.
- Checking (monitoring, measurement and analysis, legal and other requirements, internal audit of the EnMS, control of records): This required an upgrade of the existing EMIS.

ISO 50001 requires all staff to be trained to certain competencies. Consequently, the Brockville plant established a training team to train staff to effectively manage the new EnMS and sustain the resulting energy-use performance improvements. ISO 50001 customized modules were added to provide training for different kinds of personnel – such as plant engineers or equipment operators. The training plan includes ongoing training to reinforce the established competencies.

In 2012, the Brockville plant achieved third party certification to SEP (Platinum level under the Energy Performance Pathway) and ISO 50001. The third party certification process involved the following steps:

- Pre-audit: This step was done remotely and involved compiling documentation.
- Phase 1: A third party review of the submitted documentation.
- Phase 2: A three-day on-site visit to verify that the facility complied with the certification requirements.

3M Canada received significant financial support from Natural Resource Canada, Enbridge Gas Distribution and Hydro One Networks. Staff at the Brockville plant also contributed by giving their time and commitment to the process.

The results

Since the formal energy management system was set up, the Brockville plant has seen the following improvements in its energy use:

- a 15.2 percent intensity-based performance improvement relative to the 2010 baseline, as required by the SEP Certified Partner platinum level designation
- an overall 3 percent energy intensity improvement per year, as required by 3M to meet its global targets

⁸ Engineering technologists are graduates of bachelor-level programs in engineering technology. They apply engineering and scientific knowledge combined with technical skills on the applied design, using current engineering practice. Technologists play key roles in the engineering team. They are typically involved in product development, manufacturing, product assurance, sales and program management.

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- a 12 percent reduction in the energy use of its compressed air system.
- a 30 percent energy cost reduction per unit of product (\$/m²) since the EnMS has been implemented
- a 42 percent energy intensity reduction (BTU/m²) since November 2011

Implementation of the EnMS has also helped the plant to identify other energy performance improvement opportunities as well as non-energy related benefits, such as having a more sophisticated monitoring system that can improve operation and maintenance

procedures, and identify water-use reduction opportunities.

By committing to a formal framework, the Brockville plant committed to continuous improvement. Under its EnMS, the energy management team must now consistently review performance and recalibrate targets and objectives as required. For instance, in the SEP Energy Performance Pathway, SEP status lasts three years, after which companies must seek recertification. As such, the development and implementation of the EnMS is only the beginning.

3M is the first company in Canada, and the third company in the world, to achieve the SEP highest-level Platinum designation.

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