



Catalyst Crofton ISO 50001 Case Study

Catalyst Paper has a long history of reducing costs and improving energy efficiency. At its Crofton mill near Duncan on Vancouver Island, Catalyst's second biggest expense is energy. In December 2011, the Crofton paper mill joined BC Hydro's Strategic Energy Management (SEM) Program, which financially supports the position of Edinson Mahecha, the mill's energy manager. From 2012 to 2015, the mill has achieved a 5.6% reduction in purchased electricity by consuming less while generating more.

SEM enables organizations to successfully staff and deliver a strategic approach to managing energy. ISO 50001 takes energy management to the next level with an external validation process, a focus on operations and controls, and the requirement to understand and document all energy management systems.

This case study explores the value of ISO 50001 to B.C. companies, compares the certification process to BC Hydro's SEM Program, outlines the steps to implementation, and shares results, benefits and lessons learned based on the Crofton mill's experience.

Why ISO 50001 made sense for Catalyst's Crofton Mill

When Ed Mahecha started in his position, he immediately recognized a problem. "Many companies have been through this experience: you do energy efficiency projects, but you have a hard time sustaining the effort," he says. "Every time we had a new energy manager, the situation changed, and the communication wasn't always ideal. This is what triggers the need to go a little further."

Mahecha made a commitment that a future energy manager would never have to start from scratch again. He was determined to set up a system of continual improvement to generate energy savings long into the future.

Carlo Dal Monte, the Director of Energy at Catalyst Paper at the corporate level adds, "For companies like Catalyst, with very high energy intensity, you need systems that have long-term stability and are not dependent on regional or even national policy."

What is ISO 50001?

The International Standards Organization launched ISO 50001 in 2011. It's a standard for Energy Management Systems – a global benchmark for energy conservation.

ISO 50001 uses a project-based approach to help organizations reach their energy saving goals. By using an Energy Management System, businesses can embed energy conservation into their regular operations. The standard has been adopted by the Canadian Industry Program for Energy Conservation, among other national organizations.

Mahecha and Dal Monte turned to ISO 50001 as an established international standard that brings together every aspect of energy management. The mill initially intended to build a management system that conformed fully to the standard without going for certification.

“If people in the company are going to take this program seriously, then executives need to show that it’s important enough to assign a real contributor to manage it,” says Carlo Dal Monte.

Key benefits of ISO 50001

Cushioning the effect of an electricity rate increase. The mill was looking at an electricity rate increase of 27% over five years, so long-term viability involved steady and lasting reductions in energy intensity.

Focus on improving performance. ISO standards have been criticized as paperwork exercises with a weak connection to business results. However, from its launch in 2011, the ISO 50001 standard has focused on performance improvement, which is vital to the mill’s success.

Availability of a respected energy manager. Mahecha is a persistent, visionary and credible energy manager. He was a respected engineer at Catalyst’s Crofton mill before taking on the energy manager position, and he brought to the mill his experience in implementing ISO standards in previous positions.

Existing ISO processes. The company had received certification under ISO 9001 (quality assurance) and ISO 14001 (environmental management) standards. This helped the company move more quickly to ISO 50001.

BC Hydro funding. The funded Energy Manager position was instrumental in the implementation of ISO 50001. BC Hydro also funded energy management consultants to coach the mill through the transition.

NRCan funding. The mill was able to use financial support from Natural Resources Canada for some staffing needs to achieve ISO 50001 certification.

Selling the idea

All of these factors made ISO 50001 attractive, but Mahecha had to work hard for 18 months, first to sell his vision to managers and staff across the mill, and then to implement the standard. He was supported by Rob Belanger, the new mill manager, who was committed to a long-term future for the mill as it emerged from bankruptcy.

Other senior managers also needed to buy into the idea across their departments. Mahecha made monthly presentations to the senior management team (SMT) where he drew parallels between energy management and the mill’s existing systems for safety, production and quality. Managers also understood that previous energy managers had seen their support fade because their projects did not align with core business needs.

Comparing BC Hydro SEM Program to ISO 50001

BC Hydro’s SEM Program laid important groundwork for the ISO initiative. The SEM Program is designed to offer flexibility for BC Hydro’s largest customers within a framework of an energy management plan. Mahecha’s main concern was that the SEM Program was not prescriptive enough to persist over many years and multiple leadership changes.

Catalyst Crofton mill

The Catalyst Crofton mill produces pulp using the kraft process, and paper from thermo-mechanical pulping. For energy, the mill uses electric power, natural gas, oil, and hog fuel (chips from solid wood processing). The mill also runs its own wastewater treatment plant, generates its own steam, and runs a large-scale turbo generator. Catalyst is BC Hydro’s largest single customer, and energy is the mill’s second largest cost.

Facilities and capacity

- Paper machines: 3
- Pulp machines: 2
- Directory paper: 145,000 tonnes
- Newsprint: 291,000 tonnes
- Northern bleached softwood kraft pulp: 310,000 tonnes

FEATURES	BC HYDRO'S SEM PROGRAM	ISO 50001
Requirements	Flexible	Prescriptive
Scope	Electricity (min 80%)	All fuels
Priorities	Set by negotiation in SEM contract	Determined by standard
Management engagement	Annual check-in, attendance at the Energy Management Assessment, annual communications to staff on the importance of energy efficiency.	Regular participation in policy, performance review, resource allocation.
Results	Expected energy savings for each two-year contract.	Energy performance is measured against energy performance indicators (energy objectives and targets determined by the organization).
Reporting	Quarterly Reporting	Annual reporting with third party onsite verification
Verification	Informal self-verification on SEM activities.	Formal, third party external audit of energy management system and performance improvement.
Certification	Not required	Provided
Funding	Financial support by BC Hydro for program initiatives, including the Industrial Energy Manager role, Energy Coaching and Employee Awareness. Energy management assessment and audit were aligned with ISO 50001 requirements.	Co-funding available from NRCan to support ISO 50001 certification (\$25,000 was available to Crofton, additional funding now available). BC Hydro support for some initiatives related to ISO 50001.
Incentives	Provides access to funding opportunities for studies and incentives for retrofit projects.	No funding for projects.
Other support	Strong support from account management, engineering and marketing departments.	No direct support for ISO 50001.

The plan to implement ISO 50001

Having received the ISO 50001 gap analysis, Mahecha spent most of 2013 planning for implementation of the standard. This involved many weekends and evenings, since Mahecha was at the same time responsible for continuing success in energy savings activity, including his commitments to the BC Hydro SEM Program.

He worked with mill management to determine:

- Desired scope of the ISO-conformant Energy Management System
- Budget for the program
- Deadline for achieving conformance
- Accountability for success across the management team
- Use of BC Hydro resources

Crofton decided to move forward with ISO 50001 across all of the mill's operations. The mill already had solid management practices in safety, environment and quality. Mahecha's consistent motto throughout the project was "Use the strengths the company has in management systems to organize and save energy."

Measuring energy performance is a key part of the standard. A comprehensive energy management information system was not within budget, so the mill decided to move forward with measurement based on monthly energy data. Mahecha and his colleagues built models of energy use based on specific products and settings.

Developing the business case

Mahecha developed a detailed business case, along with the Crofton SMT, to ensure that ISO 50001–conformance would provide value to the mill. The key drivers of the business case were:

- Increase in electricity rate of 27% in five years, with energy being the mill's second biggest expense
- Global competition in the pulp and paper market
- Decreased global demand for many types of paper

Given these drivers, Mahecha reviewed the benefits and costs.

BENEFITS

- Increased energy sustainability
- Reduced cost
- Reduced risk
- Reduced environmental impact
- Integrated management systems
- Demonstrated commitment

COSTS

- Internal and external consulting
- Awareness and training
- Documentation
- Change management
- Hardware and software for new IT systems

The business case showed that cost reductions, plus the resources from BC Hydro and NRCan, offered:

- Potential energy reduction of 3% in the next three years
- BC Hydro funding, including 75% funding of Mahecha's position, gap analysis and a mock audit by EnerNOC, and ISO coaching covering 60% of ISO elements by EnerNOC
- NRCan funding, including onsite ISO training and support for Certification Stage 1
- Resources from the Catalyst Mill, including 25% of Mahecha's salary (independent of the ISO project), temporary staff for help with documentation and SharePoint support, and support for Certification Stage 2

Getting staff on board

At the start of the project, employees and managers at the mill either thought ISO was expensive, documentation–heavy, and conformance–oriented, or had no interest in the whole concept of standards.

But they did care about cost reductions that would help keep the mill in business. Mahecha made sure that all of his conversations started with that point, and then led to an energy management system as a tool to find more savings and lock them in. He translated the language of the standard into practical terms for mill operators and managers.

Education was a huge part of implementing an energy management system. ISO is driving the mill to include energy management in training across four categories:

- **General awareness.** Mandatory training is tracked for all employees.
- **Procurement.** For staff who are responsible for purchasing energy–using equipment.
- **Induction.** The mill's induction software includes a section on energy management that all visitors must read.
- **Contractors.** If their work affects energy–consuming equipment, contractors receive additional training.



“The ISO standard doesn't save energy – it's just one way of having a robust energy management system that drives energy savings. Creating the system is hard work – but it's rewarding because it's an investment for our future.”

– Edinson Mahecha

Building on ISO 9001 and ISO 14001

“We couldn’t have done ISO 50001 if we didn’t have the other standards in place,” says Mahecha. His first step in planning was to consult with the ISO 9001 and ISO 14001 representatives on site. He learned from the challenges that those standards face:

- Implementation requires strong leaders
- Manuals are extensive but not really used
- People perceive the standards as pure paperwork with a focus on conformance

To avoid these problems, the 50001 project planning focused on the benefits and results, not the standard itself. It was positioned as just one of many tools to achieve energy goals, and Mahecha took pains to make 50001 more appealing than the other standards, for example by making the internal SharePoint site much more enticing.

In particular, ISO 14001 is a big help because 50001 and 14001 are closely aligned: many of the roles and responsibilities are already clearly defined. And across the existing 9001 and 14001 standards, processes were already in place for 16 of the 26 required 50001 elements (for example, control of records, general management review, and internal audit of the management system).

The steps to certification

After spending four months on the project, in January 2014, Crofton conducted a mock audit with EnerNOC’s certified ISO auditor to see how the mill was progressing towards meeting the requirements. The auditor evaluated the mill’s compliance to each of the 26 elements. The report showed Crofton management that getting certification would be easier and \$20,000 cheaper than expected.

Mahecha, along with the standards leaders for 9001 and 14001, conducted a four-step process to integrate the implementations at Crofton:

- Identify common elements and gaps
- Incorporate energy language into the processes for 16 elements already in place from previous ISO work
- Perform the first integrated audit
- Integrate documentation

The three ISO leaders determined that working together would reduce the cost and time for the initial 50001 certification and for continued certification across all standards. For example, in two areas, there were obvious savings:

- **Audit integration.** With intensive planning, the ISO leaders determined how to optimize the audit time on site. For the 16 elements in common, one manager can respond to audit questions about any of the 16 elements. All three standards were audited in four days with two auditors.
- **Action registry.** Crofton uses PCAR (Preventive and Corrective Action Register) which is software shared across standards. One manager can present the PCAR results to the auditor and the SMT.

The mill has successfully completed ISO 50001 certification, becoming the first pulp and paper manufacturer in Canada to be certified.



Improved performance and production

From 2012 to 2015, the mill has achieved a 5.6% reduction in purchased electricity by consuming less while generating more. This is a result of the foundation provided by the SEM Program plus the increased attention to energy from implementing ISO 50001. At the same time, production in 2013–2014 increased by 1.5%. Generation increased from 60% to 95% of rated capacity. Moreover, Crofton is seeing consistent energy utilization improvement every year.

The energy management system has forced the mill to become more disciplined around baselines. “Now we can prove the results we have using 2012 as a baseline,” says Mahecha. The ISO process also means all energy – from electricity to natural gas, gasoline to biomass – is considered and managed together.

These results had to come without significant investment in capital, because Catalyst was very capital-constrained. The vast majority of savings came from operational improvements and the increasing strength of the energy management system.

Staff now seek savings

By consistently measuring energy performance, the staff at Crofton have changed their attitude toward energy management.

- Crofton staff members now see – and actively seek – opportunities all around the mill. The SMT tracks the number of energy-related opportunities for investment in their monthly energy meeting.
- Conversations about energy used to focus on the trade-offs between energy and production. After ISO implementation, these win-loss discussions have been replaced by productive collaborations based on two agreed-upon factors:
 - Reducing energy intensity
 - Understanding energy drivers so that the team can rank projects more effectively
- Operators now have clearer objectives. In the Thermo-Mechanical Pulp (TMP) operations room, the team understands that their objective is to make as much pulp as they can with as little energy as possible. At the same time, mill operation staffing has been reduced by over 50% in the past five years. There has been a flood of innovation in rising to this challenge, such as removing unnecessary screens and cleaners.

New energy management focus at senior levels

The ISO system brought a consistent, senior-level focus to energy management, instead of periodic interest in these kind of projects. Energy performance (both usage and generation) is analyzed every day in the daily production meeting. It's also on the regular agenda for area-specific meetings (such as thermo-mechanical pulp and utilities).

Once a month the senior management team meets as the energy management team – switching focus but not members – to make sure energy is integrated into all aspects of plant operations and funding. This monthly meeting reviews performance from an energy scorecard maintained by Mahecha but the meeting happens whether Mahecha, as the energy manager, attends or not, because the SMT is committed to the success of the energy management system.

Making saving energy a policy

The SMT developed the mill's energy policy at the same time as the energy management system. The goals in the policy cover all energy sources:

- Minimize energy intensity
- Minimize fossil fuel usage
- Maximize power generation
- Reduce greenhouse gas emissions

These four main goals guide all energy management decisions at Crofton.

Berk Borrett, Manager of Technical Services, was eloquent on the topic of accountability. "Our energy objectives are perfectly aligned with the mill's annual financial plan," he says. "Expected energy savings are baked into our financial plan, so if a project is not delivering, then the SMT holds the process owner accountable and works with the owner to achieve the expected results."

At a more tactical level, "ISO puts PDCA in your face," says Mahecha, referring to the Plan-Do-Check-Act cycle. To get persistent savings, the mill needs to be organised and ask hard questions:

- Are you really planning?
- Do you have good measurement?
- Who is tracking deviations?
- What are they doing about it?

Redefined processes save time

Before the energy management system was in place, staff would waste time by re-inventing the wheel on every project, which was frustrating for all concerned. Completing the system required an intensive effort in redefining processes, developing tools for those processes, and training mill staff. But now, with the system entrenched, many tasks are simpler.

A good example is preventive maintenance. ISO 50001 requires preventive action on significant energy uses. Crofton was called out by an auditor for a dirty transformer that clearly had not been inspected for some time. This transformer is now part of preventive maintenance, and mill operators are seeing much greater reliability.

Other benefits of ISO certification

On top of cost savings from better energy management, other benefits came from ISO certification:

- **Drive to improve performance to meet audits.** The annual surveillance audit introduces a level of rigour that forces the mill to make sure that it delivers on commitments.
- **Community interest in mill impact.** The local community is very interested in the mill's environmental impact, as is true for many industrial facilities. Certification shows the community that Catalyst Crofton is attaining global standards of resource conservation.
- **Reward for the hard work of building the energy management system.** ISO is a known brand that provides internal credibility for all of the work that goes into getting to ISO-conformance.
- **Market branding.** Catalyst "has been at the forefront of corporate and environmental responsibility for two decades" (see catalystpaper.com/sustainability). External validation of this commitment is consistent with the firm's brand.
- **Customer retention.** Catalyst's customers are familiar with the impact of rising energy costs on the Crofton mill, so they are concerned about long-term pricing. With ISO 50001, Catalyst is able to reassure them that the company is committed to finding savings through energy management.
- **Partnership with BC Hydro.** By becoming certified, the mill has shown BC Hydro that it is a long-term partner for energy management.

Lessons learned

CHALLENGE	LESSONS LEARNED
The ISO standard is seen as external to the company's real business.	<p>Use the successes from BC Hydro's SEM Program to show how strategic energy management delivers results.</p> <p>Do not create a new, standalone program that could be killed off easily. Instead, provide tools so that energy can be part of day-to-day practices.</p> <p>Increase energy-related training.</p> <p>Communicate all successes.</p>
ISO standards are seen as busywork.	<p>Focus on an energy management system that delivers results. Make ISO a milestone or reference, but not the goal.</p> <p>Focus conversations on outcomes, using practical language, not standards language.</p>
ISO is seen as expensive.	<p>Leverage existing ISO programs for ISO 50001 as much as possible.</p> <p>Use BC Hydro and NRCan funds.</p> <p>Read terms carefully to make sure that all available funding can be tapped.</p> <p>Explain how energy success removes waste that can be re-invested in the business.</p>
Management is not engaged.	<p>Break the project down into small steps to allow for go/no-go decisions along the way.</p> <p>Present the energy management system potential to the plant GM along with the business case at each step.</p> <p>Ask the SMT to be the steering committee for the project (although they will want to delegate responsibilities along the way).</p>
Employees are resistant to change.	<p>Make education a constant aspect of mill operations so that staff understand the benefits and how to participate.</p> <p>Ensure all conversations and training are directly relevant with simple examples.</p>
Auditors can focus on conformance only.	<p>Spend time interviewing the auditors to make sure they are a good fit for your goals.</p> <p>Collaborate with auditors to focus on components that add value, and speak clearly to mill employees.</p>

Mill manager Rob Belanger says he would do nothing differently if he had to go through ISO certification again. Looking to the future, he constantly challenges Mahecha, his manager Borrett, and the SMT to make sure all energy management efforts deliver sustaining value to the mill.

Is ISO 50001 for you?

Catalyst Paper Director of Energy, Carlo Dal Monte, recommends that executives at other organizations consider three factors when making a decision about ISO 50001.

1. Understand why you want to do it. Catalyst had specific needs that this project met – other firms should be equally clear about the expected results and costs.
2. Make sure you have a champion who is respected and is passionate about pursuing ISO. If people in the organization are going to take this seriously, then executives need to show that ISO is important enough to assign a real contributor.
3. Understand the role of ISO 50001 in your global marketplace. For energy-intensive industries such as pulp and paper, this is a mechanism for holding organizations accountable for their energy performance. ISO 50001 is different from other standards in that it has continuous improvement built into it.

What's next for the Crofton mill? Mahecha and Borrett are excited to be pursuing four initiatives:

- Bringing continuous improvement to the energy management system and to overall energy management
- Developing a mill-wide mass-energy balance
- Improving measurement for key energy-consuming processes
- Developing new competency training for relevant mill staff

As Mahecha says, ISO certification is just the beginning.

Appendix A: tools for ISO conformance

- **Gap analysis.** The gap analysis was a critical element in deciding to move forward, especially because of its optimistic view that ISO conformance would be achievable with resources available to Crofton. The details in this report gave Mahecha a roadmap for building his EMS.
- **Opportunities for investment (OFIs).** The gap analysis identified that the mill did not have a consistent process for identifying energy savings opportunities and seeing them through to completion or closure. The resulting OFI system is a way for anyone at the mill to submit recommendations that provide incremental and sustainable improvement based on the existing plant. OFI has become a critical part of the mill's success, where it has now been taken company-wide by the financial manager. BC Hydro provided support for the OFI launch.
- **Energy connection map.** As part of EnerNOC's coaching, Mahecha received a multi-tab Excel sheet that links all of the ISO elements together. This was a practical guide to connecting the elements from policy to SEUs to variables to calibration to action planning to verification.
- **Training system.** Mill employees and managers needed extensive training to make the EMS work. Mahecha made use of the mill's existing Traccess system that was already in place.

In addition, the mill needed new processes and tools to bring energy management into core activities. As Mahecha says, "Practical tools are the difference between "talking nice" and "making a difference." Two examples demonstrate this idea:

- Every request for CapEx or equipment replacement includes a checkbox where the requester indicates that they have considered the energy implications of this equipment. By checking this box, the requester commits to including energy data with the request. All such requests are then routed to Mahecha as part of the approval process.
- Procurement documents include high-efficiency standards and the parts list in the Stores department includes high-efficiency options.

Appendix B: timeline for ISO certification at Catalyst Crofton

The journey to ISO 50001 certification began after Mahecha’s hiring in December 2011 and his subsequent analysis of Crofton’s energy situation. The details of the three–year journey to full certification in January 2015 are laid out below.

DATE	MILESTONE
Dec 2011	Mahecha hired as Energy Manager
Early 2012	Introduce senior management team to strategic energy management
Spring 2012	Gather data from consultants and other sources on ISO 50001
June 2012	Present business case (proposal, budget, sponsors, resources) to be 50001–conformant without certification
June 2012	Receive go–ahead from mill manager to do gap analysis between current state (SEM Program) and ISO
Dec 2012	Conduct gap analysis with EnerNOC (paid for by BC Hydro)
Jan 2013	Receive go–ahead from SMT to create action plan for ISO implementation
Spring 2013	Receive approval from BC Hydro to fund coaching support for ISO implementation
Summer 2013	Plan for implementation
Oct 2013	Begin ISO implementation
Jan 2014	Conduct mock/internal audit focused on 50001 with EnerNOC
Jan 2014	Decision to proceed with certification (only 2 major non–conformances)
Feb 2014	Complete phase 1 of certification
Oct 2014	Complete phase 2 of certification
Dec 2014	Conduct integrated internal audit of three ISO standards (9001/14001/50001) with Envirochem
Jan 2015	Gain full certification

Appendix C: The 26 elements of ISO 50001

Full details of the ISO 50001 standard are available at the ISO website (iso.org).

ELEMENT NUMBER	ELEMENT DESCRIPTION
4.1	General Requirements
4.2.1	Top Management
4.2.2	Management Representative
4.3	Energy Policy
4.4.1	Energy Planning (General)
4.4.2	Legal Requirements and Other Requirements
4.4.3	Energy Review
4.4.4	Energy Baseline
4.4.5	Energy Performance Indicators
4.4.6	Energy Objectives, Energy Targets and Energy Management Action Plans
4.5.1	Implementation and Operation (General)
4.5.2	Competence, Training and Awareness
4.5.3	Communication
4.5.4.1	Documentation Requirements
4.5.4.2	Control of Documents
4.5.5	Operational Control
4.5.6	Design
4.5.7	Procurement of Energy Services, Products, Equipment and Energy
4.6.1	Monitoring, Measurement and Analysis
4.6.2	Evaluation of Compliance with Legal Requirements and Other Requirements
4.6.3	Internal Audit of the EnMS
4.6.4	Nonconformities, Correction, Corrective Action and Preventive Action
4.6.5	Control of Records
4.7.1	General Management Review
4.7.2	Inputs to Management Review
4.7.3	Outputs from Management Review