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Case study:

St. Marys Cement's Bowmanville plant is the first to achieve ISO 50001 certification

Since St. Marys began implementing processes to achieve ISO 50001 certification, the Bowmanville plant's electricity consumption has been cut by 10.3 million kilowatt hours, the equivalent amount of power used by 880 Canadian homes in one year.

Founded in 1912 in St. Marys, Ontario, (200 kilometres southwest of Toronto), St. Marys Cement Inc. (Canada) is a major producer of cementitious materials in the Great Lakes Region. Today, the company forms a key component of the North American operations of Votorantim Cimentos, based in Sao Paulo, Brazil, one of the world's top 10 manufacturers of cement, concrete and aggregates.

September 2012 marked St. Marys Cement's 100th year in business. The company is getting used to achieving milestones because just the year before the company's Bowmanville plant received North America's first International Organization for Standardization (ISO) ISO 50001 certification.

Certification did not happen overnight. Its origins can be traced to 2005 when senior management approved an integrated strategy to reduce the plant's energy consumption.

Why ISO 50001?

Martin Vroegh, Corporate Environment Manager, learned of ISO 50001 through Natural Resources Canada (NRCan). His participation on the Canadian Industry Program for Energy Conservation Task Force Council gave him an advanced look.

St. Marys was already certified in ISO 9001 (quality management) and ISO 14001 (environmental management).

Registering for ISO 50001 was a natural next step. The company jumped on the opportunity the moment they knew the standard was approved.

One reason St. Marys wanted to use the standard was to have a system that everyone could use and that could survive employee turnover. "It ensures that there are written policies and procedures so that the next plant manager can follow them," says Vroegh.

Canada

Industrial competitiveness and environmental and financial reasons were also important. “We want to make a product of the highest quality with the least waste,” says Vroegh. “When you are a large industry in a small community, you need to demonstrate to your stakeholders that you are being the best you can be. We do not want to be compared to others – we want to be the baseline for others.”

Getting to ISO 50001

First St. Marys had to find a registrar to perform the certification audit and retained International Certification Services (ICS) to oversee the process. Since the plant already had a proven track record of energy management, ICS were very pleased with what they found when they did the assessment. “We were in good shape,” says Fabio García, Operations Manager.

Long before the new standard was announced, St. Marys had engaged 360 Energy, an energy services firm in Burlington, Ontario, to help them find ways to reduce their energy consumption. In 2009, following a 12-month, third-party assessment, St. Marys attained 360 Energy’s silver-level Certification in Energy Excellence. The certification requires companies to demonstrate continuous improvement over three years, a process that complemented St. Marys’ drive for ISO 50001.

The ISO 50001 standard was formally launched in June 2011, and two staff members from the Bowmanville plant spent close to 140 hours on the certification.

It all started with Einstein

The Bowmanville plant operates around the clock, 365 days a year, with an annual rated capacity of 1.8 million tonnes of product. Energy represents about 35 percent of the plant’s production costs. “We needed a program to develop new ideas and to change people’s minds and a 40-year culture based on the notion that energy is cheap,” says García.

E=MC² was formed in 2006. At Bowmanville, E=MC² stands for Energy Management Conservation Committee but the catchy name did help draw people’s interest.

People power

A philosophy of team work and shared responsibility permeates all of St. Marys’ energy management activities. All employees are trained in energy management. Initially, training focused on how employees could save energy and money in their own homes. To inspire the same amount of conservation initiatives at work, they trained every employee through NRCan’s Dollars to $ense Energy Management workshops. The strategy worked. Energy management has become so second nature that employees now tell management when they are doing something wrong.

Supervisors receive advanced training to understand how their decisions impact the bottom line. St. Marys started benchmarking what other companies were doing and demonstrated to managers how they could adopt similar practices.

E=MC² keeps it all together. Today, the plant’s energy performance is assessed in five key areas: energy data management, energy supply management, energy use in facilities, equipment efficiency and organizational integration.

Taking action

With management’s support, E=MC² developed a Sustainable Energy Plan, which included more than 100 action items, identified existing energy management activities, captured current tracking and measurement efforts, and helped guide the company’s energy efficiency priorities and investments. They reviewed 80 percent of their processes and procedures.

Before initiating any projects, staff conducted fuel and electricity assessments and found that the Bowmanville plant consumes roughly 200 gigawatt hours of electrical energy and 5000 terajoules of thermal energy annually. These numbers set the baseline.

Many of the lowest cost projects yielded the biggest paybacks, including installing occupancy sensors, ceiling fans and programmable thermostats and using variable speed drives on motors. Other easy fixes included monitoring and control software, lighting upgrades and automating processes to turn off equipment when it is inactive.

However, the single most important change was rescheduling certain plant operations to off-peak hours. The Bowmanville plant participates in the Ontario Power Authority’s (OPA’s) Demand Response Program (DR3) – a contract-based program that provides cash rebates to companies that shift their energy use to off-peak times. Although thermal energy represents nearly 90 percent of the plant’s energy consumption, electricity represents a greater portion of its operating costs. The cement kiln must run continuously but processes such as milling, grinding, material handling, fuel unloading and conveying were shifted to off-peak hours, where possible.

Participation in the OPA’s DRP program generated approximately $750,000 in revenue annually for the plant. Managing plant operations during periods of high demand in the province allowed the plant to reduce demand by 24 megawatts on average during the five critical peaks (5CP). By doing so, St. Marys reduced its 5CP electricity demand by 92 percent.

Control room operators also rely on alarms that sound when certain operations in the plant approach demand thresholds. Real-time energy data displays are accessible throughout the plant, and each area of the plant is monitored separately for electricity use with instantaneous values and targets displayed in the main control room.

Having those displays lead to a savings of almost $100,000. In 2007, St. Marys shut down one of two 1500-horsepower fans that powered the bypass system. By putting those controls in place, they were able to shut the second fan down without any impact on productivity.

To keep employees up-to-date on the latest technologies and efficiency measures, the Bowmanville plant holds an Energy Conservation Week each June. It serves to showcase cutting-edge technologies and provide additional training. An awards ceremony is also held to celebrate the company's achievements.

Cost-shared assistance

As much as possible, St. Marys tackles initiatives that are low- or no-cost, and takes advantage of government and utility incentive programs. The OPA's DR3 Program is a prime example. The OPA sends a rebate cheque each quarter to St. Marys. Depending on how much they reduced their peak electricity demand, rebates can be as much as $200,000.

St. Marys is also involved with Hydro One's Energy Retrofit Incentive Program (ERIP) and received incentives for its lighting retrofits.

Results

Since St. Marys began implementing processes to achieve ISO 50001 certification, the Bowmanville plant's electricity consumption has been cut by 10.3 million kilowatt hours, the equivalent amount of power used by 880 Canadian homes in one year.

The energy conservation elements of ISO 50001 certification saved $1.6 million in 2011. García notes that these savings are from projects the company has undertaken since 2005. He expects similar savings for the 2012 fiscal year, and the plant has set an energy reduction target of 2 percent annually.

Although the reduction of greenhouse gas emissions from all of St. Marys energy management activities has not yet been fully quantified, some individual initiatives have shown impressive results. The lime injection system that was installed in 2005 reduced sulphur dioxide emissions by 53 percent from the previous year, and a new selective non-catalytic reduction system that uses ammonia injection reduced nitrogen oxide emissions by 18 percent.

Employees' attitudes have also changed. "Since $E=MC^2$ began, many employees have made comments to me about how they look at energy differently," says Vroegh. "We have a lot of young engineers who are interested in other ways of doing things, and that all helps to build team work at the plant."

Benefits

García says that the biggest benefit of following the ISO 50001 standard is that it helps businesses understand, then modify energy consumption and use. It has the added benefit of communicating to customers, regulators and suppliers in a reliable and transparent manner how the plant is reducing its energy use and emissions.

"Our ISO 50001 certification guarantees our customers that we are doing everything we can, and have come up with innovations in savings to reduce our carbon footprint," he says.

Advice for others

Vroegh says that ISO 50001 standard is the only one he has implemented that had a direct financial payback.

"The other ISO standards have obvious improvements, such as quality and safety, but those can be difficult to quantify monetarily. ISO standards also reduce environmental impact, risks and liabilities, but with ISO 50001 you *directly* reduce the energy you consume, and that is the number one reason to get it," he says. "You can concentrate on energy but when you have a third-party assessment requirement, it keeps you on your toes and avoids complacency."

For any company striving for ISO 50001 certification, García advises that they "know their numbers. Sixty to 70 percent of any plant's processes are about energy, and many companies think they cannot do anything about it. We did our internal reviews first, and although that was painful at first, it created excitement among the employees."

Next steps

Several new initiatives are in the works at St. Marys, including research into cogeneration and how to reuse low-grade waste heat. They are working closely with universities, government and other companies on many of those projects. For example, St. Marys has partnered with Pond Biofuels Incorporated to use the carbon dioxide generated by its cement plants to speed the growth of algae, which will be converted into fuel.

St. Marys also plans to bring the ISO 50001 standard to its Charlevoix, Michigan, plant. "Once we get that started, we can do some parallel work between the two plants, which will give us a greater economy of scale," says Vroegh.

Recap of the steps leading to ISO 50001 certification

1. Obtain management support.
2. Build a team ($E=MC^2$).
3. Develop a sustainability plan.
4. Establish an energy baseline.
5. Identify and act on opportunities (project checklist).
6. Monitor and measure energy use (energy management information system [EMIS]).
7. Verify performance (EMIS).
8. Recognize achievements.
9. Perform an ISO 50001 assessment.
10. Receive certification.

ISO 50001 – Energy Management Systems standard

ISO 50001 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). The standard has been available on the ISO Web site since June 15, 2011 and has been adopted as a Canadian national standard.

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Étude de cas : L'usine de Bowmanville de l'entreprise St. Marys Cement est la première à obtenir la certification ISO 50001