From **ACTION**
to **WINNING** results

12 Outstanding Achievements in Energy Management

CIPEC ANNUAL REPORT 2016

CIPEC
Canadian Industry Partnership for Energy Conservation

Canada

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Contents

22 members CIPEC Task Force Council

20 industrial sectors

OVER **7,000** *Heads Up CIPEC* newsletter subscribers

2,386 CIPEC Leader facilities

OVER **50** trade associations

About CIPEC

The Canadian Industry Program for Energy Conservation (CIPEC) is a voluntary industry-government partnership established to improve Canada's industrial energy efficiency.

In the CIPEC partnership, change emerges from consensus and joint action developed through open communication. CIPEC continues to be the focal point for industry's action on energy efficiency in Canada.

The CIPEC Executive Board and Task Force Council are made up of volunteer industry leaders, working in partnership with Natural Resources Canada (NRCan) to advance energy efficiency. The Task Force Council and sector task forces are constantly working toward broadening participation, encouraging information sharing and bolstering awareness of the role and achievements of CIPEC members.

The 22-member CIPEC Task Force Council includes representatives from CIPEC's 20 industrial sectors, which encompass 2,386 CIPEC Leader facilities and over 50 trade associations. The Council provides a forum for sectors to share ideas and recommend ways to address common needs. It includes representatives from every CIPEC sector task force. Each CIPEC task force represents companies engaged in similar industrial activities. Overall direction is provided by the CIPEC Executive Board, made up of private-sector leaders who are champions of industrial energy efficiency and who provide advice on industrial energy efficiency programs and related issues to the Government of Canada.

CIPEC's mandate is to promote greater energy efficiency by providing tools, raising awareness and recognizing top performers. At its industrial energy efficiency conference, the Energy Summit, CIPEC presents the Leadership Awards to honour Canadian companies that have demonstrated a significant and innovative contribution to energy efficiency.

CIPEC's awareness program is anchored in its Heads Up CIPEC newsletter, which has a readership of over 7,000 subscribers.

CIPEC volunteers include successful business leaders and nationally recognized players. The profiles of these leaders and their strong belief in CIPEC's mandate attract new members from industry, building on the successful partnership between industry and government.

Our Mission

To promote effective voluntary action that reduces industrial energy use per unit of production, thereby improving economic performance while participating in meeting Canada's climate change objectives.

Join CIPEC

Participate in CIPEC by registering your company's commitment to energy efficiency improvements and greenhouse gas (GHG) reductions. Signing up as a CIPEC Leader is free and provides eligibility for a broad range of benefits:

- Cost-sharing for
  - Implementing the Energy Management Systems standard (ISO 50001).
  - Process integration (PI) studies.
  - Computational fluid dynamics (CFD) studies.
  - Energy management information systems (EMIS) implementation.
  - Other energy management projects.
- Opportunities to network with other industrial energy managers and practitioners.
- Opportunity for your company to participate in ENERGY STAR for Industry recognition.
- Eligibility to nominate your organization for a CIPEC Leadership award.
- Free webinars on innovative energy practices.
- Technical guidebooks, case studies and tools.
- *Heads Up CIPEC* – a monthly e-newsletter that provides the latest energy efficiency information.

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New Gold – New Afton Mine

New Afton's Energy Specialist, Andrew Cooper, mentions that, since New Gold became a member of CIPEC, its employees have participated in energy efficiency best practices webinars and Dollars to $ense energy management workshops, and the mine received cost-sharing assistance for ISO 50001 implementation.

Global Woods Concepts Ltd.

CIPEC member Global Wood Concepts Ltd. used cost-sharing from NRCan and Toronto Hydro to shorten the project's payback period.

3M Canada

Andrew Hejnar, 3M's designated Energy Manager, mentions that cost-sharing from NRCan was an important success factor in continuously improving energy performance, as it helped reduce the risk of investing in energy-efficient technologies.

ArcelorMittal Dofasco

An NRCan $40,000-cost-sharing arrangement helped offset the expense of moving toward the ISO 50001 Energy Management Systems certification, which Angela Pappin, Vice-President, Technology at ArcelorMittal, says is an important goal for the company, as it will bring even more rigour to the company's energy portfolio.

Message From the Chair

Andy Mahut
Chair, CIPEC Executive Board

There can be no doubt that, in 2016, CIPEC helped industry deliver the kinds of results Canadians expect.

This year we reflected on 40 years of success. Founded in 1975, CIPEC was considered an organization with an aspirational vision for Canadian industrial energy efficiency because then, energy efficiency was an afterthought. Today, we are in a stronger position than ever before to help Canadian industrial facilities that want to strengthen their corporate bottom line through energy efficiency improvements.

CIPEC is integral to delivery on the Pan-Canadian Framework on Clean Growth and Climate Change – a plan to meet Canada's emissions reduction target and grow the economy. Economic and environmental objectives used to strike many Canadians as being opposed; but now we know that they can be mutually reinforcing. CIPEC is at the crossroads of progress on clean growth and climate change.

I invite you to view a series of case studies, starting on page 10 of this report, that showcases the successes of our Leadership Awards winners. These winners were recognized at CIPEC's Energy Summit, *From Ideas to Action*, co-hosted with the Excellence in Manufacturing Consortium in May 2016. The summit is an important event for recognizing Canada's industry leaders and for sharing ideas, best practices and the latest innovations in industrial energy efficiency.

You will see a common thread throughout the Leadership Awards stories: that energy efficiency improves our bottom line and, in doing so, strengthens our competitive position in the marketplace. In industries with shrinking profit margins, reducing energy use has become a key success factor.

Part of the reason companies are prospering from judicious investments in energy efficiency is that CIPEC and others – such as local utilities – offer incentives that reduce the financial risk of investing in energy efficiency. Many of the Leadership Award winners took advantage of the incentives, tools and peer-to-peer learning offered by CIPEC. Some of the many tools that CIPEC supports are the new ENERGY STAR for Industry program, the ISO 50001 Energy Management Systems standard, energy management workshops through a sole licensee – the Canadian Institute for Energy Training, webinars, newsletters, case studies and technical guides. Canadian companies are well supported by CIPEC in their energy efficiency planning and implementation.

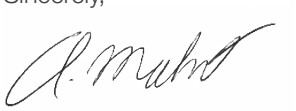
One tool that has been quite helpful to CIPEC Leaders is the ISO 50001 Energy Management Systems standard. Evidence shows that a properly executed ISO 50001 standard provides bottom-line value to leading-edge companies. ISO 50001 is helping industrial firms recognize energy as a fundamental input, similar to raw materials or personnel that should be viewed from a strategic, longer-term perspective rather than from a strictly tactical one. To date, 16 CIPEC Leaders have achieved ISO 50001 certification.

I would like to recognize the profound contributions of two individuals who have left the CIPEC family but without whom CIPEC might not have realized such progress. Sue Olynyk, from ArcelorMittal Dofasco, chaired CIPEC's Task Force Council for many years and left an indelible mark that CIPEC will benefit from for years to come. Philip Jago retired as Director of the Buildings Division of the Office of Energy Efficiency (OEE) at NRCan. Phil was responsible for the delivery of CIPEC for 15 years. I would like to thank them both for their service and dedication to Canadian industrial energy efficiency and prosperity.

In closing, I am always eager to contribute my opening remarks for the CIPEC annual report because I believe it is an important tool that can inspire companies to further their exploration of operational cost savings through improved energy efficiency. In these pages, CIPEC members can read about their peers' achievements and gauge what is possible in their own operations. Knowledge is power, and the CIPEC annual report is a great way to share successes and provide one another with inspiration and guidance.

Congratulations to all Canadian industrial champions of energy efficiency on a job well done! I wish you the best of luck in your future efforts to convert energy efficiency and GHG reductions into operational cost savings for your businesses and industries.

Sincerely,



Andy Mahut
Chair, CIPEC Executive Board

CIPEC Leadership Awards

CIPEC Leadership Awards are presented every two years to CIPEC member companies that distinguish themselves in energy efficiency by demonstrating a significant and innovative contribution to energy management and increasing productivity and competitiveness.

In May 2016, at the CIPEC energy efficiency conference – the Energy Summit 2016 – co-hosted by CIPEC and the Excellence in Manufacturing Consortium (EMC), 12 CIPEC Leaders won awards under six distinctive categories:

1. CIPEC Energy Management National Award – new award category;
2. Corporate Stewardship;
3. Process and Technology Improvements;
4. Energy Performance Management;
5. Employee Awareness and Training; and
6. Integrated Energy Efficiency Strategy.

To win, entrants must demonstrate a significant and innovative contribution to responsible energy use.

SIX AWARD CATEGORIES – 12 outstanding achievements in energy efficiency

Winning projects were as diverse as the products their companies produce, but they all had one thing in common: an outstanding commitment to improving industrial energy efficiency.

1 CIPEC ENERGY MANAGEMENT NATIONAL AWARD – new award category

The CIPEC National Energy Management Award is presented to the two highest scores achieved by Canadian entrants for the Clean Energy Ministerial (CEM) Energy Management Leadership Award. To qualify, an applicant is required to implement an ISO 50001 or Superior Energy Performance (SEP) energy management system and submit a case study outlining the benefits achieved by their organization. A panel of judges selected by CEM's Energy Management Working Group scores each case study.

WINNERS

- **New Gold – New Afton Mine**
  Kamloops, British Columbia

  WINNING EDGE: ISO 50001 inspires improvements at all levels of the organization.

- **3M Canada Company**
  Brockville, Ontario

  WINNING EDGE: The company achieved ISO 50001 certification and SEP implementation across multiple Canadian (and global) facilities.

2 CORPORATE STEWARDSHIP AWARD

Winners in this category promoted energy efficiency at the corporate level by the creation and engagement of an energy management team, the development of a corporate energy management plan or policy, or the implementation of a formalized management system.

WINNERS

- **Cascades inc.**
  Kingsey Falls, Quebec

  WINNING EDGE: The company is the pulp and paper industry's most energy-efficient.

- **ArcelorMittal Dofasco**
  Hamilton, Ontario

  WINNING EDGE: The company implements wide-ranging projects to significantly reduce its energy consumption.

3 PROCESS AND TECHNOLOGY IMPROVEMENTS AWARD

Winners in this category reduced energy intensity in an industrial process by improving procedures and equipment such as refrigeration or compressed air systems.

WINNERS

- **Barrick Gold-Hemlo**
  Marathon, Ontario

  WINNING EDGE: Site-wide ventilation management reduces energy demand, consumption and GHG emissions.

- **CAE Inc.**
  Saint-Laurent, Quebec

  WINNING EDGE: The facility manager builds an iron-clad, nearly risk-free energy efficiency business case.

4 ENERGY PERFORMANCE MANAGEMENT AWARD

Winners in this category enhanced their monitoring and measuring of and reporting on facility or company-wide energy consumption and improved energy performance.

WINNERS

- **Catalyst Paper Corporation – Powell River**
  Powell River, British Columbia

  WINNING EDGE: The company converts waste steam to electricity.

- **Shell Canada Limited**
  Fort Saskatchewan, Alberta

  WINNING EDGE: Shell Canada finds major energy-saving synergy for two industrial plants.

5 EMPLOYEE AWARENESS AND TRAINING AWARD

Award winners in this category raised employee awareness and understanding of energy efficiency and promoted best practices through knowledge exchange.

WINNERS

- **Canfor Pulp Limited**
  Vancouver, British Columbia

  WINNING EDGE: The company's investments in energy efficiency initiatives are supported by deeply engaged employees.

- **3M Canada – Brockville**
  Brockville, Ontario

  WINNING EDGE: The employee engagement plan keeps staff at all levels educated on every aspect of energy management.

6 INTEGRATED ENERGY EFFICIENCY STRATEGY AWARD

These winners improved energy efficiency at a facility or on a company-wide level through a range of initiatives as a result of an integrated strategy.

WINNERS

- **Global Wood Concepts Ltd.**
  Toronto, Ontario

  WINNING EDGE: The company has pursued energy management at all levels for over a decade.

- **Mother Parkers Tea & Coffee**
  Mississauga, Ontario

  WINNING EDGE: Their energy management system, including major system upgrades and cutting-edge technology, dramatically reduces energy use.

For more information on the awards, visit **nrcan.gc.ca/energy/efficiency/industry/cipec/5409**.

Energy Management National Award

New Gold – New Afton Mine

ISO 50001 is the bedrock for change across a large organization.

> *"ISO 50001 keeps New Afton Mine accountable so undertaking effective energy efficiency activities is just part of what they do."*

The New Gold – New Afton copper-gold mine and concentrator plant has been a proponent of energy efficiency practically since the day it opened. The mine, which started production in 2012, was the first in North America to receive ISO 50001 certification, in 2014. Since 2013, New Afton has continually improved its energy efficiency performance by launching projects large and small and ensuring that all employees feel a deep sense of engagement. The result has been an 11 percent reduction in the energy intensity per tonne of ore milled and an associated reduction in GHG emissions of over 19 percent.

ISO provides the framework

New Afton's Energy Specialist, Andrew Cooper, says that ISO 50001 has provided an ideal framework for the company's dogged pursuit of new energy improvement projects.

"ISO keeps us accountable so that undertaking really effective energy efficiency activities is just part of what we do," he says. He added that New Afton's primary reason for pursuing ISO 50001 certification was to build energy management into the systems and culture of the company. "We saw this internationally recognized and externally verified system as the ideal vehicle to help us achieve our energy management vision."

New Afton undertakes programs and projects at all levels and of all sizes, across all operations to propel its energy-saving culture. Interestingly, the company focuses on encouraging employees to be energy-efficient at home, which Cooper says builds commitment in the workplace. One such initiative, called Mission Zero Energy Waste, bestows every staff member at New Afton with the playful title of Power Saving Agent. Employees are encouraged to borrow one of New Afton's FLIR ONE™ thermal imaging cameras, attach them to their smart phones, and take thermal readings inside their homes.

"The images show them where heat is leaking out of their homes so they can fix the leaks and stop wasting energy," says Cooper. "They share their photos and stories about what they find at home, which helps create awareness in the workplace." Cooper says the program is so popular that he has had to buy additional thermal cameras to keep up with demand.

In another project, New Afton worked with BC Hydro to subsidize employees in adopting home energy meters. The meters enable employees to view the home's energy "signatures" on-line – all part of building a strong practice of energy awareness.

Taking a page from the safety book

In an example of culture shift, New Afton took a cue from the PASS® (Positive Attitude Safety System), which encourages staff to ask themselves continually whether their workplace and actions are as safe as possible. Cooper used the same concept for improving energy efficiency,

and it led to a program in which staff make suggestions for improving New Afton's energy efficiency and track whether their ideas are being implemented (they nearly always are).

"Transparency combined with decisive action leads to deep culture change," says Cooper. "The suggestion program got people talking and yielded a lot of ideas from staff." For example, operators took it upon themselves to shut down conveyors that in the past had run continuously between shift changes, wasting energy. Employees also suggested lighting improvements, and one even noticed that an outdoor freezer should be covered on warm, sunny days.

When New Afton implements new projects, achieves energy efficiency savings and wins awards, Cooper is careful to feed that information back to staff. "Promotion is important so that people are publicly recognized for the special efforts they make."

A team effort

While senior management buy-in is clearly important in managing energy and approving sometimes costly projects, it's not everything, says Cooper. "You also have to get all staff engaged along all steps of the journey. No energy manager is going to notice every little thing." Cooper stresses that it's people who manage systems; therefore, engaging people needs to be an energy manager's primary focus.

At the same time, says Cooper, resounding support from New Afton's management team has been a key to success. Management buy in led New Afton to employ Cooper as a full-time Energy Specialist. They reasoned that a designated professional would not be sidetracked by production or other challenges. "It's hard to imagine how someone with other duties could manage the implementation of ISO 50001 in such a dynamic and multi-faceted operation," says Cooper.

Leveraging cost-sharing programs

Cooper also pointed to cost-sharing programs as foundational to New Afton's ISO 50001 journey. BC Hydro's Strategic Energy Management Program, for example, facilitated many of the mine's early energy studies and projects. New Afton also leveraged FortisBC for an energy efficiency feasibility study and, as a member of CIPEC, participated in energy efficiency best practices webinars and Dollars to $ense energy management workshops and received cost-sharing assistance for ISO 50001 implementation.

Cooper says that the cost-related benefits of ISO 50001 couldn't have come at a better time for New Afton. "The cost reductions and improved cash flow from our energy performance improvements have been particularly valuable during a period of low metal prices," he says. What's more, every energy performance improvement initiative that New Afton has undertaken has led to additional operational, safety, environmental or maintenance benefits. "This is a story about much beyond just reducing our energy intensity," says Cooper. "It's about how ISO 50001 has led to a better operation overall."

FAST Facts

WINNING EDGE: ISO 50001 inspires improvements at all levels of the organization.

- Energy awareness has increased at all levels.
- People, not systems, are driving change.
- Energy intensity was reduced by 11 percent, with GHG reductions of over 19 percent.

3M Canada Company

3M's practice of strengthening energy efficiency dates to the 1970s.

> *"ISO 50001 is the perfect vehicle to formalize 3M's approach to energy management."*

3M has been a careful energy manager for decades and, over the years, has developed a strong culture of continuous improvement. 3M Canada facilities were among the first to pilot the implementation of ISO 50001, which led the company to certify all its manufacturing plants across Canada, as well as achieve SEP for one facility and begin the process of certifying all its Canadian facilities to SEP qualifications.

A long history of energy management

Although 3M is probably best known as the maker of Post-it® notes, the company manufactures 60,000 products – everything from tapes to cleaners to reflective lights for highways in manufacturing plants around the globe. In Canada, 3M Canada operates manufacturing facilities in London, Brockville, Perth, Toronto and Morden and employs 1,800 people.

"We're a large company that has had a culture of energy efficiency for a long time," says Andrew Hejnar, 3M Canada's designated Energy Manager. 3M first established an energy management department in the 1970s and, in 1991, its parent organization 3M Company launched a corporate-wide energy policy. In the years that followed, 3M Canada implemented projects that affected everything from the introduction of more efficient technologies in its operations to the incorporation of energy concerns into its product development activities.

A dedicated energy manager makes all the difference

Energy management began to take hold in a new way in 2008 when the company appointed a dedicated, full-time energy manager. "Before then, energy managers were assigned more casually, so projects would begin and end when whoever was in charge moved on to something else," says Hejnar. Once a dedicated employee could focus on energy management full time, 3M Canada was able to pursue a common approach to energy efficiency and significantly improve its performance.

The move caused ripples across the organization that led to the completion of dozens of projects – from a series of lighting retrofits to major overhauls of the company's HVAC systems to the introduction of combined heat and power (CHP) systems at several Canadian plants.

ISO 50001 establishes framework for excellence

While having a dedicated energy manager was a key advancement for 3M Canada, the energy team recognized that more was needed to formalize the company's approach to energy management. 3M's culture of continuous improvement kicked in once again, and ISO 50001 was brought in as a solution. It proved to be the perfect vehicle.

"No other program can bring as much success and payback as a properly implemented ISO 50001-certified energy management system," says Hejnar. "The framework it provides ensures our energy-saving measures will lead to bottom-line results as well as influence an evolving culture of sustainability and energy stewardship."

Hejnar says 3M integrated ISO 50001 with relative ease because the company had already achieved ISO 9001 and ISO 14001 certification.

"When you integrate the various elements of ISO management, you realize that you're not building an island," says Hejnar. "You're adding the system into an already effective framework, which puts you ahead of the game."

Support is crucial

Also key to sustaining and continuously improving its energy management undertakings was support from the company's leadership at all stages of its journey. 3M took that commitment to the next level in 2008, when senior managers agreed to sit on the company's Energy Management Committee. This demonstrated their support for energy efficiency and set a strong example across the organization.

"It showed everyone in the company the seriousness of our commitment to continuously improve our energy performance," says Hejnar. He says cost-sharing from NRCan and 3M's local utility providers was also an important success factor, as it helped reduce the risk of investing in energy-efficient technologies.

Impressive results

3M has been extraordinarily successful in implementing ISO 50001 not only at its six Canadian plants, but also internationally. The standard is in place at 18 facilities in seven countries. One 3M Canada facility (3M's Brockville Tape Plant) has also implemented Superior Energy Performance (SEP) at the Platinum level, and 3M has begun the process of certifying all its Canadian facilities to SEP.

Globally, 3M's ISO 50001-certified facilities outpace average 3M facilities for energy management by 60 percent. Put another way, ISO 50001 facilities have shown an energy performance improvement of 10.5 percent over the past three years, which has resulted in 740,000 gigajoules (GJ) of energy savings and a reduction of 104,000 tonnes of CO_2 equivalent.

3M Canada's facilities, meanwhile, have shown an energy performance improvement of 25 percent, which has resulted in savings of roughly $150,000 per year for each manufacturing plant.

FAST Facts

WINNING EDGE: The company achieved ISO 50001 certification and SEP implementation across multiple Canadian (and global) facilities.

- 3M integrates ISO 50001 with relative ease.
- ISO 50001- and SEP-certified facilities outpace others in the 3M family.
- Canadian facilities save $150,000 per year.

Corporate Stewardship Award

Cascades inc.

This forward-looking company established a 15-member energy management division.

> *"Cascades leads the industry in energy efficiency after two decades of commitment – and hundreds of successful projects."*

Cascades inc. is a company that makes products out of recycled fibres and, as such, has had an environmental bent from its earliest days. Founded in 1964, the company has 90 production units in North America and Europe that manufacture packaging and tissue products.

Pulp and paper production processes have historically been energy-intensive. Although processing recycled fibre is more energy-efficient than processing virgin wood fibre, energy costs still represent a large portion of Cascades' total costs. To address this issue, the forward-looking company established a division of 15 employees in the 1990s who specialize in energy management. Their mission? To reduce the amount of energy Cascades buys to make its products.

In a true success story of corporate stewardship, Cascades' energy efficiency gains over 20 years have been many and varied, with hundreds of projects implemented to date.

Building awareness across the company

Fabien Demougeot, Cascades' Director of Energy, says Cascades has been motivated on several fronts to make energy efficiency improvements. "In addition to the environmental benefits, making paper is energy intensive from a business perspective," he says. "Therefore, focusing on energy reduction has made a great deal of sense to everyone from senior management to operational staff." Demougeot says the reality of shrinking profits margins in the industry has been another strong motivator. "Energy is one factor we can control."

From its beginning, the energy efficiency team has had objectives that included large projects, such as implementing a company-wide energy management system, defining overall energy-reduction targets and establishing specific energy efficiency action plans with Cascades' many production facilities. Throughout, awareness about energy use has spread steadily to all levels of the company.

Running large field projects

Since 2013, Demougeot's team has intensified its efforts by implementing several large field projects aimed at reducing energy consumption. Among them was a boiler audit program for all North American facilities that resulted in adjustments to 10 boilers; an air compressor program in which waste heat from compressors was redirected to heat buildings; and a program to replace propane forklifts with electric ones – ideal for Cascades facilities located in Quebec, which use carbon-neutral hydroelectricity.

Using Kaizen treasure hunts

Demougeot says that implementing energy management beyond field projects across a large, geographically dispersed company can be

a challenge. The solution, starting in 2013, was to use Kaizen lean manufacturing principles at the company's 23 most energy-intensive manufacturing plants – which as a group account for nearly 90 percent of Cascades' energy consumption.

"The Kaizen approach involves what we call a treasure hunt for energy-saving opportunities and provides us with areas of specific focus and improvement." Demougeot says Kaizen enables facilities to build their own energy efficiency action plans and identify opportunities to target low-hanging fruit. He said the process involves three phases:

1. Planning, in which Demougeot's team sets expectations with the facility's team and looks at cost-sharing opportunities and other logistics.

2. Kaizen week, in which the facility's team brainstorms and prioritizes energy-saving opportunities.

3. Post-Kaizen, in which Demougeot's team devises a schedule and implementation plan, including writing submissions to attract cost-sharing and other incentives.

The results of Demougeot's approach have been impressive. By the end of 2015, the Kaizen process alone achieved over $2 million in energy savings.

Established programs add to more recent savings

Meanwhile, other energy efficiency programs have been working effectively in the background at Cascades. For example, the company implemented a lighting retrofit a decade ago that continues to pay dividends. Cascades replaced inefficient lighting with fluorescents in the early 2000s; today, the company has gone a step further by upgrading to LED technology.

"Taken together, all our projects and programs have led to significant savings," says Demougeot. "We have embraced a culture of comprehensive corporate stewardship in the energy efficiency domain."

In fact, he says, Cascades has exceeded even its most optimistic projections. While the company had targeted a 3 percent reduction in energy intensity per tonne of product, it achieved a 12 percent reduction between 2013 and 2015. This included a reduction of 1.29 GJ/tonne in energy purchased compared to 2012.

An industry leader

Across the over 130 projects that have taken place just since 2013, total energy savings have amounted to over 1 million GJ, which is equivalent to the average yearly energy consumption of 9,503 Canadian households.

Cascades is now positioned as an extraordinarily efficient company in the pulp and paper industry: it uses 9.9 GJ/tonne to manufacture its products, which is 63 percent less energy than the Canadian industry average, which uses 26.7 GJ/tonne.

FAST Facts

WINNING EDGE: The company is the pulp and paper industry's most energy-efficient.

- Completed over 130 projects since 2013.
- Used Kaizen lean manufacturing principles to motivate teams.
- Uses 63 percent less energy than the Canadian industry average.

ArcelorMittal Dofasco

Series of energy efficiency projects lead to savings of over 125,000 megawatt-hours annually

> *"Successful corporate stewardship reinforces ArcelorMittal Dofasco's position as an industry leader and underlines its commitment to sustainable development."*

ArcelorMittal Dofasco is a century-old Canadian business with a penchant for forward-looking ideas. One of Canada's leading producers of steel, the company works with North America's top automotive, energy, packaging and construction brands to develop lighter, stronger and more sustainable products – from food cans to cars and everything in between.

ArcelorMittal Dofasco is also the leading private sector employer in Hamilton, Ontario, with 5,000 people producing approximately 4 million net tonnes of high-quality steel per year. The company maintains a prominent position in the community. It is committed to conducting business in a way that is good for ArcelorMittal Dofasco, its stakeholders and the broader world.

A keen focus on energy management

Against this backdrop, ArcelorMittal Dofasco pursues its ambitious Integrated Energy Efficiency Strategy.

"Energy is one of our highest input costs, and we're committed to conserving it – not only to reinforce our position as leaders in the industry but also to assume our environmental responsibilities for the benefit of society," says Angela Pappin, Vice-President, Technology. Since it implemented its program, the company has seen energy savings of over 125,000 megawatt-hours (MWh) annually.

ArcelorMittal Dofasco is one of the largest consumers of electricity in the province, which means it has a keen focus on reducing consumption. At present, ArcelorMittal Dofasco has 30 energy management projects underway, 8 of which are focused on reducing its electricity use. The projects run the gamut from ambitious new installations to complex retrofits.

New installations

One major recent installation is a 12-MW turbo generator that has dramatically reduced the company's electricity consumption since it came on-line in 2015. The steel-making process generates combustible gases as a by-product; in the past, ArcelorMittal Dofasco flared the gas to eliminate it, wasting a potential energy source. Since the turbo generator was installed, the company has used the gas to drive the generator and produce electricity. "By installing the turbo generator, we've managed to make a high-value commodity – electricity – which reduces our demand on the power grid and improves our cost structure," says Pappin. Annual electricity savings are nearly 50,000 MWh.

Upgraded equipment

The company points to its high-turbulence roll cooling (HTRC) system as an example of a successful retrofit. The process of rolling steel slabs into flat strips requires that the slabs be heated to extremely high temperatures – roughly 1,200°C. Meanwhile, the rolls need to be kept cool. This used to be accomplished using high-pressure (220 to 230 psi) water, administered via four pumps.

HTRC enables the use of water under lower pressure (55 to 60 psi), which eliminates the need for two pumps, saves energy and, as an added benefit,

reduces deterioration on the surface of the rolls. “This is a great example of where we took an existing process, improved on it and saw tangible benefits in addition to reducing our electricity consumption,” says Pappin. Annual electricity savings for this innovation are over 13,100 MWh.

IT improvements

ArcelorMittal Dofasco has looked all the way to its IT system for energy efficiency improvements. “Computers aren’t necessarily where you expect to find energy efficiency gains at a facility like ours,” says Pappin. “But we’re determined to find every opportunity.”

The company carried out a “thin client computer retrofit” that centralized the network, enabling it to run computer terminals at 40 watts (W) each instead of the former 200 W. For the company’s over 2,000 computer terminals, the savings add up to over 1,100 MWh annually. As an additional benefit, engineers have better control over the system when making changes and software updates.

Key partnerships enable success

Pappin says that CIPEC has been an important support in ArcelorMittal Dofasco’s energy efficiency journey; it has helped the company offset the costs of completing technology studies for converting waste-heat streams into electricity. More recently, an NRCan $40,000 cost-sharing arrangement helped offset the expense of moving toward the ISO 50001 Energy Management Systems certification, which Pappin says is an important goal for the company, as it will bring even more rigour to the company’s energy portfolio.

ArcelorMittal Dofasco’s partnership with the Independent Electricity System Operator (IESO) has been another important factor in managing costs. The company leveraged IESO’s Industrial Accelerator Incentive program to support capital investments, which lowered the payback periods from three to five years to just one to two years for certain projects. “Accelerated return on investment is a compelling business case,” says Pappin. “We’re able to deliver on several fronts: reduce demand on the system, deploy cutting-edge technology, which improves our competitiveness, and at the same time improve our cost structure. The key is to leverage everything that’s available.”

A neighbourly motivation

While presenting management with a tight business case is critical, Pappin also stresses that ArcelorMittal Dofasco is also highly motivated to pursue its Sustainable Development Outcomes, including outcome number six: Responsible energy user that helps create a low-carbon future.

“Our organization is mature in that we look beyond the financial business case when we make decisions on energy management,” adds Pappin. “We know there is a broader responsibility to deliver to all our stakeholders – from shareholders to the community.”

Pappin says that a large and energy-intensive company that makes steel must always be cognizant of how it undertakes its operations. “We live in the community as well. The company is part of a larger system, and we want to make sure we’re a positive contributor.”

FAST Facts

WINNING EDGE: The company implements wide-ranging projects to significantly reduce its energy consumption.

- A turbo generator turns a gas by-product into electricity.
- In-house innovation reduces energy needs for rolling steel.
- A centralized IT network enables low-power computer work stations.

Process and Technology Improvements Award

Barrick Gold-Hemlo

Strategic management of ventilation system yields significant energy savings.

> *"Fresh air ventilation is critical for worker health and safety in a mine. Managed well, it can also reduce electricity and propane consumption."*

Barrick-Hemlo gold mine has operated on the north shore of Lake Superior for 31 years, employing hundreds of people and helping support local First Nations. Since 1992, the company has placed a focus on energy management. In 2011, the site underwent ISO 14001 certification and joined the Northern Industrial Electricity Rebate Program, which together propelled the development of Hemlo's first energy management plan. As part of the plan, the company recognized it could dramatically improve the performance of its highest energy consumer: its ventilation system.

"Ventilation is critical from a health and safety point of view," says Andrew Baumen, the mine's General Manager. "It provides fresh air for miners working a kilometre underground. At the same time, ventilation is extremely costly and our biggest energy user."

In 2013, when Hemlo's ventilation management program began, the system cost over $5 million per year to operate. Hemlo was operating a network of auxiliary fans underground, each of which ran at 50 to 200 horsepower (hp), a main surface exhaust fan that ran at 2,000 hp, the main fresh air intake at 1,000 hp and a second fresh air intake at 500 hp.

All were operating 22 hours per day, year-round. Electricity consumption to run the system was high, and a large amount of propane was needed to heat the fresh air pumped underground in the winter to keep near-surface infrastructure from freezing. Improving the ventilation system would improve efficiency and reduce energy consumption as well as GHG emissions.

Hemlo determined that the best solution was to implement three major fixes: ventilation on demand (VOD) in strategic underground levels, dedicated fan management where VOD was not feasible, and the use of geothermal energy to heat fresh air in the winter.

Ventilation on demand where possible

Because this element of the project was capital-intensive, the company planned a phased approach over four years in which it installed variable frequency drives (VFD) on fans at selected underground levels, developed a modular control platform and installed gas monitoring and air flow meters to ensure optimal air quality. A monitoring system developed for the VOD system enables operators to monitor the status of the fans as well as the gas concentrations underground to ensure proper ventilation and conditions for workers. Hemlo continues to develop a tracking tool by extracting real-time data from the system.

Dedicated fan management enables efficient tracking

Hemlo hired a dedicated worker to manually control underground ventilation fans that are not included in the VOD project. VOD is ideal in levels where mining activities are ramping up to full production. In other levels, it is less cost-effective to implement VOD, and it also takes

very little time to set up the fan management program. In addition, this dedicated worker is a great agent to foster behaviour change. As part of this intervention, the ventilation team began to track the status of each fan through a tracking tool developed in-house.

"Hemlo developed a tracking tool that lets us record and track the status of the different fans so we can improve the efficiency of the system," says Baumen. Based on the log and metering data, he says, a dashboard displays the monthly and annual energy use and cost savings.

Using geothermal to heat cold air

In the winter, the air temperature in northern Ontario can dip down to -40°C, and fresh air being ventilated into the mine needs to be heated with propane to prevent pipes from freezing. Hemlo found an approach that uses geothermal energy from the ground to heat air entering the mine.

Hemlo continues to manage the nearby David Bell mine site, which has been closed but is connected underground to the Hemlo site. When Hemlo draws fresh air through the intake fans at this decommissioned site, the air picks up heat and moisture on its way underground. By the time it arrives at the Hemlo site, it is the right temperature for workers. Using the old mine to heat fresh air cuts operating costs by decreasing the demand for propane – and reduces GHG emissions. In the summer, the old mine sites can be used the same way to cool air, decreasing the need for air conditioning.

Hemlo put a tracking tool in place to calculate and report out the monthly and cumulative savings from this project. The geothermal element of Hemlo's ventilation management project has reduced Hemlo's ventilation propane consumption by 40 percent.

Impressive results across the board

From 2013 to 2015, overall energy consumption at Hemlo dropped by nearly 10 percent. Similarly, the site energy consumption per tonne of ore processed dropped by nearly 11 percent and is expected to improve by over 20 percent in the coming years. Meanwhile, GHG emissions dropped by 24 percent during the same period.

Anticipating future success

Hemlo's energy management program created lasting change at the company. An energy management steering committee made up of senior management, technical staff and operating staff meets every two weeks to report on the program advances. A site management team reviews progress on Hemlo's yearly targets and objectives annually and provides direction. Following the success of the ventilation management program, and other energy projects, the committee is looking at getting Hemlo certified to the ISO 50001 Energy Management Systems standard.

"We have all the pieces in place to make this happen," says Baumen.

FAST Facts

WINNING EDGE: Site-wide ventilation management reduces energy demand, consumption and GHG emissions.

- Implemented VOD in targeted areas of the mine.
- Used geothermal energy to reduce propane use.
- Reduced energy consumption and GHG emissions by 10 percent and 24 percent, respectively.

CAE Inc.

Reconfigured HVAC system saves $1 million per year in energy and management costs

> *"Facility manager puts together business case that reduces risk and protects the company's investment."*

CAE made a courageous decision in 2013 to invest heavily in an "unglamorous" retrofit of its energy-intensive HVAC system. Although the upgrade was not a typical core business-related investment, careful planning and meticulous execution, combined with an iron-clad business case, have paid off handsomely. CAE now pays nearly $1 million less per year in energy and maintenance costs to run its head office and factory in Montréal, Québec. And, because of the nature of CAE's agreement with its design-build energy consultant, the project payback period is protected by contract.

A gigantic leap into energy savings

CAE provides simulation solutions and training for the civil aviation, defense and security, and healthcare industries. A relative newcomer to energy efficiency planning, the company undertook a few small-scale energy conservation initiatives in recent years, including lighting upgrades, heat recovery and peak demand management. But when CAE's Manager of Facility Services, David Héon, determined that the company's HVAC system needed a major retrofit, he knew that securing the capital would be a challenge.

"CAE is a global company that has many core investment opportunities every year, so getting approval for a capital investment that has nothing to do with our core business can be difficult," says Héon. "Everyone at CAE is competing for the same annual capital budget." The solution, he reasoned, was to build a business case so compelling that senior management could not ignore the tangible benefits of investing in energy-saving technology.

An aging infrastructure

CAE has 3,200 employees working at its 97,000-square-metre (m^2) corporate headquarters and flight simulator factory. Prior to CAE's HVAC renewal, the company was spending $2.2 million on energy to run the facility. The plant was built in 1954 and had undergone many expansions, including adding HVAC equipment haphazardly to meet increasing demand.

A lack of optimization meant that over 160 uncoordinated rooftop units created a large and costly burden for the plant's small maintenance staff. In addition, by 2013, much of the equipment had reached the end of its life. As Héon puts it, "employees were complaining about comfort, constantly saying that it was either too hot or too cold, and we were very limited in what we could do about it."

A detailed study commissioned by Héon indicated the need for a complete redesign, including reconfiguration of all rooftop HVAC units as well as the addition of a heat recovery network and new mechanical rooms. The study spelled out the potential benefits in detail. They included significantly reduced energy consumption, simpler operation that would lead to lower maintenance costs, and greatly reduced use of R-22 refrigerant, which CAE needed to eliminate to meet the requirements of the Montréal Protocol on Substances that Deplete the Ozone Layer. In addition, the study noted great potential for attracting significant subsidies from local utilities Hydro-Québec and Gaz Métro.

Assembling the right team

Héon recognized that to build a compelling business case, he needed to eliminate as much risk as possible. Enter Ecosystem Energy Services which, in addition to designing the project and undertaking the retrofit as the general contractor, also guaranteed in advance of the work that CAE would receive the subsidies and that the company would achieve the annual energy and maintenance savings that Ecosystem had projected.

Héon explains that when CAE had undertaken minor energy efficiency initiatives in the past, its energy bills had remained the same. “Now, I could show management a business case where there was far less risk. If we did not realize the projected energy savings, the contractor was obligated to pay us the difference.” Héon brought in a third party, TST Energy Systems, whose job was to compare CAE’s energy consumption at the end of every year to a reference year that was agreed on at the beginning of the project. If the savings guaranteed by Ecosystem were not met, Ecosystem would pay the difference to CAE.

A solid business case

The business case that Héon presented to management called for a $10.6-million investment mitigated by $3.3 million in subsidies from Hydro-Québec and Gaz Métro – for a net investment of $7.3 million. With the compounding effect of the promised savings of roughly $1 million per year, the return on investment was 6.6 years.

Says Héon: “I remember management being doubtful about allocating the capital to this project instead of in R&D or expansion. I told them that the difference is that R&D and expansions are about increasing expense and possibly increasing revenue. However, investing in energy efficiency is simply about reducing cost and increasing profits. I was confident that the committee would see the wisdom.”

Héon was right; management approved the capital funding. Working collaboratively with Ecosystem, Héon’s team managed the reconfiguration of 149 rooftop HVAC units to just 38 units, none of which has its own compressor. They implemented three thermal power plants, each including one chiller, one heat pump, one condensing boiler and a large quantity of piping in which glycol is pumped to the building heating system. They implemented heat recovery from the building’s many simulators for use in winter and created a centralized control system able to run on smartphones and tablets. The result was a significantly more efficient HVAC system that required far less maintenance by Héon’s team.

A well-functioning system

Héon says the new HVAC system has lived up to its promise. Annual electricity consumption has fallen by 31 percent and natural gas by 38 percent. Overall energy intensity has dropped by 0.49 GJ/m^2. Meanwhile, in the first reporting year, Ecosystem’s estimated energy savings did fall a little short of projections. Héon said the company paid the small difference without hesitation. “This company has been excellent to work with at every step of the process,” he says.

FAST Facts

WINNING EDGE: The facility manager builds an iron-clad, nearly risk-free energy efficiency business case.

- The company modernizes the HVAC at its Montréal headquarters, saving nearly $1 million per year.
- The project leads to a 31 percent drop in electricity consumption and 38 percent in natural gas use.
- The business model demands commitment from the design-build contractor.

Energy Performance Management Award

Catalyst Paper Corporation – Powell River

Installation of G13 condensing turbo fulfills a long-standing opportunity for British Columbia pulp mill

> *"Catalyst (Powell River) works out practical solution to costly installation."*

Catalyst Paper is western North America's largest producer of mechanical printing paper. The company has a long history of incorporating sustainable business practices and energy efficiency into its operations – so much so, that Catalyst's leadership in reducing GHG emissions enables the company to offer carbon neutral specialty paper products to its customers.

In 2015, Catalyst's Powell River operation installed a G13 condensing turbine to turn a stream of wasted steam into electricity. The project, which came into being over many years, has led to significant improvements in the mill's ability to generate power efficiently.

A project built in increments

The genesis of Catalyst's G13 turbine installation dates back to 2001, when the Powell River mill permanently shut down its on-site kraft pulp facility. Steam is needed in kraft pulp production, and the shutdown meant the mill now produced far more steam than its operations required. This presented the mill with an opportunity to use a condensing turbine to produce electricity. Although Catalyst recognized this potential immediately, an analysis showed there was no business case for installing the prohibitively expensive technology.

"The economics just didn't make sense at the time," says Carlo Dal Monte, Catalyst Paper's Director of Energy. "With no financial driver we couldn't realize a reasonable payback period." The project was shelved.

In 2011, Catalyst used cost-sharing from the federal government's Pulp and Paper Green Transformation Program to add a condenser to an existing G12 turbine (more powerful but less efficient than the G13 turbine that was later installed). The transformation plan used "green-focused" capital investments to help the pulp and paper sector enhance its environmental performance and lay the groundwork for a more sustainable and prosperous future. This project was concurrent with BC Hydro's Integrated Power Offer under which Catalyst began to use its G12 turbine to produce and sell incremental electricity generation to BC Hydro.

With successful power-generating projects under its belt, in 2015 the Powell River mill took its efforts to the next level. Using funding from BC Hydro's PowerSmart Program, the mill purchased and installed a G13 condensing turbine to salvage wasted energy via exhaust steam from the existing G12 turbo generator. (Before the installation, the exhaust steam had been sent to a condenser, which essentially recovered only the condensate, with the vast majority of the energy being wasted.)

The project has increased the Powell River mill's capacity to generate power at the site. This additional energy displaces purchases from BC Hydro, with no incremental fuel consumed.

"This project was a practical solution to the opportunity we saw," says Dal Monte. "We did our research and found the G13 generator in the market place. We then worked with BC Hydro's PowerSmart to see what program would fit, and the decision to proceed was fairly simple."

The project has been highly successful, with energy efficiency per unit of fuel and cost of fuel per unit of energy dramatically improved at the Powell River mill. The mill has increased its generation from 33 MW to 44 MW (a roughly 25 percent increase) with no increase in fuel use. The additional 11 MW of power are enough to power the entire city of Powell River, excluding the mill itself.

Funding model encourages long-term efficiency

As Dal Monte explained, BC Hydro delivered 75 percent of the project's capital cost under a load displacement agreement. Under such agreements, BC Hydro provides funding up-front for the energy it expects the recipient company to produce. In Powell River's case, the company agreed to deliver that value back to BC Hydro in electricity over 20 years. "This type of agreement ensures that the funded company keeps generating and delivering clean energy and that BC Hydro receives a cost-effective new supply of power," says Dal Monte. "Of course, it means that the company needs to ensure it can manage the project over the long-term."

Dal Monte says the Powell River mill's monthly, in-depth performance reviews of its G13 turbine are key to ensuring success. Catalyst's utilities analyst also issues a weekly report on progress relative to the company's energy-production target. "That gives the operators and managers some good feedback on their performance," says Dal Monte. "It's important that these projects be highly visible so that they're top of mind for everyone involved."

Overcoming challenges

Although the G13 installation went well on balance, Dal Monte cautions companies that do not have excess capacity for such projects to plan carefully. The Powell River mill hired an experienced project manager who also mentored a younger employee on the ins and outs of implementing a costly and complex technological upgrade. "It's important for companies of our size to build capacity for future projects," says Dal Monte. "Opportunities like the G13 installation don't come around every day. If we're going to do a good job in the future, we need to make sure our people get experience."

Dal Monte adds that the G13 installation has palpably shifted the mill's culture by making clear the importance of viewing long-standing industrial processes with fresh eyes. "You need to look at your processes from a different perspective and identify areas that can provide a secondary benefit to the operation. At Powell River, we're continuing to move from a culture of 'it's always been done this way' (in Powell River's case) to a culture of looking for better ways."

FAST Facts

WINNING EDGE: The company converts waste steam into electricity.

- Installed a G13 condensing turbine.
- Increased energy production by 25 percent.
- Developed in partnership with BC Hydro.

Shell Canada Limited

Scotford Upgrader finds energy-saving synergies with the Quest facility

> *"This is a true energy-savings project where low-grade energy that would have been wasted is being used somewhere else in the system."*

Shell Canada's Scotford Upgrader in Fort Saskatchewan, Alberta, is a forward-looking facility that has implemented several energy efficiency improvements since the plant's start-up in 2001.

One of the facility's key energy efficiency projects – nearly six years in the making – was a new carbon capture and storage (CCS) process called Quest installed at the facility's existing upgrader utility system. The project provided an extraordinary opportunity to effectively capture waste-heat generated from Quest and transfer it into a low-temperature utility stream. The result was a significant reduction in the facility's carbon footprint.

Quest is owned by the Athabasca Oil Sands Project, of which Shell Canada is the majority shareholder. Built in 2013, it is the world's first commercial-scale CCS project for an oil sands operation. Extraction of crude oil from the oil sands is energy-intensive, and companies are continually searching for ways to reduce their carbon footprint. Quest has been remarkably successful in that regard. It removes over 1 million tonnes of CO_2 per year from Shell Canada's Scotford Upgrader, compresses it into liquid form, and stores it permanently over 2 kilometres underground.

The Quest unit requires cooling water to cool the process that compresses CO_2 gas to liquid. Cooling water is typically routed to a tower where the water is cooled and the low-grade heat energy is wasted. Quest's design engineers identified an opportunity to recover some of this waste heat and, at the same time, provide cooling by using cold, demineralized (demin) water from the upgrader utility system. Demin water is used in the plant to make steam, and it is typically heated from 20°C to temperatures between 165°C and 400°C in the steam-making process. Waste heat energy captured from Quest now "pre-heats" the demin water from 20°C to approximately 65°C, significantly reducing the remaining energy required to make steam from the water.

"This was a good example of how Shell looks at integrating energy efficiency into all its projects," says Alan Luck, Energy Engineer at the Scotford Upgrader.

Solidifying the project

As planning for Quest progressed, the detailed design of pre-heating demin water was set. The Demin Water Preheat Integration Project was born.

Luck says that a key element in the project's success was the early identification of opportunities in the design phase of Quest. The demin water stream had been identified as an excellent candidate for capturing low-grade waste heat, and Quest provided an excellent chance to incorporate that idea. "We were able to get the demin water pre-heat into the design at the very earliest stages, which is critical," he said. "If you're brought in late to the project, the process becomes much more difficult."

Significant savings

When Quest was fully operational in 2015, the captured waste heat used to increase the demin water temperature from 20°C to 65°C was saving approximately 15 to 25 tonnes per hour of low pressure steam. This

efficiency equates to an annual reduction of 20,000 to 40,000 tonnes of CO_2 per year.

"Fundamentally, this project converts a 'waste' stream into a high-value, useful energy stream," says Luck. "The potential savings in energy, costs and the reduction in GHGs are extraordinary. By reducing the demand for steam at Scotford, we also reduce the amount of natural gas we need to run our operations."

Superior performance analysis

Luck and his team track the Demin Water Preheat Integration Project every month by using process flow and temperature data, equivalent commodity cost, and CO_2 equivalent (CO_2e) factors to calculate energy savings and GHG reductions. They use the monthly reports to communicate results from energy efficiency initiatives and apply their reports to their cost accounting models.

"By calculating the actual savings and including them in our monthly variable cost tracking and budget process, we are able to effectively communicate results of energy efficiency improvements to all levels in our organization," says Luck.

Committed to energy awareness

The Demin Water Preheat Project is a resounding success story that shows Shell Canada's commitment to cross-corporate collaboration. The Scotford team and the Calgary design team in charge of implementing Quest collaborated extensively to refine the details of the project. Luck says that dynamic showcases an evolving improvement-planning tactic within Scotford's Energy Management Framework.

"The project is part of Scotford's – and Shell Canada's – journey toward the best achievable energy performance," he says. He added that Shell Canada is focused on making it a fundamental requirement for teams to identify integrated energy efficiency opportunities in cases where new facilities are constructed adjacent to existing facilities.

"A lot of people don't see the efforts that are made in this industry toward energy efficiency," says Luck. "We continue to work to find opportunities wherever they may lie."

FAST Facts

WINNING EDGE: Shell Canada finds major energy-saving synergy for two industrial plants.

- The project reduced steam requirements by heating water with waste heat.
- Shell tracks project data monthly to report to management.
- The project reduces the Upgrader's energy consumption by up to 600,000 GJ per year.

Employee Awareness and Training Award

Canfor Pulp Limited

Strategic Energy Management Programs are supported by dedicated teams at four pulp mills

> *"Energy Leaders report regularly to the company president on their energy efficiency successes."*

For many years, Canfor Pulp Limited in British Columbia has made energy management a priority across its four pulp mills. As a result, the company has made great strides in improving its efficiency and reducing costs. Much of Canfor's success emanates from its implementation of innovative technologies such as turbo-generators and upgrading older pumps and fans to highly efficient systems. But Canfor credits an employee engagement and awareness program as an indispensable element in its successful energy management approach.

A dedicated program at every pulp mill

Canfor employs 1,300 people in northern British Columbia, producing over 1.6 million tonnes of pulp and paper per year. The pulp and paper industry is typically energy intensive, so Canfor looks for every opportunity to improve efficiency at its Intercontinental, Northwood, Taylor and Prince George pulp mills.

Robert Thew, Canfor's Manager of Strategic Capital and Energy, says the only way to ensure no stone is left unturned is to have employees engaged in energy efficiency at every level of the organization. He says an all-encompassing culture of cooperation is what sets Canfor apart as an energy-saving success story.

So how does Canfor get such cooperation? Each of the company's four mills has a Strategic Energy Management Program led by an energy leader who works with a team to coordinate the mill's conservation initiatives. The energy leaders report quarterly to Canfor's Energy Steering Committee, which includes the company's President, Vice-President Pulp Operations, Corporate Controller and General Managers from the four mills.

"How many employees in a company this size make regular presentations to their senior leaders?" asks Thew. "That attention from the top levels of the organization goes a long way toward establishing an energy-efficient culture."

A busy schedule of awareness activities

Thew says Canfor engages employees in numerous other ways and that most awareness activities are delivered directly by each mill's energy team. The teams meet monthly to establish priorities and track progress on engagement.

For example, all new employees receive energy awareness training on their first day. The mills deliver regular technical training to increase employee awareness about key energy-related issues, such as how to maximize pump and motor efficiency.

Canfor publishes an energy newsletter that describes recent successes, future aspirations and technical best practices, as well as energy

information posters on topics such as the importance of minimizing air leaks and properly sizing and maintaining steam traps.

Every two years, Canfor organizes an event with BC Hydro for which vendors are brought in to talk to employees about energy efficiency. Canfor also reaches beyond the workplace by encouraging employees to apply what they learn at the mills in their own homes. "If they're thinking about energy efficiency in their own lives at home, they're more likely to bring that culture of innovation to work," says Thew.

Canfor's Northwood Mill has been a leader in engaging employees by implementing an EMIS that enables employees to track the use of energy by each department from any computer in the facility. "It tells the user whether the amount of energy being used lines up with our targets," says Thew. Understanding where energy is being used and how it is impacted by different production rates and seasons is key to managing it, and this is now possible – because of the EMIS.

Planning for future success

Canfor reformed the energy teams at its four mills in 2015, ensuring they were made up of employees from all levels of the organization. The overarching goal of each diverse team is to make fundamental changes to energy awareness throughout the mills. Each team has a different focus based on the needs of its mill. The following are some examples:

- The Northwood team is focused on increasing energy awareness of the operators on shift. The team is addressing this by visiting every crew member in the mill twice a year to discuss energy conservation. Northwood is also focused on creating a sustainable energy audit program that will enable the mill to discover and address energy waste.
- The Prince George and Intercontinental mills are focused on improving measurement and reporting to draw more attention to the efficient use of process hot water and to reduce its use. In addition, the teams have developed a list of training opportunities and are working on a report to ensure the verified results of energy projects are distributed to a wider audience.
- The Taylor mill is focused on improving the operational controls of its energy systems. It places a particular focus on training, developing standard operating procedures for energy management, and documentation.

Thew says that Canfor Pulp's employee engagement and awareness efforts have created palpable change across the organization. "When you first introduce people to ideas like focused energy management, it can feel like you're pushing a rope. Today, it feels like the energy teams at the mills are pulling the rope. They want to meet every month and they want to discuss the issues. Today the teams are leading the changes at the mills."

FAST Facts

WINNING EDGE: The company's investments in energy efficiency initiatives are supported by deeply engaged employees.

- Employee awareness is a major part of Canfor Pulp's corporate culture.
- An energy leader heads a strategic energy management program at each mill.
- Employees are empowered to monitor energy consumption.

3M Canada – Brockville

Employees attain a genuine sense of responsibility for energy management

> *"3M's commitment to working closely with employees keeps them engaged and focused."*

3M Canada's Brockville Tape Plant is an industrial pioneer in many regards. Among the first Canadian facilities to be ISO 50001-certified, 3M Brockville is continually striving to improve its energy performance. Since it implemented ISO 50001 and SEP, 3M Brockville has saved $350,000, which has helped support other 3M facilities in adopting and improving energy management practices.

Although no single factor can account for 3M Brockville's success, 3M Canada's Energy Manager, Andrew Hejnar, says that the company's commitment to working closely with its employees on energy management may be the most important.

"All our employees are responsible for success in energy management," says Hejnar. "The people who work with the equipment every day are the ones who know it best. It only makes sense to use their ideas and inspiration as often as possible and to keep them completely informed about what's going on."

A multi-faceted engagement plan

3M has a well-established employee engagement strategy developed over decades of dedicated energy management. The strategy is to educate employees about energy management from the day they arrive, communicate with them consistently and transparently about all energy efficiency projects and goals, and reward them for work well done.

Education is the foundation

3M uses an electronic training system to ensure that every new hire is educated not only about 3M's corporate culture around energy efficiency but also about the specific actions employees are expected to take. For example, the system tells them why energy management and conservation is increasingly important to 3M, and how to make energy conservation suggestions.

"Employees are told that 3M has aggressive sustainability goals but, more importantly, they are told precisely what those goals are," says Hejnar. By educating employees about its specific goals, 3M achieves buy-in from people who can make a substantial difference.

Employees learn from the outset of their careers that 3M has a goal to improve its energy efficiency by 3 percent per year until 2025. They also learn that the company will increase its renewable energy content to 25 percent of its total energy use in that period, and will lower its GHG emissions to 50 percent below its 2002 baseline.

"When you teach people about company goals, they get the sense that every action they take contributes in a small way to a larger whole," says Hejnar. "It makes it clear that their day-to-day activities are relevant. This is one way that 3M Canada is able to get such impressive results on energy efficiency."

Thorough communication

3M also uses several communication strategies to let employees know about current and future projects and real-time energy use.

"Energy boards" give employees up-to-date information about the results of various energy efficiency projects in the works. The boards report information about who is on the project teams, the results the teams have achieved and what projects are coming in the future. A flat-screen television in the cafeteria displays energy metrics in real time. Additionally, 3M sends monthly emails to all plant employees that report the latest energy efficiency results.

The company also hosts events to communicate with employees about current and upcoming projects. "We invite customers and vendors who sell and install energy efficiency equipment to showcase their products," says Hejnar. "This shows employees that we take their participation seriously, and it educates them about how to use the products to 3M's advantage."

Suggestion system – with rewards

Another strategy for showing employees that their participation matters is 3M's suggestion system, which is tied to rewards. The company asks employees for their energy-saving ideas. For example, one employee noticed that some equipment was not being shut down correctly, and his suggestion helped reduce energy use. Another employee noticed that similar products coming off the same production line were using very different amounts of energy. The energy team fixed the discrepancy, and energy use fell.

3M rewards energy efficiency ideas using a point system. Employees amass points, which they can cash in for flat-screen televisions, vacations and other gifts – much like a rewards credit card.

"The energy team awards points based on how good the suggestion is," says Hejnar. "This tells employees that 'your suggestions matter so much to us that we will actually reward you for them.' That keeps the system alive and makes it much more engaging."

3M tracks employees' suggestions carefully and replies to suggestions weekly, making sure to follow up so staff can see that the company is paying close attention. "If an idea is implemented, we keep the employee in the loop," says Hejnar.

FAST Facts

WINNING EDGE: The employee engagement plan keeps staff at all levels educated on every aspect of energy management.

- Mandatory education ensures all employees understand the intense focus on energy management.
- Thorough communication conveys key information.
- The reward system keeps employees motivated.

Integrated Energy Efficiency Strategy Award

Global Wood Concepts Ltd., Member of the Global Furniture Group

Consistent work over a decade leads to a winning energy management system

> *"Global Wood's lean-focused culture expanded over time to include a major emphasis on implementing energy-saving projects."*

In a manufacturing sector where Canada is working hard to match other countries in productivity, Global Wood Concepts Ltd. is using energy efficiency as one way to close the gap. A decade-long journey to create a more efficient manufacturing operation has resulted in ISO 50001 certification and a vibrant culture of energy efficiency across the company. Today, all the staff is intent on strengthening the company's energy management system (EnMS) and overall competitiveness.

Improving performance in a competitive industry

Global Wood designs and manufactures office furniture at its Toronto facility that ships several hundred units of furniture per day to customers in Canada and the United States.

The company's efforts to reduce pollution and use waste to produce energy began in 2006 when Vlad Rabinovitch, now the company's Project Manager for Manufacturing Engineering, saw an opportunity to divert particle board offcuts from landfill and significantly reduce the number of truckloads hauled away from the plant. At that time, Global Wood was shipping 26 truckloads per month of waste particle board to landfill. In a project aimed at implementing lean manufacturing principles, the company installed equipment that converts the particle board to chips and enables it to be used for fuel. This first successful project, which continues to this day, has reduced the number of truckloads of waste hauled by nearly one half.

Projects of all sizes over the past decade have contributed to Global Wood's success in energy management. "Our energy efficiency story has been a long journey," says Rabinovitch. "It started with single projects aimed at reducing production costs and has grown to the company-wide, ISO-based EnMS that we now have in place."

Replacing outdated lighting

In an early project, Global Wood implemented a lightning retrofit where T-8 fluorescent lights replaced old, inefficient metal halide high-bay ceiling lights. The project, which took advantage of Ontario's SaveOnEnergy cost-sharing, was simple and began to produce energy savings overnight. Eventually, Global Wood upgraded its lighting to LED, which provided even greater savings.

"In 2015, when LED lights became affordable, we recognized an opportunity to implement greater energy efficiency in our lighting system, even compared with energy-efficient fluorescents," says Rabinovitch. The conversion has led to a saving of over 113,000 kilowatt-hours (kWh) per year. "This continual search for better options reflects the energy efficiency culture that has developed here at Global Wood."

Complete overhauls for heating and compressed air

In 2009, Global Wood completely replaced the plant's outdated and highly inefficient water heating system. The replacement involved installing 21 infrared tube heaters, with modulation, together with a heating control system that enables Global Wood to set separate temperatures and schedules for each of the production floor's six zones. The new system allows for custom temperatures based on time of day, outside temperatures, proximity of workers to heat-producing machines, proximity to loading doors open to the outside, and a host of other factors. Global Wood reduced its use of natural gas by nearly 59,000 m^3 annually.

A year later, Global Wood recognized a major opportunity to improve the efficiency of the company's compressed air system. This involved several projects. The original system had worked on four 25-hp piston compressors. These were replaced with two more efficient 75-hp screw compressors with modulation, working in tandem. Then Global Wood implemented a control system where one compressor runs as the lead and a second one starts only when pressure drops lower than a set level. Finally, the company eliminated 36 air-powered hand tools and replaced them with energy-efficient cordless tools, further reducing the load on the air compressors. This led to energy savings of nearly 37,000 kWh annually.

Smart dust collection

Likely Global Wood's largest energy-saving project to date is the installation of a smart dust-collection system by EcoGate in 2010. The two dust-collection systems are powered by 75-hp and 50-hp motors that ran steadily for 18 hours per day before the retrofit. The smart system monitors the production machines' operation in real time and adjusts the speed of the motors' fans accordingly. Energy savings from this single project amount to roughly 246,000 kWh per year, representing a nearly 40 percent reduction in energy consumption for dust collection. Global Wood used cost-sharing from NRCan and Toronto Hydro to shorten the project's payback period.

Deep culture change delivers results

Global Wood has implemented many other energy-saving projects, large and small, and the results across the organization have been substantial. Rabinovitch reports that Global Wood's energy intensity (measured in kilowatts per unit produced) was nearly 4.5 percent lower in 2015 than the previous year. In 2016, the company achieved a further 2.35 percent reduction.

Global Wood's EnMS is backed by management, who have gained a full understanding of the opportunities inherent in saving energy, says Rabinovitch. "We have buy-in from the top corporate levels right down to the floor level," he says. Meanwhile, Global Wood's Energy Management Committee, made up of employees and managers, meets monthly to discuss overarching goals and specific projects.

"We are constantly on the lookout for new technology that can reduce our energy use as well as improve our productivity," says Rabinovitch. Moving forward, the company will continue to pursue a "no project too small" policy that includes such improvements as installing light sensors in bathrooms and little-used supply rooms. "An energy-saving culture has infiltrated all aspects of the organization, which means our EnMS is now self-sustaining."

FAST Facts

WINNING EDGE: The company has pursued energy management at all levels for over a decade.

- Implemented an ISO 50001-based EnMS.
- Decreased energy intensity by nearly 4.5 percent in one year.
- Achieved 246,000 kWh per year in energy savings from a single project.

Mother Parkers Tea & Coffee

Century-old Canadian business invests in cutting-edge technology

> *"With the coffee industry growing by leaps and bounds, Mother Parkers' technology and process improvements will pay dividends for years to come."*

Over the past two years, Mother Parkers Tea & Coffee worked diligently across the company's operations to reduce its environmental footprint. Adrian Khan, Sr. Manager, Environmental, Health, Safety & Security, referred to the ISO 14001 standards as he led the development of what has become a highly successful environmental management system. The system focused on three major areas of energy conservation: reducing Mother Parkers' consumption of natural gas, electricity and water. As a result, the company has achieved cost savings to reinvest in the business and, importantly, created a culture of environmental stewardship.

Implementing an environmental management system

Mother Parkers Tea & Coffee has been a vibrant Canadian business since 1912 and is one of the largest coffee roasters in North America, with over 1,000 employees in Mississauga and Ajax, Ontario, and Fort Worth, Texas, with sales locations across North America.

In 2014, Khan recommended the installation of new LED lighting to replace metal halide light fixtures in the company's Canadian plants, which proved not only to be safer for employees but also much more energy-efficient than the lighting it had replaced. A culture shift toward energy efficiency was born and a process of improvement was set in motion.

"When we saw the difference that the lighting made to our electricity consumption, we reasoned that there was much more we could do across the company," said Khan. Today, Mother Parkers has a full-fledged environmental management system based on ISO 14001 principles.

Partnering with local utilities

Following the lighting retrofit, Mother Parkers was eager to make additional improvements and realize savings by reducing its use of major utilities. Khan's next step was to contact local natural gas, electricity and water utilities to learn more ways to conserve.

He was pleasantly surprised, not only by the volume of information available from his local utilities but also by the number of incentive programs available to Mother Parkers for identifying and investing in technological upgrades. During a two-year process of making energy-saving improvements, Mother Parkers partnered with Ontario's SaveOn Energy Retrofit program, which provides financial incentives that reduce the cost of equipment upgrades when companies identify projects that save energy, as well as with natural gas utility Enbridge through its Industrial Energy Efficiency Program. Khan also received valuable data from his local utilities about Mother Parkers' energy use and advice on the best ways to reduce consumption. "Companies should not hesitate to contact their utilities for assistance," he says. "There's a wealth of information available."

With key information and significant support in hand, Khan and his team were set to make major changes.

Upgrading key technology

Mother Parkers' most important energy source is natural gas, which it uses to power its coffee roasters. Roughly 75 percent of the energy

the company consumes – and 85 percent of the GHG emissions it produces – are from natural gas. To reduce consumption, Mother Parkers replaced inefficient roasters with more efficient models that yield increased throughput and reduce energy consumption. In addition, updating the controls on two roasters including catalytic afterburners resulted in lower hourly consumption of natural gas. “The roaster optimization is a significant improvement in Mother Parkers’ roasting technology,” says Khan. “In addition to the energy savings, we also realized the potential to produce a better product, so it’s a major win.”

The LED lighting retrofit projects that set Mother Parkers’ environmental management system in motion reduced the company’s electricity consumption. Specific improvements included adding occupancy sensors to ensure no electricity was wasted on empty rooms. “The benefits of the lighting upgrade go well beyond just energy efficiency,” says Khan. “The lighting is also more natural and has eliminated the irritants associated with fluorescent lightning.” Lighting outside the facilities is now brighter, which gives employees more confidence when they leave the building at night, and the LED lights last over 10 years, which reduces maintenance costs.

In other electricity-saving ventures, Mother Parkers’ coffee grinders were reduced from three inefficient units to two high-efficiency models. Air compressors were replaced with more efficient ones, including a variable-speed unit to adjust the compressed air output as needed. These improvements have also helped to reduce Mother Parkers’ yearly electricity consumption.

Finally, Mother Parkers reduced its water consumption by 42,000 m^3 per year by installing a closed-loop chilling system to cool process equipment. Reducing water use is an improvement close to Khan’s heart. “Water is essential to life, and we all have a responsibility to be conscious of our consumption,” says Khan.

Company investment

Mother Parkers recognizes the positive corporate stewardship and citizenship aspects of investing in environmentally beneficial technologies and values the incentives that utilities were offering to help maximize the eventual payback of the company’s energy improvement initiatives.

FAST Facts

WINNING EDGE: Their environmental management system, including major system upgrades and cutting-edge technology, dramatically reduces energy use.

- The company uses ISO 14001 principles to drive energy management.
- The company reduced natural gas consumption by 1.6 million m^3 annually.
- A tight business case made energy efficiency an easy sell.

NRCan's Industrial Energy Management Program

Energy management systems help organizations achieve savings through a systematic evaluation of energy uses, operations, maintenance, and system performance. They help organizations improve their understanding of energy use and how to best manage their energy.

The Industrial Energy Management program offers a continuum of strategic energy management options, resources and tools to Canadian industrial facilities at all levels of experience with energy management:

- The **Canadian Industry Program for Energy Conservation (CIPEC)** offers networking opportunities for industry to share information, identify common needs and best practices and improve energy efficiency.
- The **ISO 50001 Energy Management Systems standard** helps industrial firms establish systems and processes necessary to take a systematic approach to continually improve energy management, reduce costs, and improve competitiveness.
- **ENERGY STAR for Industry Certification** is the latest program administered by NRCan. The program helps industrial firms measure energy performance, set goals, and track energy savings in order to be recognized for top energy performance.
- **Financial Assistance** is available to industrial companies to perform ISO 50001 implementation, energy assessments and other energy management projects. NRCan will provide up to 50 percent of the cost, to a maximum of $40,000.
- The **Dollars to $ense Energy Management Workshops** help reduce energy use by improving energy management practices.
- The ***Heads Up CIPEC*** e-newsletter keeps subscribers abreast of the latest energy efficiency technologies and programs and features leading firms in energy management.
- Through **Technical Information for Industry** an organization can reduce costs, improve competitiveness, productivity and environmental performance.

Tax savings for industry

The Government of Canada provides income tax incentives (capital cost allowances) to industrial firms that undertake clean energy projects. NRCan is the technical authority for *Classes 43.1 and 43.2*. Further information on what qualifies for these classes can be found in the ***Technical Guide to Class 43.1 and 43.2***.

Companies that invest in manufacturing and processing equipment may take advantage of *Class 29* in *Schedule II* of the *Income Tax Regulations*. Canadian Renewable and Conservation Expenses can be fully deducted in the year incurred. Further information is also available in the ***Technical Guide to Canadian Renewable and Conservation Expenses***.

For more information on NRCan's Industrial Energy Management Program, visit **nrcan.gc.ca/energy/efficiency/industry/cipec/5153** or send an email to **NRCan.oee_industry-industrie.RNCan@canada.ca**.

ENERGY STAR for Industry Certification

NRCan has added a new tool that will help companies manage energy, protect the environment and lower costs. After much work in 2016 to benchmark energy efficiency data in the manufacturing industry, the ENERGY STAR for Industry Certification program was launched.

ENERGY STAR for Industry certification is the latest in the ENERGY STAR program series administered by NRCan. For many years, Canadian companies have participated in the ENERGY STAR for Products, ENERGY STAR for New Homes and ENERGY STAR for Buildings programs, making them fixtures in the energy efficiency landscape.

The NRCan program is aligned with the United States (U.S.) version that already has a strong foothold in the U.S., where it has certified 175 industrial plants.

How ENERGY STAR for Industry certification works

Like all ENERGY STAR programs, ENERGY STAR for Industry is voluntary. It is a recognition program.

To get ENERGY STAR for Industry certification, a company needs to verify that its energy performance indicators (EPI) are performing at a high level.

Participating companies enter their energy consumption data into an EPI tool to determine whether they are in the top 25 percent of companies benchmarked. Those that are – and that can also show that they are meeting environmental protection compliance standards regarding air quality – qualify for ENERGY STAR for Industry certification.

NRCan has an EPI available for integrated steels mills and is working on developing EPIs for cement and fertilizer manufacturers. Steel is the first industry eligible for recognition, and NRCan will continue to add industries to the list as they are benchmarked. At present, 15 industries are benchmarked in the U.S. ENERGY STAR for Industry program.

Get ready to participate

Manufacturing companies with established energy management systems are best positioned to get ENERGY STAR for Industry Certification. However, companies that do not yet have such systems can take steps toward getting involved. The first steps are to make energy efficiency a priority and designate an individual – or even a whole team – in the company to take responsibility for energy management. The team then needs to make a business case that shows energy management will lead to lower costs in the manufacturing operation.

ENERGY STAR Challenge for Industry

NRCan will also launch the ENERGY STAR Challenge for Industry later in 2017. The Challenge is a call to action for industrial sites to reduce their energy intensity by 10 percent within five years.

The Challenge is one early step for a manufacturing company as it moves toward formally verifying its energy management practices through such vehicles as ISO 50001 certification.

Impact of ISO 50001 Certification in Canadian Industry

CIPEC believes that Canadian organizations can improve their energy performance by using integrated energy management systems such as ISO 50001 – Canada's national Energy Management Systems standard. As of December 2016, 35 organizations in Canada, of which 16 are CIPEC Leaders, were certified to ISO 50001.

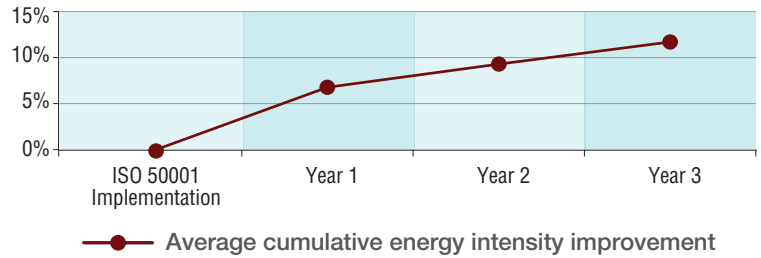
Energy management systems can be quickly implemented with immediate results. If five percent of Canada's total industrial energy use came from ISO 50001-certified facilities by 2030–2031:

- We would achieve annual reductions of approximately 80 to 110 petajoules (PJ). This translates into an estimated $1 to $1.4 billion in cost savings for Canadian industry.
- We would readily identify energy savings opportunities in industry that would achieve a payback period of less than two years, followed by continual savings.
- It would be equivalent to annual reductions of 4 to 6 megatonnes (Mt) in GHG emissions through energy management. This has the same impact as taking 1.6 to 2.4 million cars off Canadian roads annually.

CIPEC encourages effective energy management and continual improvement in industrial energy efficiency, as it improves the corporate financial bottom line while helping Canada meet its climate change objectives.

Canadian industrial facilities that have implemented ISO 50001 have achieved, on average, an 11.7 percent cumulative energy intensity improvement. This is consistent with data reported by the U.S.

Impact of ISO 50001 certification in Canadian industry



Department of Energy in case studies showing that ISO 50001 can improve energy performance by 10 percent or more within the first 18 months, with most of the improvement coming from low- or no-cost operational improvements.

Data Sources

Energy Use – CIPEC Database, December 2016
Production – CIPEC Database, December 2016

For more information on the ISO 50001 Energy Management Systems standard, visit the following:

Natural Resources Canada
ISO 50001 Energy Management Systems standard
Energy Efficiency for Industry Financial Assistance program
CIPEC case studies

Clean Energy Ministerial
Energy Management Working Group

Energy Summit 2016: *From Ideas to Action*

CIPEC and EMC co-hosted the 2016 Energy Summit on May 17 and 18 in Niagara Falls, Ontario. Called *From Ideas to Action*, the two-day Summit brought together more than 300 of Canada's industry leaders, foremost energy experts, and suppliers to share ideas, best practices and the latest innovations in industrial energy efficiency.

The Energy Summit focused on how energy efficiency improves a company's profitability. To underscore this phenomenon, From Ideas to Action showcased the best environmental resources, tools and information available to Canadian businesses as they work to grow and profit while reducing their environmental footprint.

Over the two days, participants attended a variety of workshops and panel discussions. Session topics ranged from discussions on why companies should care about energy management to the best software for managing energy consumption in a specific industry.

The following are some highlights.

Danielle Fong, the Co-founder and Chief Scientist at LightSail Energy, shared her insights on sustainable energy. Fong said that the potential of renewable energy sources remains largely untapped and is limited primarily by the state of current technology and the difficulties associated with storing energy.

Ian Potter, Vice-President of Engineering at the National Research Council of Canada, spoke about his vision for the energy-efficient factory of the future. He said it is achievable and could propel Canada's manufacturing sector into a new era of innovation and competitiveness.

Chris Ragan, Chair of Canada's Ecofiscal Commission and Associate Professor of Economics at McGill University, said that appropriate carbon pricing can drive market transformation and a transition to low-emission energy sources in Canada.

CIPEC presented 12 Leadership Awards. The awards recognize companies that have distinguished themselves by improving their energy efficiency and increasing productivity and competitiveness.

The event wrapped-up with a new take on the hit TV show *Dragon's Den*. CIPEC invited ambitious energy managers to pitch their energy saving ideas to leading industry and energy efficiency experts. The three ideas pitched were a net-zero plant; utilizing biogas from waste; and implementing a systematic energy management plan. The judges – Al Diggins, President, EMC; Andrew Bowerbank, Global Director of Sustainable Building Services, EllisDon Corporation; Chih-Ting Lo, Principal, EELO Solutions; David Arkell, President and CEO, 360 Energy; Jim McCoubrey, President, Troy Life Fire and Safety Inc. – gave realistic, yet thought-provoking insights into the issues plants face when implementing better energy management practices. In the end, the experts agreed energy management systems are the most viable option for reducing energy use.

The Energy Summit takes place every two years. The next one is scheduled for spring 2018.

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CIPEC Leader Companies by Sector

To view the listing, visit **www.nrcan.gc.ca/energy/efficiency/industry/opportunities/5233**.

CIPEC Trade Associations

To view the listing, visit **www.nrcan.gc.ca/energy/efficiency/industry/opportunities/5235**.

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