

ISO 50001 Energy Management Systems standard certification

New Gold Inc. New Afton Mine

This B.C. gold and copper mine implemented energy performance improvement projects and is on track to save 9 gigawatt-hours of energy in 2014.

About CAN/CSA-ISO 50001 Energy Management Systems standard certification

ISO 50001 provides organizations with a structured framework to manage energy in such a way that it can increase energy efficiency, reduce costs and improve energy performance. This standard is based on the common elements found in all the ISO management systems standards, assuring a high level of compatibility with ISO 9001 (quality management) and ISO 14001 (environmental management). It integrates energy efficiency into management practices by making better use of existing energy-consuming processes. Based on the Plan-Do-Check-Act cycle, this standard integrates both technical and managerial activities.

Natural Resources Canada (NRCan) through its [ecoENERGY Efficiency for Industry program](#) is offering cost-shared assistance to industrial companies to implement energy management projects, including CAN/CSA-ISO 50001 Energy Management Systems standard pilots. The program will provide financial assistance of up to **50 percent** of eligible costs to a maximum of **\$40,000**.



CASE STUDY SNAPSHOT

Industry: Mining

Energy management system (EnMS) guidance/standard: CAN/CSA-ISO 50001

Key driver for an EnMS: Cost reduction

Improvement focus: Energy efficiency for mine production and operations

Location: New Afton Mine, Kamloops, British Columbia, Canada

Products: Gold and copper

2014 expected annual energy savings: 9 gigawatt-hours

Payback period: Typically less than two years

Employees: About 400

Energy sources: Electricity, natural gas, diesel fuel, gasoline, propane and explosives

2014 energy objective: To implement projects to improve energy performance with savings equivalent to 3 percent of the 2012 energy consumption

Photo: New Gold Inc. New Gold operations personnel leave the underground access point.

Energy management system overview

An energy management information system (EMIS) was essential to support the ISO 50001 system implementation at the New Afton Mine. An EMIS is a performance management system that enables individuals and organizations to plan, make decisions and take effective action to manage energy use and costs. It helped the New Afton Energy Team set energy objectives and targets and to monitor, measure and analyze energy performance. The EMIS also alerted the team to significant deviations from target baselines.

“The most useful resource, which really got us started in the right way, was the *Energy Management Information Systems Planning Manual and Tool*. It is available for free on the Natural Resources Canada (NRCan) website and formed the foundation of our entire EMIS,” Cooper says. “I also attended an excellent NRCan Dollars to \$ense workshop on EMIS, based on the principles of this manual.” Cooper also cited generous financial support and expertise from BC Hydro as critical to the project’s success.

NRCan Energy Management Information Systems Planning Manual and Tool
nrcan.gc.ca/energy/efficiency/industry/cipec/5223

NRCan Dollars to \$ense Energy Management workshops
nrcan.gc.ca/energy/efficiency/industry/training-awareness/5461

Business benefits achieved

Working through the energy planning process helped the Energy Team learn more about energy management and energy use than the team originally thought was possible. “An energy management plan forces you to look at, and analyze, which factors and variables affect energy use at your site. This helps you understand how you can control the use of energy,” Cooper says.

Good energy data acquired because of the EMIS is proving to be extremely useful. Month-end energy-cost allocation is far easier and more accurate. The budget forecast was done by using regression models of energy use, so forecasts are now far more accurate. Data is readily available for energy studies, and this has saved time on information gathering.

- Total annual energy savings have exceeded 2.4 gigawatt-hours (GWh) since ISO 50001 was established in the first quarter of 2014.
- The energy management team is led by a professional engineer who serves as the mine’s energy specialist.

“Mining is energy-intensive. At the New Afton Mine, a 1 percent reduction in energy costs is worth hundreds of thousands of dollars a year,” says Andrew Cooper, Energy Specialist at New Gold’s New Afton Mine.

There are also numerous examples of employees stepping up with ideas to save energy and reduce costs. Mine operations personnel took the initiative to shut down the conveyor systems during shift change, saving approximately \$12,500 per month. An electrician found an easy fix for a blow-down valve on a compressor after attending a short session on compressed air awareness that featured a bicycle pump to show the energy lost through air leaks.

Cooper also notes how more and more personnel are starting to use the energy-use data to improve mine operations and reduce costs. For instance, the reliability group is using energy data instead of run hours for some of the reliability-centered maintenance they are doing.

Indeed, awareness around energy management has increased at all levels of the organization. “For me, personally, this is an invaluable benefit because it is people who ultimately manage energy. Folks are constantly telling me of things they have done to save energy,” Cooper says.

The employee energy suggestion process is being well used, and the suggestions coming out of it have been excellent. The Energy Team analyzed these suggestions during its 2014 energy review to determine what warranted further study and what might be implemented in the 2015 financial year.

“The number of spinoff benefits that resulted from energy performance improvement projects has been one of the biggest eye-openers for me. There is not one project to date that has had only an energy performance improvement benefit because we have also had operational, environmental and safety benefits associated with each project,” Cooper says.

New Gold is also proud of how energy management has supported its reputation for taking corporate social responsibility seriously. In May 2014, New Gold won an Energy Performance Management Award. It was awarded at the Canadian Industry Program for Energy Conservation (CIPEC) Energy Summit 2014 – entitled “Where Efficiency Meets Profitability.” This CIPEC award, supported by NRCan, recognized the New Gold New Afton Mine for improving their energy performance through enhancements to their monitoring, measuring and reporting processes relating to the facility’s energy consumption.

This was the first mine in North America to achieve ISO 50001 certification. The implementation also helped meet the requirements of the Toward Sustainable Mining, Energy and Greenhouse Gas Protocol from the Mining Association of Canada.

Company profile

New Afton Mine is an intermediate gold mine with about 400 employees. The company has a portfolio of four producing assets and three significant development projects. The New Afton Mine in Canada, the Mesquite Mine in the United States, the Peak Mines in Australia and the Cerro San Pedro Mine in Mexico provide the company with its current production base and solid foundation. In addition, New Gold owns 100 percent of the Rainy River and Blackwater projects, both in Canada, as well as 30 percent of the El Morro project in Chile. New Gold’s objective is to be the leading intermediate gold producer, focused on the environment and social responsibility.

The New Afton Mine is in the south-central interior of British Columbia, 15 kilometres (km) west of Kamloops and 350 km northeast of Vancouver. The mine site includes an old open pit, underground workings, historic support facilities, a new concentrator and a recently constructed tailings facility. The total area of the Afton Mining Lease and all other claims is 12,450.4 hectares.

The mine began production in June 2012 and began commercial production ahead of schedule in July 2012. The underground operation is expected to produce, on average, 85,000 ounces of gold and 75 million pounds of copper per year over a 12-year mine life. The mine’s resources include 2.3 million ounces of gold, 7.8 million ounces of silver and 1.988 million pounds of copper.

Energy use profile			
Energy sources	2013	2012	2011
Electricity (megawatt-hours [MWh])	186,219	90,631	35,888
Diesel fuel (kilolitres [kL])	3,900	3,979	3,021
Propane (kL)	43	154	203
Gasoline (kL)	149	147	123
Natural gas (gigajoules)	46,965	30,608	1,514
Explosives (tonnes [t])	682	1,242	930

Business case for energy management

Gold miners have been cutting costs across the board since the spring of 2013. But at the same time, they continue to produce unprecedented amounts of gold. According to the *Gold Demand Trends* report from the World Gold Council, production hit record highs in the first six months of 2014. The report states that global output rose 4 percent year-on-year to 1,478.5 t. This means that 2014 could be the highest year on record and the fifth-straight year of record output.

However, the World Gold Council does not believe such high levels of production are sustainable. This is born out by gold price trends. The price of gold dropped from the \$1,800 per ounce range in 2013 to about \$1,300 in 2014, and many mines began to lose money. Because energy is a substantial expense in the mining industry, energy management is inextricably linked with profitability because good energy management improves energy performance, which, in turn, reduces energy costs and improves profitability.

Operating a gold mine like the New Afton Mine in these hyper-competitive times means that any way of reducing costs is welcomed. “With low commodity prices and increasing offshore competition, energy efficiency improvement is one of the few places where an increase in profitability can be found,” Cooper says. Moreover, improvements can be accomplished with minimal capital injection by using innovation, creativity and, most importantly, EnMS. “Even in a relatively small mine like New Afton, a 1 percent reduction in energy costs is worth hundreds of thousands of dollars a year,” he adds.

The mine is also well placed to maximize gains from energy efficiency. “Because of efficient production and very specialized mining methods, New Gold is one of the lowest-cost producers in the global mining industry, and we are hoping with our energy management practices we can reduce our costs even further,” Cooper says.

Implementation

“Energy management at New Afton is self-sustaining. It is done by all employees on a day-to-day basis as part of what we do at New Gold,” Cooper says. “I was excited when I saw the ISO 50001 coming into play. I saw it as a vehicle to achieve our vision because ISO 50001 is focused on continual improvement of energy performance, and it develops and builds energy management into the culture and systems of an organization.”

The energy planning process, approved by the mine’s senior management, helps to share ideas between staff and standardize operations to maximize energy efficiency.

The mine also benefitted greatly from good information management infrastructure. A new process integration (PI) server had been installed so the mine used the PI data historian to collect and manage energy data.

An EMIS was installed to tie the mine’s energy sources – electricity, diesel fuel, propane, natural gas, gasoline and explosives – into energy account centres.

These account centres included:

- milling
 - grinding
 - flotation
 - regrinding
 - dewatering
 - compressed air
- mining
 - ventilation
 - dewatering
 - compressed air
 - batch plant
 - production
- crushing and conveying

Also, New Gold was able to dramatically reduce submetering costs by tying feeds from multiple meters into aggregators. Data from 152 electrical submeters in the mines was collected with a network that extends across the company and below ground in the mine and was sent to a data concentrator. Indel Control Service Inc. of Ingersoll, Ontario, played a key role in developing this system. Four new gas submeters were also installed. Energy data from diesel fuel, gasoline and explosives can be entered manually into the system until the data capture can be automated.

New Gold hired ADM Systems Engineering of Dartmouth, Nova Scotia, to install RtEMIS, an EMIS developed by RtTech Software of Moncton, New Brunswick. Cooper and his team provided all the information for the PI system. The EMIS had to support ISO 50001, meet the EMIS criteria in the NRCan guidelines and be installed within three months.

Like other ISO standards, ISO 50001 works on the Plan-Do-Check-Act cycle. It requires an organization to:

- Conduct an energy review, which involves analyzing energy data, identifying areas of significant energy use and areas for energy performance improvement.
- Establish an energy baseline.
- Establish energy objectives and targets that are measureable and have timelines for achievement.
- Establish an action plan to achieve energy objectives and targets.
- Implement the action plan.
- Check performance.
- Monitor, document and report all the above.



Photo: New Gold Inc. The grinding circuit mills break solid material into smaller pieces.

People and organizations behind the energy team

The cross-functional energy team works to keep energy awareness high on everyone's radar.

The New Afton Mine took advantage of the funding available from NRCan for the ISO 50001 implementation. Lauri Gregg from LCG Energy Management Group also helped with the implementation. BC Hydro funded a communication, training and awareness plan for ISO 50001 that was developed in conjunction with Prism Engineering in Burnaby, British Columbia.

The mine used funding from BC Hydro for a full-time energy specialist. This meant that there was someone dedicated full-time to the implementation and that it would not go off track if production challenges arose. New Gold aimed for long-term sustainable energy management, where energy management is part of the culture and is built into the systems of an organization. Most importantly, the approach is not dependent on any one person, and there is continual improvement in energy performance no matter who is involved.

Company-wide, staff recognize that the New Afton Mine Energy Policy is the staff's commitment to manage energy as efficiently as possible, to continually improve their energy performance and to use resources as responsibly as possible. The policy sets the path for what the mine wants to achieve. The energy policy is posted on bulletin boards around the mine and is prominent on the energy management page on the intranet.

Communication, training and awareness are at the crux of the system, and the Energy Team spends a great deal of time on them. BC Hydro's support for training and communications was crucial to the project's success. "It is not the system that manages energy – it is the people who manage energy. This is where a lot of the work comes in. When you have a 24/7 operation with different departments and different crews, the Energy Team has to spend a lot of time spreading the word, training people and promoting the program," Cooper says.

But it is also important to acknowledge that support for the energy policy cannot rely just on arms-length communications such as email, posters and tweets. "It has got to be done face-to-face, talking to people and listening to their concerns. Let them know what this will do for them, how it will make their job easier, how it will improve profitability, how it will enhance the company image. You really have to sell the benefits of the system," Cooper explains.

In addition, the mine uses the Positive Attitude Safety System (PASS[®]) for safety awareness. Cooper worked with the PASS team in Kelowna, British Columbia, to incorporate energy awareness into PASS. This started with small tasks such as turning off lights and created awareness where it counts — on the shop floor. "Folks were accustomed to PASS[®], and the results of incorporating energy awareness into it thus far have been encouraging," Cooper notes.



Photo: New Gold Inc. The 7,500-HP SAG mill operates in the grinding circuit.

Energy project highlights

Mill flotation blower control upgrade

Expected energy savings: 1,411 MWh/yr
Completed: March 2014 with a BC Hydro incentive

Underground compressed air compressor relocation

Expected energy savings: 1,335 MWh/yr
Completed: March 2014 with a BC Hydro incentive

Underground ventilation on demand

Expected energy savings: 7,868 MWh/yr
Expected completion: December 2014 with a BC Hydro incentive

Surface and mill lighting upgrades

Expected energy savings: 310 MWh/yr
Completed: March 2014 with a BC Hydro Self-Serve Incentive Program (SIP) incentive

Barriers

Changing the status quo mindset was one of the biggest early challenges. “You have to get people off the project-based, or roller coaster, energy management mentality. But it is what people are used to, and we had to work hard to shift to a system-based, continual improvement mindset,” Cooper says.

Cooper was also surprised by how much time and energy it took to install all the submetering and connect all the networks to get the information into the EMIS.

Another of the most challenging components was dealing with operational controls. Determining parameters, set points and alarms to ensure equipment is operated in the most efficient way was hard work. Each crew had their own perspective on what was efficient and how to run the equipment. Metallurgists also have their perspective, and superintendents have their perspective. “Trying to align these perspectives, operational requirements and energy efficiency is still a work in progress,” Cooper notes.

Lessons learned

Cooper recommends using the free NRCan *Energy Management Information Systems Planning Manual and Tool* to get started in right direction for ISO 50001.

He also says that for industrial environments, such as a mine, it makes sense to go with energy management consultants and EMIS suppliers that have industrial experience. Many consultants and suppliers have the bulk of their experience with buildings, which is valuable, but it does not translate as well as industrial experience.

Meters, relays and transmitters used for managing or monitoring energy performance need to be calibrated, and a system to ensure these items remain accurate is needed. Some devices have built-in functionality to ensure accuracy but some manufacturers suggest removing the power meter to recheck calibration annually. For a mine that runs 24/7/365, this is not a practical option. Be aware of this constraint when you specify data-gathering equipment.



Photo: New Gold Inc. A scoop mucks out an underground draw bell. Overhead rock collapses into the draw bells to be extracted.

Lesson learned highlights

- Good energy data is necessary and extremely useful.
- Much about energy management and energy use at your facility can be learned from the ISO 50001 energy planning process.
- An employee suggestion process is a good way to engage employees and collect excellent ideas.
- Most energy efficiency projects also have operational, environmental and safety benefits.
- Get outside assistance – it will be a challenge to go it alone.

Results

The New Afton Mine is the first mine in North America to implement the ISO 50001 standard (as of the first quarter of 2014).

The mine is on track to exceed their 2014 energy objective and save 9 GWh of energy in 2014.

Next steps

The mine plans to continue to heavily promote energy management as a core company activity that focuses on continuous improvement. Cooper is working with the cross-functional Energy Team to keep energy awareness high on everyone's radar.

The EMIS will continue to be used to make energy management visible to all levels of the organization.

Planning energy performance improvement initiatives for implementation in 2015 is a high priority.

Most important, though, is to solidify the ISO 50001 systems and processes to ensure energy management at the New Afton Mine is self-sustaining and is done by all employees on a day-to-day basis as part of what we do at New Gold.

Keys to success

An EMIS was essential to support the ISO 50001 system implementation at the New Afton Mine. An EMIS is a performance management system that enables individuals and organizations to plan, make decisions and take effective action to manage energy use and costs. It helped the Energy Team to set energy objectives and targets and to monitor, measure and analyze energy performance. The EMIS also alerted the team to significant deviations from target baselines.

Good energy data from the EMIS is proving to be extremely useful. Month-end energy-cost allocation is far easier and more accurate. The budget forecast was done by using regression models of energy use, so forecasts are now far more accurate. Data is readily available for energy studies, and this has also saved time on information gathering.

The mine also benefitted greatly from good information management infrastructure. A new PI server had been installed so the mine used the PI data historian to collect and manage energy data.

The energy planning process, approved by the mine's senior management, helps to share ideas between staff and to standardize operations to maximize energy efficiency.

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