CIPEC
Industrial
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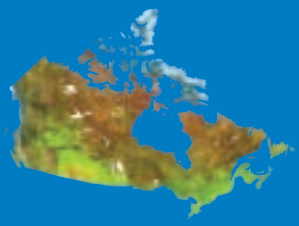

Canadian Industry Program
for Energy Conservation

Annual Report 2006

Delivering Results

Natural Resources
Canada

Ressources naturelles
Canada

Canada

Canadian Industry Program for Energy Conservation (CIPEC) **Annual Report 2006**

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The digital mosaic of Canada that appears on the cover of this publication is produced by Natural Resources Canada (Canada Centre for Remote Sensing), and is a composite of individual satellite images. The colours reflect differences in the density of vegetation cover: bright green for dense vegetation in the humid southern regions; yellow for semi-arid and mountainous regions; brown for the far north where vegetation cover is very sparse; and white for the Arctic regions.

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Annual Report 2006

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. The success stories featured in this report exhibit the vision and perspective that symbolize CIPEC's mission.

Partnership Pays Dividends

Fiscal year 2005/2006 was a great one for the CIPEC family. The program continued to grow in numbers and in achievements.

CIPEC has extended its reach to small and medium-sized enterprises, and has continued to build productive relationships with various levels of government. We have intensified our efforts to meet regional needs across Canada and enhanced our services to increase CIPEC's impact on energy consumption and greenhouse gas emissions.

We have done all of this while remaining true to our commitment to voluntary cooperation between the private and public sectors in the quest for industrial energy efficiency.

Growing in New Directions

CIPEC's effectiveness as an energy efficiency driver in Canada will depend on our continued ability to attract small and medium-sized enterprises into the fold. We set growth in this area as a priority in our business plan three years ago. While this segment of Canadian industry represents a relatively small percentage of energy use, it includes the vast majority of our industrial organizations and industrial employment base. Small business is an asset that has yet to be significantly mined for energy efficiency.

I am happy to report that, thanks to substantial concerted effort by CIPEC and Natural Resources Canada (NRCan) staff, we have made significant inroads into this area over the past year. Many more small and medium-sized enterprises are now actively participating in CIPEC programs, signing up as Industrial Energy Innovators (IEIs), and taking advantage of CIPEC tools and resources. Small and medium-sized enterprises now represent more than half of IEIs, and about two thirds of Dollars to $ense workshop participants and Industrial Energy Audit Incentive recipients. We anticipate that the growth trend for this segment will continue to accelerate in the coming months and years.

We have also broadened our reach to include industrial companies from more communities across Canada. Three Nunavut companies recently signed on as IEIs. CIPEC also established a new Atlantic task force in the spring of 2005. This task force, our 27th, provides a focal point for business in the Atlantic Provinces to network, learn new energy management techniques, access CIPEC resources and develop a relevant industrial energy efficiency agenda. The task force has already held three meetings, and enthusiasm is high.

Fiscal year 2005/2006 also saw five new industry associations enter the CIPEC family. With the addition of the Atlantic Dairy Council, the Canadian Energy Pipelines Association, the Canadian Healthcare Engineering Society, the Forest Engineering Research Institute of Canada, and the Wine Council of Ontario, there are now 52 associations participating in CIPEC.

CIPEC sectors make up over 98 percent of Canadian industry. Because of their continued efforts, they have

Douglas E. Speers
Chairman, Emco Corporation
Chair, CIPEC Executive Board

improved their combined energy intensity by 9.1 percent between 1990 and 2004. That's an average of 0.7 percent per year. By adopting better energy management practices, these sectors saved approximately $3.1 billion in energy costs in 2004. This is the equivalent to the energy required to heat 4.8 million Canadian households for one year. The mining, manufacturing and construction sectors improved their energy intensity by an average of 2.0 percent per year. Between 1990 and 2004, these sectors improved energy intensity by 24.3 percent.

Strengthening Programs

CIPEC's impressive program offerings – the workshops, tools and incentives so vital to driving energy efficiency – continue to perform at a record-setting pace. The list of Innovators now exceeds 1,000. And the list keeps growing. IEI companies have exclusive access to certain CIPEC tools and receive discounts on the full complement of CIPEC workshops.

CIPEC workshops, the backbone of our program offerings, continue to exceed projections for participation and impact. Workshop participation is ten times what it was in 1997, with the knowledge imparted leading to estimated savings of over $70 million in FY 2005/2006 in energy consumed.

The Industrial Energy Audit Incentive program also continues to exceed expectations, with 587 audits completed between 2001 and March 31, 2006, leading to the identification of more than $98 million in potential annual energy savings. CIPEC has expanded its site-specific audit program with the introduction of the Process Integration pilot program and the combustion diagnosis pilot. Process Integration studies take a holistic look at energy consumption and allocation patterns in complex industrial facilities, identifying ways to use waste energy from one process as input to another. CIPEC has successfully piloted Process Integration at 10 facilities, with extremely positive results. Combustion diagnosis pilots have also yielded striking savings in industrial combustion systems.

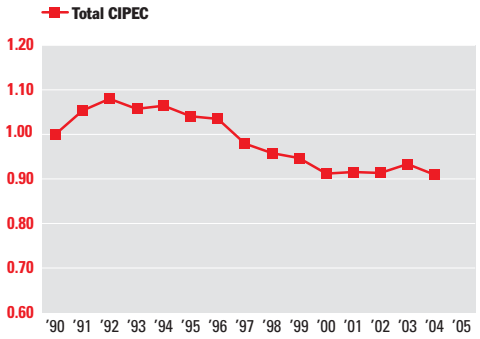
Building Relationships

When I became Chair of the CIPEC Executive Board three years ago, I asked the Board to break free of our exclusive CIPEC industrial focus and extend our reach to include new relationships in promising areas of opportunity. This focus on engagement and partnership building has started to pay significant dividends.

For example, in 2005 we were invited to the table at the Council of Energy Ministers, the umbrella group made up of federal, provincial and territorial energy ministers who regularly meet to discuss energy issues of mutual concern. We were able to raise CIPEC's profile within an influential group whose members are responsible for overseeing and administering energy policy in Canada. We were also pleased to host Canada's new Minister of Natural

Total CIPEC Mining, Manufacturing, Construction and Energy Producers

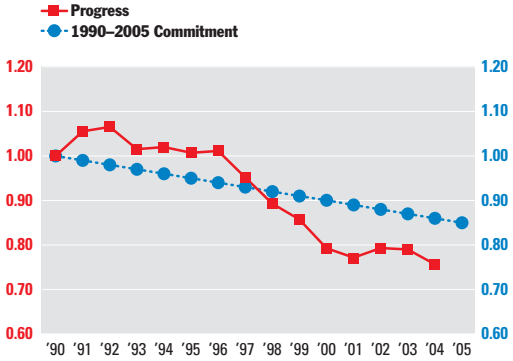
Normalized Energy Intensity
1990 = 1.00



All CIPEC industries improved their combined energy intensity by 9.1 percent, or an average of 0.7 percent per year, for the period 1990 to 2004. Had energy intensity remained constant, greenhouse gas emissions would have been 29.5 megatonnes higher.

Mining, Manufacturing and Construction Progress Against Voluntary Commitments

Normalized Energy Intensity
1990 = 1.00



Mining, manufacturing and construction member industries improved their energy intensity by an average of 2.0 percent per year over the period 1990 to 2004, or 24.3 percent since 1990. This surpasses the public voluntary commitment to achieve an average annual energy intensity improvement of 1 percent per year for the period 1990 to 2005 made by these CIPEC members.

Resources, the Honourable Gary Lunn, at a joint Executive Board / Task Force Council meeting on March 7, 2006. Minister Lunn had strong words of encouragement for the CIPEC partnership and was keenly interested in industrial energy efficiency's role in Canada's economic competitiveness and environmental performance.

CIPEC's Executive Board and Task Force Council have also opened a dialogue with Canada's utilities and provinces/territories and worked to get industrial energy efficiency on their agendas. These efforts have led to the formation of a number of partnerships with local and provincial/territorial organizations to bring CIPEC tools and services (including audits, process integration studies and workshops) to new locations in Canada. Our proactive outreach efforts are spreading the industrial energy efficiency message to a broader constituency and engaging allies in our efforts to help Canadian industry realize the benefits of energy efficiency.

CIPEC has also played a key role in the recent establishment of the Industry Demand-Side Management and Energy Efficiency Working Group. The Working Group's mandate is to "promote information exchange among industrial energy end-users and authorities, agencies, utilities and jurisdictions involved in the design, development and delivery of industrial efficiency programming in Canada." The group will seek partnerships and synergies that can increase the scope and effectiveness of industrial energy efficiency programming across Canada.

Membership in the Working Group includes representatives from the Industrial Programs Division of NRCan's Office of Energy Efficiency, CIPEC's Executive Board and Task Force Council, British Columbia Hydro, Manitoba Hydro and the Province of New Brunswick. The group plans to work to extend membership to all agencies, jurisdictions and utilities involved in industrial energy efficiency programming.

Delivering Results

While I am pleased with the various programs we have strengthened, the key issue is results. In this regard, it is important to note that CIPEC's impact on industrial energy efficiency and the reduction of greenhouse gas emissions is exceptional. As well as identifying positive impacts, two studies highlighted the overall importance of the programs to industry. The reports cited CIPEC tools and services for their contribution to reducing Canada's overall energy consumption. For example, one study concluded that "the program rationale for the Dollars to $ense program is sound. Providing business energy managers with detailed information on how to identify, analyse, implement and monitor energy savings opportunities leads to substantial reductions in energy consumption and greenhouse gas emissions."

These studies quantify what CIPEC participants have known all along: CIPEC works! This was clearly demonstrated at our Energy 2005 Conference for Industry, where more than 300 energy managers, engineers and environmental specialists converged at the Fairmont Château Laurier in Ottawa on May 24 to 25, 2005. NRCan staff assure me that this was the most dynamic and productive conference to date, with enthusiasm and passion for CIPEC's energy efficiency mandate running at an all-time high.

Implementing the Plan

CIPEC's three-year business plan, covering the 2003–2006 period, has now successfully concluded, with gains made in all of our targeted areas. A new three-year plan, extending through to 2009, is ready to go. This plan has set bold new objectives for CIPEC's going forward. The four key areas of focus are:

- Increase and track CIPEC's effectiveness.
- Set targets and establish high quality, timely data reporting.
- Provide better tools, services and information to enable companies to improve their energy efficiency outcomes.
- Increase the effectiveness of CIPEC communications at all levels.

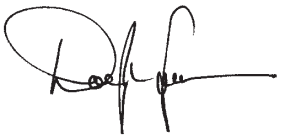
These objectives build on our previous success in engaging new constituencies by ensuring that CIPEC continues to bring superior, practical tools and resources to the table for all participants.

In Closing

As Canadian industry faces uncertain energy prices, more stringent environmental regulations, a burgeoning marketplace and ongoing structural changes, the need for a cost-reducing, business-improving resource like CIPEC has never been greater. I am certain that CIPEC will continue to be a significant contributor to Canadian industrial competitiveness and to our national sustainable development and climate change goals.

I would like to extend my thanks to NRCan and its extraordinary people for their passion and hard work as they hold high the CIPEC banner. I would like to acknowledge the vision and dedication of Chair Sue Olynyk and the other members of the Task Force Council, as well as my colleagues on the Executive Board. Their willingness to think outside the box, to pursue and embrace innovation, and to work selflessly on behalf of CIPEC and its energy efficiency mission has made the organization the poster child for what can be achieved by voluntary action and private/public cooperation.

Sincerely,



Douglas E. Speers
Chairman, Emco Corporation
Chair, CIPEC Executive Board

Participation Pays for Itself

Over the years, one fact about CIPEC has remained constant: participation pays off! People and companies that embrace CIPEC's energy efficiency mandate invariably lower their business costs, enhance their processes, motivate their employees and improve their bottom lines. There is no doubt that the returns from participation far outweigh the costs.

When your company participates in CIPEC, you gain access to an unparalleled energy efficiency menu. Formal programs, such as those you will see outlined in this report, help you and your company identify energy efficiency opportunities and implement improvements cost-effectively. Equally important, CIPEC plugs you into a network of energy managers and professionals, both within your sector and beyond. By attending sector task force meetings, you have an opportunity to learn from the experiences of colleagues at other facilities and to build relationships that can broaden your outlook and expand your knowledge.

Networking with counterparts in other sectors also pays dividends. Attending broader venues, such as Task Force Council meetings, enables you to meet, and learn from, energy management professionals from across Canada – people with broad experience and innovative ideas. What you learn from them is often transferable to the needs of your own operations and business environment.

Personally, CIPEC meetings and events frequently introduce me to concepts and practices that I can apply to my own company. These ideas often have an immediate payback. It doesn't take much in the way of energy savings to pay for the cost of attending these meetings. Participation does indeed more than pay for itself!

Beyond the tangible returns of CIPEC involvement is the contribution that your ideas, perspective and commitment can make to building new and improved CIPEC programs and to ensuring a more energy-efficient

The CIPEC Executive Board and Task Force Council held a joint meeting with NRCan officials on March 7, 2006, to plan future CIPEC endeavours.

future for Canadian industry. Knowing that you are contributing to the broader public good is a powerful reward for serving the best interests of your company, your industry and your country.

CIPEC is not a government program. It is an industry/government partnership driven by the ideas, energy and passion of Canada's industrial sectors. It is conceived and designed to marry the needs of industry with programs tailor-made to build competitiveness and business success.

Energy efficiency is not a destination; it is a forever-rising target that demands constant vigilance and careful stewardship; and it is CIPEC's mission. You and I and our fellow energy management professionals are the guardians of Canada's industrial energy efficiency, of our industrial competitiveness and of our environment. I urge you to join me and your colleagues by actively engaging in your sector task force and, perhaps, at the Task Force Council table.

It will be time well-spent.

Sincerely,

Sue Olynyk
Senior Energy Specialist, Dofasco Inc.
Chair, CIPEC Task Force Council

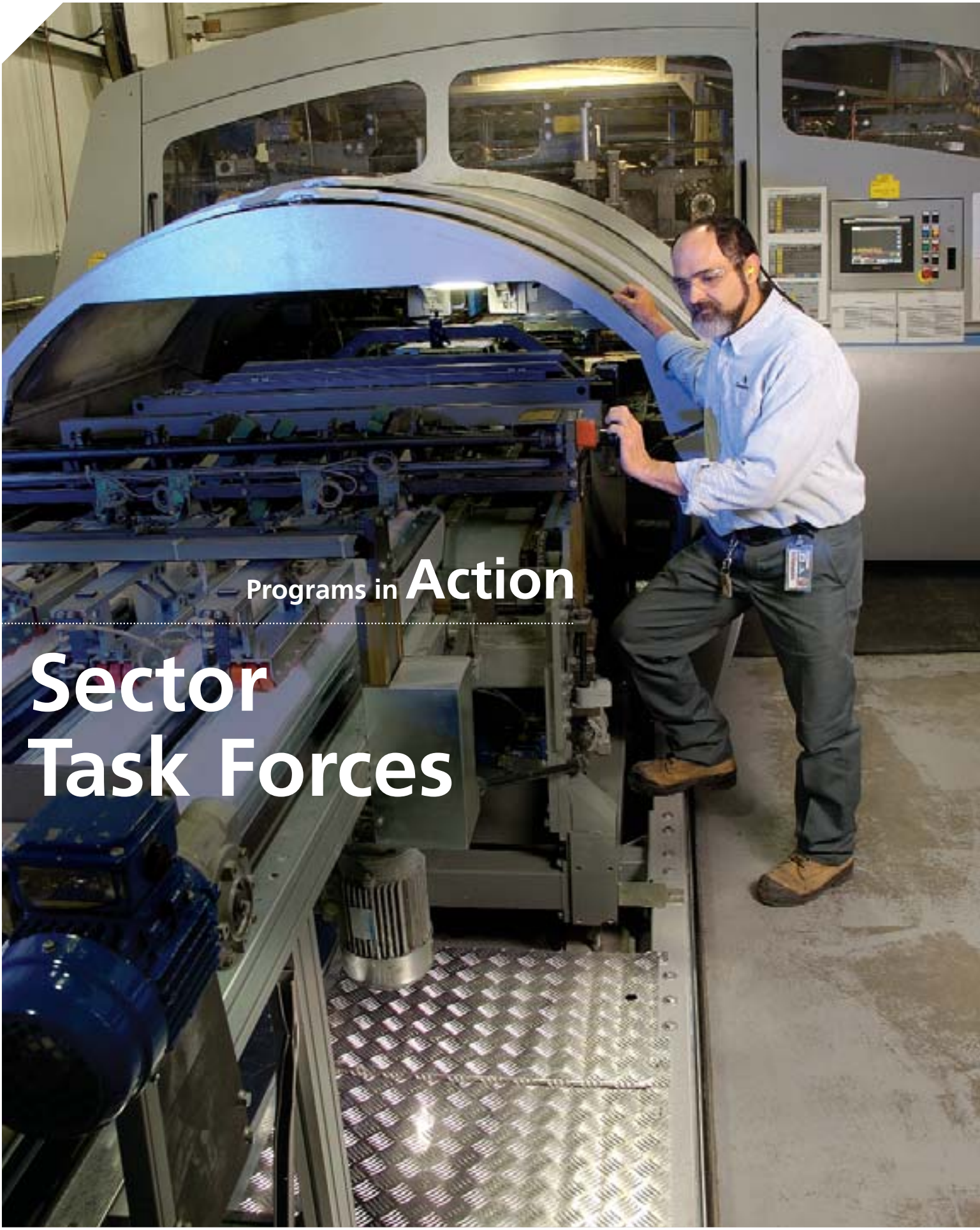
Programs in Action

With industry leading the agenda and government providing support, the Canadian Industry Program for Energy Conservation (CIPEC) has long been recognized as Canada's industrial energy efficiency champion. For over thirty years, industry and government partners have worked in concert to identify and capitalize on energy efficiency opportunities. This extraordinary industrial energy efficiency partnership has led to the creation of an ever-evolving toolbox that continues to adapt to the needs of Canadian industry.

CIPEC's results-oriented tools and programs have emerged from this unique, cooperative arrangement. Educational resources, such as Dollars to $ense workshops, have proven themselves for identifying opportunities, improving energy management and achieving results. Co-funded energy audits help offset the costs of finding energy losses and identifying ways to address them. The CIPEC range of publications, including newsletters, case studies and energy efficiency guides, disseminates ideas and promotes energy consumption improvements.

CIPEC sector task forces, led by industry associations and passionate champions, advance energy efficiency agendas to improve energy management across entire industries. Industry-specific benchmarking studies create snapshots of how companies compare with their competitors, presenting comparative data and motivating improvement. The Industrial Energy Innovators initiative provides an energy management template for companies in all sectors to follow, backed by the resources needed to get results.

There is little doubt that CIPEC's rich array of tools and services presents an exceptional opportunity for Canadian industry to reduce energy consumption and enhance business performance. It represents value delivered where it matters most.



Programs in **Action**

Sector Task Forces

The engine driving CIPEC's success is its 27 industry sector task forces. Led by 52 committed trade organizations representing companies that understand the importance of energy efficiency to industrial competitiveness and corporate citizenship, the task forces coordinate the sector's efforts to advance an industry-wide energy management agenda. Combined, CIPEC task forces represent more than 5,000 companies encompassing over 98 percent of Canada's industrial energy consumption.

Organized for Success

CIPEC task forces educate, motivate, inform and engage industrial organizations to better manage energy use. They organize benchmarking studies, create energy management guides, host energy conferences, advance new technologies, promote best practices and sponsor industry-specific workshops. Regular task force meetings provide a venue for energy managers to discuss problems, identify opportunities, tour facilities and share ideas. Supported by Natural Resources Canada's (NRCan's) Office of Energy Efficiency, task forces are powerful partners in the march toward a more energy-efficient Canada.

Seizing the CIPEC Opportunity

CIPEC task forces help companies bring energy efficiency concepts to the shop floor. Through participation in task force activities, companies have expanded their knowledge, discovered innovative ideas, established useful relationships, acquired new skills and improved their energy management programs. Task forces have provided them with an essential gateway to valuable energy efficiency resources.

For example, **Molson Canada**, a company with a long history of pursuing energy efficiency, uses CIPEC to enhance its energy management program. "Participation in the Food and Beverage Sector task force brings us an unusual opportunity to talk about energy management successes, problems and ideas with other companies," says Paul Swindall, Development Brewer and the corporate energy manager for the company. "It also gives us a chance to tour other facilities and see first-hand how they handle the issues also found in our breweries."

Cavendish Farms uses ideas presented at CIPEC task force meetings to identify energy savings opportunities and enhance business performance. These ideas complement the company's successful energy management program that has led to ongoing operational improvements.

According to James Vaughan, the company's Environmental Health and Safety Manager, "CIPEC participation provides us [Cavendish Farms] with motivation and focus and assists us in keeping our energy efficiency program on track."

To date, the company has completed heat transfer projects that reduce fuel consumption and capture and re-use waste process heat, introduced measures to reduce the use of process water, automated boilers and refrigeration defrost systems, installed motion detector lighting, and captured biogas for use as heating fuel. "We are focused on capturing all energy savings opportunities," Vaughan says. "Our goal is to do more work with less energy."

Cavendish Farms' energy management program shows no signs of slowing down. Already achieving substantial energy savings and excellent returns on its investment, the company plans to conduct energy audits, launch steam trap and compressed air studies, and explore additional heat recovery opportunities. Continued participation in CIPEC is also high on its priority list.

Inco Limited is a Canadian leader in the mining industry and a Canadian leader in energy efficiency. Thanks in part to its long record of participation in CIPEC, the company has reduced its energy consumption by 10 percent since 1990, while increasing production by 20 percent. In total, the company has recorded a $60 million reduction in energy consumption since 2000.

"It doesn't matter whether your profit comes from increased sales or reduced costs, the bottom line results are the same," says Andy Lemay, Energy Analyst at Inco's operations in Sudbury, Ontario. "And energy efficiency can play a significant role in reducing costs."

Lemay believes that CIPEC's value extends from providing nuts-and-bolts ideas to motivating action and inspiring leadership. "Associating with companies who pursue environmental excellence will help us to be excellent," he explains. "CIPEC keeps the industrial energy efficiency agenda front and centre in Canada, and it plays a pivotal role in our industrial competitiveness and environmental sustainability."

Millar Western Forest Products Ltd. uses CIPEC task force meetings to discover new ideas that might apply to the company's facilities in Whitecourt, Alberta. "The meetings are an excellent way to network with other energy managers, talk shop and find out what companies in other industries are doing to reduce energy consumption," says Scott Shannon, a Process Technologist at the company. Millar Western also uses the *Heads Up CIPEC* newsletter and CIPEC's on-line resources (housed under the NRCan Web site) as energy management information and learning tools. "CIPEC gives us a focus, a sense of direction and a pile of new ideas," Shannon notes.

With the help of a consultant, the company identified a series of energy reduction projects it could implement with very short payback periods. To date, the company has acted on four opportunities. They include recapturing additional process heat by diverting heat recovery condensate directly to its steam cyclone instead of passing it through the chip drainer filtrate; reducing process heat requirements by minimizing chip drainer filtrate flow to the chip washer; capturing effluent heat in a heat exchanger to heat chemical dilution water; and preheating second stage air in the flash dryer in warm months using the mill's glycol system. These projects returned the company's investment in nine months, and will reduce Millar Western's natural gas bill by nearly $2.4 million per year. As a result of the projects, Millar Western won third place in the Energy Conservation Awards presented by the Pulp and Paper Technical Association of Canada (PAPTAC).

Energy 2005

Canada's industrial energy efficiency efforts received a major boost thanks to Energy 2005, CIPEC's biennial forum for transferring knowledge and celebrating success.

Held May 24 and 25 at the Fairmont Château Laurier Hotel in Ottawa, Ontario, the conference flew the banner "Good for Business, Good for the Environment." The event featured

- leading experts who shed light on some of the latest and most cost-effective techniques to improve energy performance
- industry leaders who explained strategies for making energy efficiency viable
- senior government and industry officials who discussed programs and tax breaks available to industry

"Canadian industry saved over $3 billion in purchased energy in 2003 alone thanks to effective energy management," says Douglas Speers, President and CEO, Emco Corporation, and Chair, CIPEC Executive Board. "With Energy 2005, we built on that momentum by showcasing the latest trends, technologies and successes in industrial energy efficiency."

Geared to industry representatives including engineers, operations managers and energy practitioners, Energy 2005 provided the 300 delegates an opportunity to network, exchange ideas and explore new energy efficiency concepts.

Sessions and conference activities included a "7 Steps to Good Energy Management" workshop, a preliminary version of a Dollars to $ense financing workshop that revealed innovative approaches to financing industrial energy efficiency projects, a tour of NRCan's CANMET Energy Technology Centre's Research Facility near Ottawa, and "A Mark of Success" 30th anniversary dinner.

Programs in Action

Industrial Energy Innovators

The Industrial Energy Innovators (IEI) initiative is the gateway to CIPEC's full array of programs, products and services for individual companies. Administered through NRCan's Office of Energy Efficiency, the IEI initiative helps to transform sector-level commitments made by CIPEC task forces into company-level action.

Participation Delivers Value

The IEI initiative is growing in leaps and bounds because it delivers exceptional value to its participants. Becoming an Innovator is easy. Companies make a commitment to set energy efficiency improvement targets and report annually on progress. In return, the more than 1,000 industrial facilities that have registered for this initiative have access to financial incentives and discounts, customized workshops, and NRCan industry officers. More specifically, they are eligible for NRCan's Industrial Energy Audit Incentive (worth up to $5,000), plus discounts on Dollars to $ense energy management workshops. They gain access to NRCan industrial energy experts who help with a range of services – from finding information on energy-related incentive programs to providing insight into the latest sectoral research and development activities.

The IEI initiative's annual reporting requirement helps participants track their energy management efforts and measure their year-over-year progress toward improved energy efficiency. Innovators also receive recognition for corporate responsibility through inclusion in CIPEC's annual report, NRCan's Web site and the *Heads Up CIPEC* newsletter. The IEI initiative makes it even more worthwhile to pursue energy efficiency and even easier to acquire the tools to put it into practice.

Innovators Get Results

Industrial Energy Innovators are energy conservation achievers. **BP Canada Energy Company** is a prime example. "CIPEC and the Industrial Energy Innovators initiative complement our internal environmental value system," says Bryan Forsyth, Energy Efficiency and Emissions Specialist in BP Canada's upstream operations. "CIPEC helps us focus on minimizing our energy use. Anything you can do to reduce the energy we use is good for business."

Active participation in CIPEC is paying off in many ways for BP Canada. For example, a Dollars to $ense workshop inspired a plan to minimize energy losses from process piping leaks by developing a unique and innovative leak detection, repair and monitoring program that targets fugitive emissions. Even energy performance reporting, part of its responsibilities as an IEI, helps BP Canada advance its aggressive environmental agenda. "Our annual energy reports help us to focus on our energy management program and greenhouse gas emissions," Forsyth explains. "They force us to take a close look at our business, identify strengths and weaknesses, set goals and make improvement plans. Reporting is a forecasting and planning tool for managing our climate change initiatives."

BP Canada's proactive corporate environmental culture and positive view of energy efficiency have led the company to achieve remarkable results. In recent years, the company has completed more than 400 energy efficiency projects, resulting in emissions reductions of more than 300,000 tonnes of carbon dioxide equivalent per year.

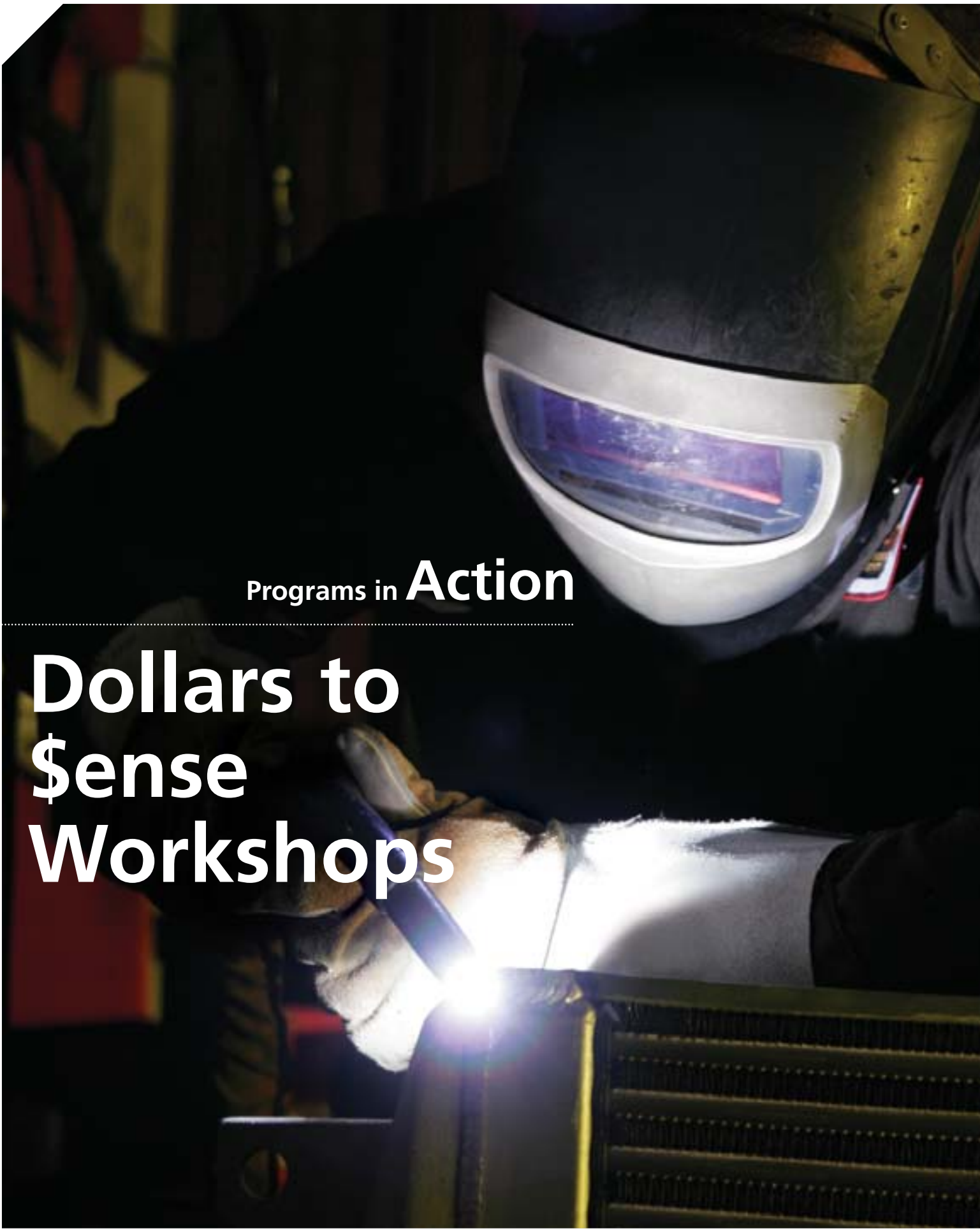
In 1999, **Frito Lay Canada**'s parent company set what it calls "Big Hairy Audacious Goals" for international resource conservation: to reduce natural gas consumption by 30 percent, electricity consumption by 25 percent and water consumption by 50 percent. To achieve these targets, Frito Lay Canada's plants have established employee awareness programs to locate compressed air leaks and identify the best ideas for saving gas, electricity and water.

Frito Lay Canada's plants in Alberta, Ontario, Quebec and Nova Scotia continued their commitment to exploit energy savings opportunities. Three years ago, they began to commit to IEI participation. "To coordinate energy efficiency efforts across the company, we established an energy management point person at each plant, appointed two Resource Conservation Captains to oversee activities in all six of our facilities, and created a cross-functional team of highly motivated technicians in each plant to turn ideas into action," says Jean-François Allard, Division Engineer and one of the Captains. This energy management team is responsible for tracking weekly consumption through a reporting system that enables the company to compare energy consumption from week to week and month to month.

With CIPEC's help, the company's plant in Lauzon, Quebec, held a customized energy fair that was the catalyst for the facility's launch of a process integration program. "We have a friendly competition between plants to establish best practices and new concepts," Allard explains. "This helps to keep enthusiasm for energy conservation high."

Internationally, Frito Lay plants are investigating or employing technologies such as a low-water corn process, oven draft controls, stack heat recovery and re-use, water-reducing microfiltration, corn washer modifications, the use of oven waste heat in fryers and replacing electrical lighting with daylight. The company is also looking at using renewable energy sources and a wide array of waste reduction initiatives to reduce its environmental footprint and cut energy consumption.

Frito Lay Canada's resource conservation program is aggressive. "While Frito Lay Canada has made significant efforts in the area of resource conservation, to take our commitment to the next level, we will need to find new ideas and approaches, as well as share what we have learned with our industry partners," Allard explains. "The networking opportunities, expertise, information and incentives available through CIPEC will be great assets for us in going forward."



Programs in Action

Dollars to $ense Workshops

Dollars to $ense training workshops bring organizations the information and motivation they need to launch, focus and invigorate their energy management programs. Since the one-day workshops were introduced in 1997, more than 4,000 industrial participants from across Canada have used them to get results. These participants have returned to the workplace with new ideas that have lowered operating costs, improved competitiveness, reduced greenhouse gas (GHG) emissions and saved their companies millions of dollars in total energy expenditures.

Bringing Energy Fundamentals to Life

Dollars to $ense workshops focus on energy management fundamentals and illustrate their importance with examples from the shop floor. For example, Energy Master Plan workshops help participants jump-start their energy management programs with useful tools and proven methods. Participants learn how to build an energy management team, capture immediate savings opportunities, build an effective business case for energy efficiency projects and motivate employee involvement.

Spot the Energy Savings Opportunities workshops help companies identify ways to save energy and reduce costs. The workshops explain energy basics and point participants toward immediate savings by highlighting opportunities to improve the energy efficiency of fans, pumps, boiler systems, facility utilities and other equipment and systems.

Energy Monitoring workshops are based on the principle that you can only manage what you can measure. These workshops demonstrate how to use energy monitoring and tracking systems to improve energy management and lower energy costs.

Putting Ideas into Action

Organizations in virtually every industrial sector use the Dollars to $ense workshops as key components of their energy efficiency programs. They find that these low-cost sessions are effective in increasing awareness, identifying opportunities and motivating action.

For example, a CIPEC workshop held in St. John's, Newfoundland and Labrador, in early 2005 was the start of something good for **Fishery Products International Limited (FPI Limited)**. "We heard about the programs and extensive energy management literature that was available from the Government of Canada for the first time at the workshop," says Randal Peddle, FPI's Corporate Engineer, Primary Group. "It opened our eyes to the savings opportunities and motivated us to act."

The most dramatic action occurred at the company's processing plant in Triton, Newfoundland and Labrador. Motivated to look for energy savings, staff at the facility determined that the plant's six blast freezers could operate just as well on two motors each instead of three. Disconnecting the six unnecessary 10-horsepower (hp) motors will save the company more than $5,000 per year in electricity. A similar amount of money was saved by operating one 150-hp cleaning pump during the processing season instead of the two or three pumps previously used. About $12,000 was saved in 2005 by running a 10-hp pump on weekends and during downtime instead of a 75-hp production pump.

Improved operating practices have also contributed to the savings. Shutting off lights throughout the plant when not needed is saving an estimated $2,900 per year. Lowering the hot water heating temperature from 88°C to 65°C (190°F to 150°F) during the winter down season is expected to produce $2,000 in annual savings. These projects are in addition to earlier procedural changes to the crab blast-freezing process that have reduced electricity costs by an estimated $30,000 per year.

Syncrude Canada Ltd. located near Fort McMurray, Alberta, also found that Dollars to $ense workshops deliver results. In 2004, the company sponsored an oil-sands-specific Dollars to $ense workshop and invited the rest of the industry to attend. "We consolidated all three workshops into one and presented it to our staff and to other oil sands plant operators," says John Velden, Syncrude's Energy Manager, Production Planning and Coordination.

Following the session, Syncrude set up an operations team to discuss energy optimization and how to integrate the approach into process optimization and plant operations. Within two weeks, the company reviewed natural gas use and launched improvements to its waste heat recovery systems.

"The workshop taught us new analytical techniques, such as CUSUM (the cumulative sum of differences), which are very useful for pinpointing changes in consumption," Velden explains. "It also showed us the importance of making it easier for people to do the right things to improve energy efficiency." Syncrude staff now use the tools learned at the workshop for production optimization as well as for energy management.

The workshop's most important impact was to increase employee awareness of the energy management opportunities that were under their own control. "Employees who attended the session are now allies in introducing energy management improvements," Velden notes.

The **Hemlo operations at Williams mine**, near Hemlo, Ontario, made Dollars to $ense workshops the starting point for the development of a comprehensive energy management program. The mine, a joint venture between **Barrick Gold Corporation** and **Teck Cominco Limited**, used the workshops to help its staff acquire useful information about energy management practices, data analysis and opportunity identification. "CIPEC workshops provided us with our first steps toward effective energy management," says Kent Cook, the mine's Senior Continuous Improvement Coach.

Workshops were just the beginning for the mine. An industrial energy audit soon followed, revealing the mine's performance compared with other mining companies and identifying about 50 specific opportunities to improve energy efficiency.

A cross-functional team at the mine developed an action plan and set up category-specific teams to address improvement opportunities in compressed air, water management, heating and ventilation, awareness building and program management. The mine also drew on resources provided by CIPEC to acquire information and build an energy efficiency knowledge network.

Low-cost and no-cost changes were implemented in mid-2004, quickly providing a 9 percent reduction in electricity costs despite a large increase in power rates. "Our primary driver was changing staff behaviour," Cook states. "We made improvements by focusing employee attention on eliminating energy waste. Our people took on the personal responsibility and accountability for energy efficiency. We are proud of what they achieved."

A Dollars to $ense workshop hosted by **Petro-Canada** at its refinery in Montréal, Quebec, brought the company much more than a day's worth of energy management ideas. "Interacting with representatives from other industries gave us a good look at how we compare to other companies," says Robert Zeijlmaker, Engineering Specialist with Petro-Canada's Process, Technology and Reliability group. "It provided a chance to measure our progress and identify our strengths and weaknesses."

Through demonstrations and presentations, the Spot the Energy Savings Opportunities workshop looked at where energy waste is likely to occur and showed participants how much energy can be lost due to seemingly insignificant items such as small air leaks. "Small things can have a major impact on operating costs," Zeijlmaker notes. The session also showed participants how to access a wealth of information available from the Government of Canada.

"The workshop got us to focus on the fundamentals and also introduced us to sophisticated energy management technology to help us advance our energy efficiency efforts," Zeijlmaker says.

Placer Dome Inc., headquartered in Vancouver, British Columbia, has used Dollars to $ense workshops to kick-start an international energy efficiency program that spans 16 mines in eight countries. "We didn't have a clue how to launch an energy management program that could encompass operations in so many countries," says Dale Ekmark, General Manager of Asset and Energy Management. "The workshops took us through the process from end to end, introducing concepts we would never have thought of on our own."

Placer Dome officially launched a new, formalized energy efficiency program for its Canadian operations in early 2005. "The workshops showed us that the greatest opportunity for immediate improvement would come from the people side of the business," Ekmark explains. "Emphasizing operating practices and promoting awareness are key components in our program."

At its three Ontario mine sites, the company introduced an employee involvement program that includes local newsletters and an emphasis on building an energy-efficient lifestyle at work and at home. In the first year, Placer Dome's energy management program delivered significant results.

The information and contacts that Placer Dome acquired at CIPEC's Dollars to $ense workshops have kick-started an effective energy management program that the company is now introducing to its subsidiaries around the world. "To my knowledge, there is no energy management support program comparable to that offered through CIPEC available anywhere else in the world," Ekmark says. "It has certainly had a significant impact on the way we operate."

Tailor-Made Solutions

NRCan makes it possible for companies or industries to develop Dollars to $ense workshops customized to their specific needs. **Molson Canada**, for example, has worked with workshop presenters to develop a Dollars to $ense workshop for its breweries in Edmonton, Toronto, Montréal and St. John's. "The workshops were customized to our individual facilities, providing each brewery with ideas and examples directly related to the way they operate," says Paul Swindall, Development Brewer. "The workshops provided plant management and staff with insights and energy management tools that they could put into action immediately to improve energy efficiency. In St. John's, for example, the brewery used what it learned at the workshop to reduce its process water consumption by 20 percent just two months after the session. In Edmonton, plant personnel learned how to improve the plant's compressed air and heating, ventilating and air-conditioning performance.

"The workshops deliver tremendous value for our money," Swindall notes. "CIPEC provides all of the handouts, presents excellent demonstrations and delivers the sessions right in our own facilities. They are great seminars that focus on what we want and what we need."

CIPEC's Cement Sector task force is using customized workshops to help spur all of Canada's cement companies to take action on energy efficiency. Based on input from industry members, the task force worked with CIPEC to set up industry-specific energy efficiency workshops and deliver them in Vancouver, Toronto and Montréal. The workshops presented information about management tools, energy audits, energy-saving technologies and best practices.

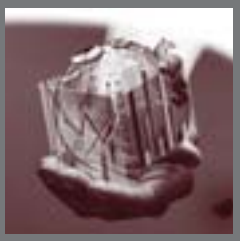
"Energy expenditures represent 40 percent or more of the cost of producing cement," says Cement Sector Chair Christian Douvre of **Lafarge North America Inc.** "This makes energy a significant strategic issue for the industry, and we are trying to make people more aware of the opportunities brought by sound energy management practices."

Participants in the workshops found the sessions enlightening, and several companies have used their new energy management knowledge to introduce changes in their operations. The Cement Sector task force is now developing additional focused workshops that draw upon the experiences and effective practices of other industries and is looking at developing a benchmarking study for the industry.

Commercial fishing is not the first industry that comes to mind when exploring industrial energy efficiency, but fuel is a significant component in overall fleet operating expenses. Recognizing the potential of energy efficiency on the high seas, the **Canadian Centre for Fisheries Innovation (CCFI)** based in St. John's, Newfoundland and Labrador, turned to CIPEC for help.

"While fuel consumption and fuel costs are an increasingly important issue in our industry, relatively few advancements have been made," says Carey Bonnell, CCFI's Industrial Liaison Officer. "We are working with CIPEC and NRCan to find ways that we can work together. CIPEC offers us a great opportunity to partner to improve energy efficiency throughout the industry."

Through CIPEC, CCFI worked with NRCan staff to design a "best practices" Dollars to $ense workshop customized for the fishing industry. In addition, CCFI has also gone back to the drawing board, working with Memorial University of Newfoundland to redesign fishing vessels and gear for improved energy efficiency. Bulbous bows, better length-to-beam ratios, anti-roll stability tanks, new trawl door concepts and lower drag nets have all been developed with fuel consumption in mind. University engineers have determined that a properly designed 100-foot vessel would consume half of the fuel of a typical 65-foot vessel. "We consume huge amounts of fuel," Bonnell explains. "There are many proactive steps vessel owners and boat operators can take that have a substantial impact on fuel costs."



Dollars to $ense Improved

After eight years of growth and 9,000 participants, NRCan's OEE has retooled its Dollars to $ense series of workshops. The retooling included improvements to the workshops, the inclusion of better practices and new technologies, and updated workshop reading material. Revamping the series ensures that Dollars to $ense continues to provide leading-edge instruction on best-in-class energy management practices.

Spot the Energy Savings Opportunities provides an overview of energy use and helps participants identify energy savings opportunities available for little up-front investment. To ensure that the workshop has the same impact as it had when it was originally conceived six years ago, the seven steps to energy savings – the backbone behind the workshop – is now the basis for all sessions, including a half-day abbreviated version.

Energy Master Plan offers information on assembling an energy management team, identifying and capitalizing on immediate savings opportunities, taking advantage of finance and insurance options, and developing cost-saving energy management solutions. The workshop was transformed to incorporate the latest information gathered on best practices from Canada, the United Kingdom and the United States. Energy Master Plan now brings participants better tools to improve energy management efforts within their organizations.

Energy Monitoring takes a holistic approach to controlling energy use through measurement and analysis. The workshop illustrates how monitoring translates into improved energy management through establishing reduction targets, regularly reporting on results, and acting on those results to ensure targets are met. Energy Monitoring was restructured based on lessons learned over the past seven years, and it is now a more detailed, technical workshop better suited to participants with expertise in energy management.

NRCan shares the cost of Dollars to $ense workshops with participants, covering approximately 40 to 60 percent of the cost depending on the size, location and degree of customization of the workshop.

Programs in Action

Industrial Energy Audit Incentive

The Industrial Energy Audit Incentive encourages IEI companies to assess their energy savings opportunities by offsetting the cost of an on-site energy audit. In fiscal year 2005/2006, NRCan processed a record-high 221 audit incentives.

Knowledge Is the Starting Point

Energy audits target specific areas of a facility's energy systems, such as natural gas boilers, steam distribution, motors, refrigeration, and compressed air, venting and water systems. By assessing these systems, an energy audit establishes a baseline from which companies can measure energy efficiency improvements and introduce effective energy management programs. Companies acting on recommendations derived from energy audits typically reduce energy costs by at least 5 to 15 percent, often with payback periods of less than two years.

Putting Audits to Work

The Industrial Energy Audit Incentive helps companies to underwrite part of the cost of energy efficiency audits. The incentive pays 50 percent of the cost, up to a total of $5,000, of an on-site audit conducted by a professional energy auditor. The incentive is available to registered Innovators who have their applications approved by NRCan before beginning an audit.

The goal of the audit incentive is to help motivate companies to gather the information they need to make sound energy management decisions. Invariably, audits produce results, leading to more efficient operations, improved environmental performance and a better bottom line.

Examples of energy audit success abound. Audits at **Abitibi Consolidated Inc.'s Clermont and Kénogami Divisions** in Quebec uncovered a number of areas where data collection and improved operating practices could produce energy savings. "We had no way of knowing how much energy each process was using in real time," says Martin Fairbank, Manager of Continuous Improvement at the company's head office in Montréal. "As a result, we couldn't pay adequate attention to our energy use."

The audit discovered that uncalibrated and inaccurate electricity and steam meters were causing energy inefficiencies, and monitoring systems could not keep up with the workload. The company resolved these issues by implementing new information technology capabilities that provide real-time information about operating performance and set usage alarm levels to warn of potential problems. All data are collected centrally and regularly reported. "Reports tell us where to focus our attention," Fairbank explains. "If energy use goes up in a certain area, we know about it right away and can address the reasons why."

Abitibi's energy strategy is based on a continuous improvement philosophy. Besides enhancing its energy measurement and control capabilities, the company is continuing to replace hydrocarbon fuels with biomass energy sources and improving the efficiency of its hog fuel boilers.

An energy audit and an internal energy projects review at **Inco's electrowinning plant** (a plant that removes metallic ions from concentrated rinse water) in Sudbury, Ontario, identified a number of energy efficiency opportunities. For example, by downsizing a 50-hp motor on one of its agitators to a 15-hp unit and by reducing the operating speed from 1,800 rpm to 1,200 rpm, the company will save between $8,000 and $10,000 per year in electricity costs. In a large storage tank, the company plans to replace air agitation with mechanical agitation, saving an additional $50,000 per year.

Inco is also studying the venting systems on its slurry thickening and storage tanks, which currently neutralize exhaust gases by incineration. Test work is underway to determine whether incineration is actually required. Eliminating this step in the process could yield savings as high as $50,000 per year in reduced natural gas consumption.

The company will consider implementing a number of other energy-saving projects such as variable-frequency drives and high-efficiency impellers, as resources become available.

Norampac Inc.'s Etobicoke Division in Toronto, Ontario, identified about $36,000 in annual energy savings. Their energy audit in 2004, which focused on steam process insulation, led the company to invest in upgrading insulation in its 50-year-old facility. Norampac decided to use the best jacketed fibreglass insulation available, which provided the best balance between cost and performance. The cost of the company's investment was recovered in just over one year. The company has also introduced insulation upgrade programs at three other Ontario plants, with two additional plant upgrades slated for 2006.

Norampac has been working to build an energy management program and instill an energy conservation mindset in its workforce over the past two years.

"Turning lights out and computers off are small things that can add up to significant savings," says Stephen Beauchamp, the Division's General Manager. The company is also committed to lowering energy costs by investing in boiler upgrades and building its transportation fleet around energy-efficient vehicles.

Northrock Resources Limited of Calgary, Alberta, used the Industrial Energy Audit Incentive to conduct audits at two of its sites. The audits, which focused on emissions and energy efficiency at well sites and processing facilities, are paving the way for substantial cost savings.

"The audits showed us that we were wasting energy by using vented natural gas to drive our on-site instrumentation," says Cyril Garvey, Senior Facilities Engineer at Northrock. The company discovered that switching to solar-powered electrical instruments could save the company about $10,000 per year per well site in vented natural gas. Although solar power technology is more expensive, installing it is easy and inexpensive, enabling the company to use it on new well sites without increasing overall costs.

"The audits helped us to demonstrate to our people the importance of reducing emissions and improving energy efficiency," Garvey explains. "It showed them that management was committed to making improvements, and it motivated them to get involved in developing solutions."

Northrock's growing culture of energy conservation and best practices has also led the company to employ other advanced technologies, such as satellite data communications and sophisticated performance modelling techniques, to improve natural gas compressor performance and enhance field maintenance practices.

NRCan's Industrial Energy Audit Incentive has helped companies identify $98 million in total potential energy savings.

Forest products producer **West Fraser Mills Ltd.** of Vancouver, British Columbia, has used energy audits to uncover potential electricity savings of more than 7 percent. "Unpredictable hydro rates have made it essential for us to maximize our energy efficiency," says Kreshka Young, the company's Energy Manager. "Energy audits are a great way to get the ball rolling."

An audit of the company's sawmill in Fraser Lake, British Columbia, in the summer of 2005 uncovered possible electricity savings of 2 gigawatt hours by upgrading its mill systems. A quarter of these savings will be realized

by upgrading fans and blowers used for dust and airflow control. Another quarter will be saved by installing refrigerant air dryers on the mill's compressed air system. The rest will come from implementing a compressed air leak detection program and by installing smaller, unobtrusive compression equipment expressly for the mill's fire control sprinkler system.

Further energy cost savings will come in mid-2006 when the company's cogeneration facility in Kitimat, British Columbia, comes on-line. The facility will use wood waste to generate 20 megawatts of electricity for the company's use.

Continental Mushroom Corporation is living proof that small companies can also benefit from energy audits. After accessing energy audit incentives from NRCan and natural gas distributor Enbridge Gas Distribution Inc., the Continental Mushroom farm in Metcalfe, Ontario, discovered substantial energy savings opportunities within its steam boiler systems.

"We use a great deal of steam for sterilization and to maintain constant temperatures and humidity," says Lyle Whitham, General Manager of the family-owned company. "The audit recommended that we eliminate our two-boiler system and install technology to consolidate all steam production into a single boiler."

The company is installing a system with a "weak acid cycle dealkalizer," an approach that eliminates the need for return-line chemical treatments and makes a single boiler strategy practical. The new system not only reduces duplication, it also reduces energy-consuming boiler blowdowns from eight per day, to two. To further reduce steam costs, CIPEC and Enbridge helped Continental Mushroom to adopt portable sterilizers for use in production chambers remote from the steam boiler. The portable units eliminate heat losses typical in long distance steam transmission.

Motivated by Canada's Kyoto commitments, high energy prices and a general desire to maximize energy efficiency, **The Mosaic Company**'s potash business unit has made energy efficiency a company-wide focus since the beginning of the millennium. In 2003, at its Belle Plaine and Colonsay sites in Saskatchewan, the company supplemented internal efforts with an energy audit partly funded by NRCan's Industrial Energy Audit Incentive.

The audit looked at mine air-heating systems, assessed natural gas equipment including rotary and fluid bed dryers and boilers, evaluated operating practices and recommended improvements throughout the operation. "The audit was a great tool for sharing information, identifying best practices and motivating our operating teams to take action," says Lorne Cooper, Assistant Vice President, Environment Health Safety and Security, Potash Business Unit.

Acting in part on the information generated by the audit, Mosaic modified dryer systems and adjusted loading and airflow rates for optimum performance. At one location, the company replaced an aging boiler with a smaller, natural-gas-fuelled unit. As a result of these and other improvements that the company introduced, between 2000 and 2004, Mosaic Colonsay reduced its natural gas consumption by about 8.5 percent and improved its energy intensity by 11 percent. Mosaic's plant in Esterhazy, Saskatchewan, has reduced gas consumption by about 3 percent and improved its energy intensity by 13 percent.

Programs in **Action**

Process Integration

NRCan has moved beyond traditional energy audits with the introduction of its process integration (PI) pilot initiative. PI refers to a detailed approach to identifying energy efficiency opportunities in industrial facilities and, thanks to the combined efforts of NRCan's Industrial Programs Division and the CANMET Energy Technology Centre-Varennes, IEI companies can now access the expertise and financial assistance needed to carry out such a study.

The Future Lies in Integration

PI studies take a rigorous and holistic look at facilities to identify process streams where it is feasible to recover energy for re-use. They apply global and systematic design methodologies, such as pinch analysis, to identify inefficiencies in energy use and find opportunities for the reduction of energy, water and raw material consumption.

PI studies are best suited for heavy energy users that have complex energy, hydrogen and/or water networks; have bottlenecks in their utility, process hydrogen or treatment systems; operate several plants; or generate valuable by-products such as fuel off-gases. Industries that benefit most from PI studies include oil and gas, pulp and paper, steel, food and beverage, and chemical.

Parmalat Dairy & Bakery Inc.'s dairy plant in Victoriaville, Quebec, was one of 15 facilities participating in the pilot program to demonstrate the power and effectiveness of PIs. "A PI study creates an operational model of plant-wide hot streams and cold streams to uncover opportunities for energy transfer between these streams," says Jeffrey Rawlins, Parmalat's Corporate Energy Manager. "It provides a comprehensive blueprint to maximize energy recovery and minimize requirements for external energy sources. In other words, it reduces the amount of energy you have to purchase."

The dynamic energy model created in the Parmalat Victoriaville study identified specific projects where energy recovery made good business sense. Projects identified include installing an economizer on the plant's boiler stack; recovering heat in the ultra filtration, cheese making and powder drying processes; and adjusting set points on the plant's refrigeration compressors. Addressing these and the other identified opportunities will produce annual energy savings of more than $1 million and reduce GHG emissions by 4,700 tonnes per year. Parmalat is currently conducting a similar PI study at one of its Ontario plants.

Molson Canada's brewery in Montréal, Quebec, which also participated in the PI pilot, found the pinch analysis tool especially useful. "Pinch analysis helped us identify nine energy efficiency projects and prioritize our approach," says Richard Morin, Chief Engineer at the brewery.

Pinch analysis compares actual energy consumption with a minimum target and identifies real potential for improvement. It also allows an operation to benchmark actual energy consumption against minimum achievable levels. "To make the most of pinch analysis, you need expert consultants with a very good knowledge of your process. NRCan's Office of Energy Efficiency helped us select the right people," Morin notes.

Pinch analysis led the brewery to pursue a number of improvements. For example, staff have changed the way the brewery's washers and pasteurizers work. This no-cost improvement optimized existing equipment operation, saving Molson hundreds of thousands of dollars in natural gas costs. The plant is considering the installation of a hot water loop on its brew kettles to capture evaporating steam and use it to preheat wort, and it is developing plans to divert exhaust gas from its boiler stacks to preheat water in its degassers.

The **Bowater Mersey Paper Company Limited** in Liverpool, Nova Scotia, was another company fortunate enough to be included in the pilot initiative. The company is a large energy user, accounting for 6 percent of the province's total electricity consumption to produce 250,000 tonnes of newsprint each year. Steam for the mill comes from heat recovered from the electrically driven refining process and a third-party biomass cogeneration power plant.

Bowater's participation in the pilot was motivated by an industry-wide energy benchmarking study that demonstrated to the mill that electricity usage was very good, but there were big opportunities to be had by doing more to reduce its thermal energy costs. "We have access to excellent information in the benchmarking study. It gives us a sense of where we sit today and where we want to be," says Bill Stewart, Manufacturing Services Manager at the Bowater mill.

"Our goal is to advance our steam efficiency from the third quartile to the first, and the PI study showed us how to get there. It gave us a systematic way to put the energy plans we had thought about in perspective," Stewart notes.

In a typical mill, there are hot and cold streams. Hot streams are available to be cooled. Cold streams need heat. The PI study showed Bowater how to create and develop heat recovery systems that match hot and cold streams. When an effective heat recovery integration program is in place, the plant's need for additional thermal energy is reduced, thereby cutting energy costs.

Programs in **Action**

Benchmarking

By studying facilities across an industrial sector, benchmarking provides companies with a standardized way to compare their own performance with others in their industry. Benchmarking studies not only show companies how they are doing, but provide the information, motivation and targets to advance their energy management programs.

With assistance from NRCan, CIPEC has actively promoted benchmarking to its sector partners as a tool for motivating improvement. Benchmarking studies typically look deeply into energy management practices and systems within companies, comparing them to other companies with similar practices and systems using consistent methodology and data. By providing the means to compare apples to apples, companies can quickly learn where they stand and where they must improve.

Since 2001, 18 CIPEC sectors have undertaken benchmarking studies of over 265 facilities yielding invaluable data and providing impetus for change. Benchmarking studies have been completed for pulp and paper, construction, textile dying, natural gas processing, food, auto parts manufacturing, mining, steel and fish processing. An additional study for the plastics industry is currently under discussion.

The recently completed studies are already having an impact. In the pulp and paper sector, for example, a joint, three-year-long CIPEC and Pulp and Paper Research Institute of Canada (Paprican) study provided an accurate snapshot of mills across Canada. "It was a very valuable process," says Daniel Lemire, Environment Coordinator for **Papier Masson ltée** in Gatineau, Quebec. "By providing us access to standardized data, the study enables us to compare our performance to see where we excel and where we need to get better."

Papier Masson found that while its pulp line led the industry in energy efficiency, its steam and electricity consumption (related to the paper machine and building heating) needed improvement. Such benchmarking data provides a good tool for the company's recently established energy efficiency committee to use to identify opportunities for improvement. "The committee is helping us to assess and prioritize projects based on their economic viability and impact on energy efficiency," Lemire explains. "It also enables us to explore the impact of each project beyond its local setting to see how it affects plant operations as a whole."

Armed with benchmarking data and a commitment to improving its energy efficiency, Papier Masson has set a goal of reducing plant energy consumption by 10 percent over the next four years.

Pope & Talbot, Inc. of Nanaimo, British Columbia, also found ways to benefit from the joint Paprican and CIPEC benchmarking study. "The study went to considerable lengths to ensure that we had results that would enable us to benchmark ourselves against mills with comparable technology and product output," says Doug McKenzie, Production Engineering Superintendent at the Pope & Talbot Nanaimo kraft mill. "The benchmarking team spent a great deal of time on site in the mills to ensure that data was both accurate and consistent from mill to mill."

By ensuring that mills could compare apples with apples, the study delivered actionable information to participating facilities. For example, the study placed the Pope & Talbot mill in the middle of the pack in most operations. However, the company's batch digester was out of line with the competition in terms of its energy consumption. "The study gave us the ammunition we needed to take a closer look at our digester process and find ways to cut energy consumption," McKenzie explains. "By rethinking the process, we were able to reduce energy consumption on the batch digester by 10 to 15 percent."

McKenzie notes that by combining the resources of Paprican, NRCan and the industry, the benchmarking study was able to apply resources and expertise beyond the capabilities of any one company. "Companies couldn't afford to undertake this kind of effort on their own," he says. "We derived a great deal of benefit from the study."

Companies in the steel sector had a similar experience. Robert Schutzman, Canadian Director of Environmental Affairs at **IPSCO Inc.** in Regina, Saskatchewan, was on the sector steering committee for the industry's benchmarking study. "Energy efficiency is a high priority issue for the steel industry," he says. "We felt that since steel is a global industry, it was critically important for us to benchmark Canadian facilities against international information to identify areas where we should improve. Benchmarking shows us not only where we are, but where we can be."

The study had unanticipated benefits for IPSCO. For one thing, the company began to see the potential advantages of regenerative and recuperative burner technology. It started to evaluate ways to optimize its already efficient reheat furnace. As a result of the benchmarking study, IPSCO and other steelmakers are now also studying ways to integrate regenerative and recuperative burners into their processes.

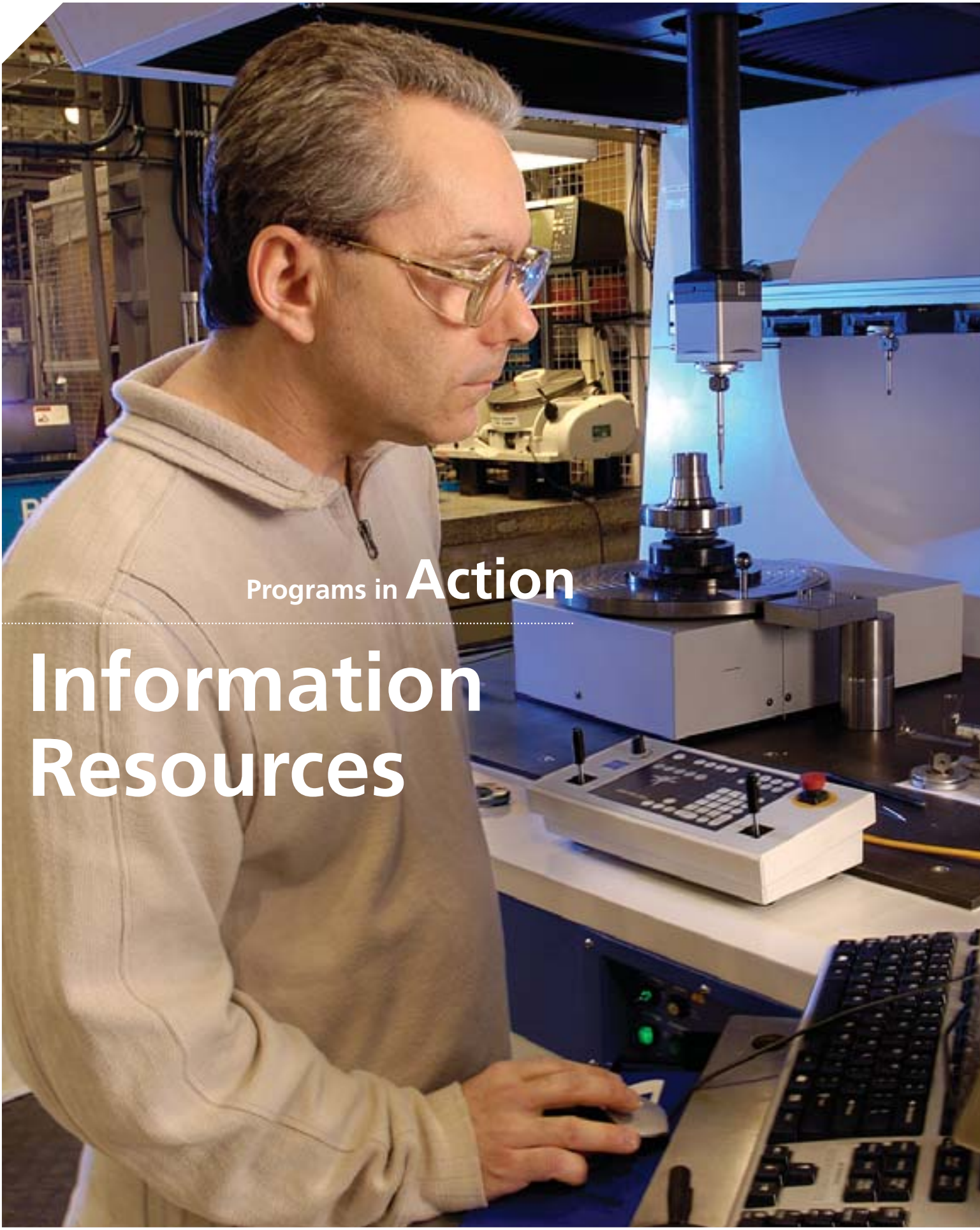
Further, benchmarking may help steelmakers address another critically important issue. "Energy efficiency is directly linked to nitrogen oxide emissions," Schutzman notes. "Higher operating temperatures create more of these gases. By introducing us to better technologies and processes, the benchmarking study may help us identify opportunities to lower nitrogen oxide emissions as we improve energy efficiency."

"The fertilizer industry does a lot of its own benchmarking internally," says Chris Micek, Environmental Manager, Canada at **Agrium Inc.** in Fort Saskatchewan, Alberta. However, a recent industry-wide benchmarking study of the industry has enabled Canadian plants to compare themselves with domestic competition and, thanks to an earlier study of the international industry, with competitors around the world.

"The study confirmed a lot of what we knew and independently verified the numbers the industry has used to track our performance," Micek explains. "Even though our plants are very efficient by global standards (ranking first or second in the world), the study also demonstrated that we could still reduce our fuel consumption by between 3 and 5 percent."

Energy benchmarking studies are helping to establish continuously improving energy efficiency culture, sector by sector, company by company.

The fertilizer industry has begun working with CIPEC to find ways to determine how much of this potential improvement is actually possible to achieve. "Our industry has the highest natural gas prices in the world, and we have to remain competitive with overseas companies with access to natural gas at as little as one third of the cost," Micek notes. "So we are eager to work together to keep moving our energy efficiency in the right direction."



Programs in **Action**

Information Resources

One of CIPEC's most valuable assets is the wealth of information it sponsors, creates and makes available to Canada's industrial organizations. Combined, CIPEC's information resources are a vital link between energy managers in the field and a world of energy efficiency ideas, programs and guidance.

Information Is the Key

Launching, sustaining and maximizing the effectiveness of energy management programs takes appropriate information. From sector-specific energy benchmarking studies and energy management guides to performance reports, case studies, newsletters and annual reports, CIPEC provides energy-conscious companies with access to an unprecedented array of practical energy efficiency information. CIPEC also connects industrial energy efficiency specialists across Canada electronically through the Energy Managers Network – an Internet-based forum for exchanging ideas, discussing challenges and sharing solutions.

Information in Action

Companies passionate about energy efficiency are constantly on the lookout for new ways to improve the way they consume, track and manage energy in their operations. Many of these organizations find that the conduit to ideas that CIPEC provides is an essential ally in this quest.

For example, the twice-monthly *Heads Up CIPEC* electronic newsletter brings a wealth of useful information to the desktop. Established in 1997, *Heads Up CIPEC* includes news about new technologies and innovative approaches to energy efficiency, company case studies showcasing energy management successes, alerts about upcoming energy-related events, helpful tips, and links to energy management programs and resources. In the 2004/2005 fiscal year, 891 new subscribers were added to the *Heads Up CIPEC* distribution list, bringing the total number of subscribers to more than 10,000.

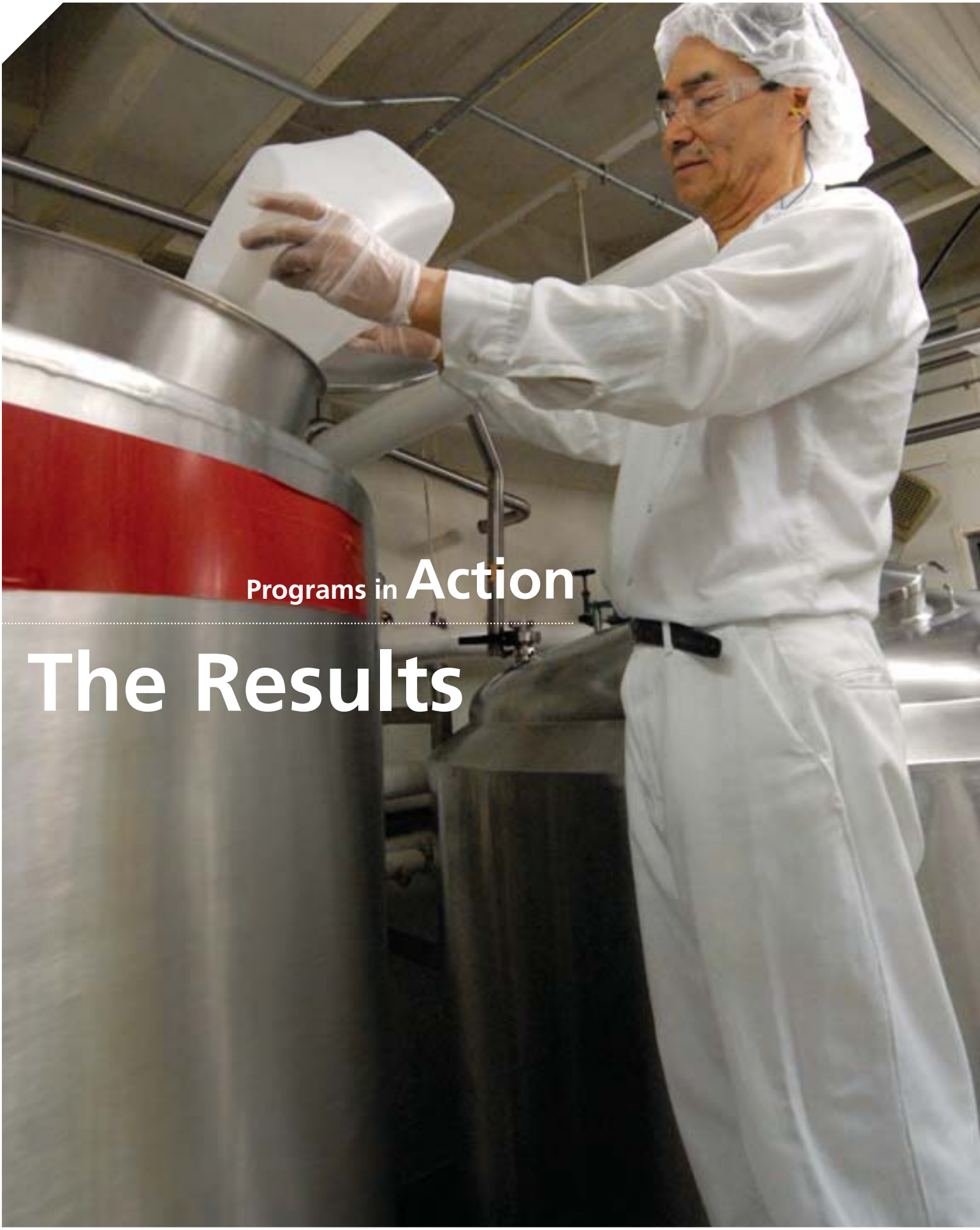
Staff at **Pope & Talbot's Mackenzie Pulp Mill** in British Columbia use *Heads Up CIPEC* to spur their energy efficiency efforts. "We read what other companies are doing, then discuss the ideas among ourselves to see if they can work here," says Ray Randall, the mill's Technical and Engineering Manager. "The newsletter is also a great help in finding resources, suppliers and expertise."

"*Heads Up CIPEC* helps us to keep focused on energy management and to build an energy efficiency culture in our company," says Randal Peddle of Fishery Products International Limited.

Companies also find that CIPEC's energy-oriented reports and guides are valuable energy efficiency tools. "The reports and guides available through CIPEC are great thought-starters and motivators for us," says Phil Croteau, Energy Efficiency Engineer at **Petro-Canada**'s upstream process engineering group. "The availability of energy efficiency materials and information is a significant benefit derived from CIPEC participation."

On average, NRCan distributes over 40,000 publications per year; and in 2005/2006, NRCan completed the conversion of all of its existing publications for electronic distribution via the Internet. Most reports can now be downloaded from the CIPEC Web site. In addition, NRCan is re-engineering and revitalizing the CIPEC Web site to provide more sector-by-sector information and to offer a more comprehensive electronic energy management resource. The goal is to have instantly accessible energy management information that accommodates the time challenges faced by energy managers.

In addition, NRCan has made provisions for the use of Web-based tools to facilitate distant access to task force and other meetings, events and information sessions.



Programs in Action

The Results

Year after year, CIPEC continues to bring exceptional value to Canadian industry while supporting Canada's drive to improve energy efficiency. When the numbers are tallied, the full impact of this extraordinary voluntary partnership becomes clear. CIPEC delivers results.

Looking at the Numbers

CIPEC operates in a vast and fertile environment. In 2004, CIPEC industries created about 29 percent of the country's gross domestic product and provided jobs for 3.5 million Canadians.

CIPEC programs and tools have gained substantial momentum within this massive industrial constituency, leading more companies than ever toward improved energy efficiency. For example, a recent study of **CIPEC Dollars to $ense workshops** reveals that workshop participants have helped their companies to save an estimated 5,770 terajoules of energy and cut carbon dioxide emissions by 641 kilotonnes from the first workshop in the fall of 1997 to March 31, 2006.

As of March 31, 2006, 587 **energy audits** have been completed with the assistance of the Industrial Energy Audit Incentive and have helped companies identify total potential energy savings of $98 million. Implementation of the audit recommendations has reduced GHGs by 0.74 megatonnes since the program was launched in 2001.

Energy benchmarking studies are providing companies with a look at how their operations compare to best-in-class competitors. These studies provide energy managers with the information they need to create energy plans and the ammunition they need to sell those plans to senior management. By both informing and motivating, these studies are helping to establish continuously improving energy efficiency culture, sector by sector, company by company.

CIPEC publications continue to spread energy efficiency information and extend the organization's impact across Canada. The ***Heads Up CIPEC*** newsletter, distributed electronically twice per month, keeps the industrial energy efficiency community informed about technological innovations, CIPEC programs and company actions that contribute to energy efficiency. At the end of 2005, *Heads Up CIPEC* was sent to more than 10,000 recipients across Canada.

The value brought to the table by NRCan through CIPEC is reflected in a dramatic increase in participants in the Industrial Energy Innovators. As of March 31, 2006, there are now 1,080 industrial facilities that have signed on as Industrial Energy Innovators. To add icing to the cake, IEI companies swept Canadian industry honours at Canada's Energy Efficiency Awards in 2005.

These tools and the energy efficiency opportunities created by CIPEC have had a significant impact on Canada's environmental performance. The gross domestic product from CIPEC industries rose 42.3 percent between 1990 and 2004. With the help of effective energy management, energy consumption by these industries rose only 29.5 percent.

The sectors that CIPEC represents reduced their combined energy intensity by 9.1 percent between 1990 and 2004, or an average of 0.7 percent per year. Improved energy efficiency enabled Canadian industry to avoid approximately $3.1 billion in purchased energy in 2004, enough energy to heat 4.8 million Canadian households for one year.

Had energy intensity remained constant, CIPEC industry's GHG emissions would have been 29.5 megatonnes higher. The mining, manufacturing and construction sectors improved their energy intensity by an average of 2.0 percent per year. Between 1990 and 2004, these sectors improved energy intensity by 24.3 percent.

Programs in Action

Success Stories

Success Beyond the Numbers

The true success of CIPEC programs is found in the companies that use them to manage their energy use more effectively. This success is built by committed, motivated and proactive individuals who use CIPEC tools on the shop floor, in the field and deep in the earth. It is measured by reduced energy consumption, enhanced operational efficiency, a cleaner environment and a healthier bottom line.

To celebrate industrial organizations that are making exceptional advances in energy management, the Office of Energy Efficiency's Industrial Programs Division created the Industrial Energy Innovator (IEI) Energy Efficiency Awards. Each year, these awards recognize the achievements of companies in five categories: Corporate Stewardship; Process Improvement; Monitoring, Tracking & Reporting; Employee Awareness & Training; and Integrated Energy Efficiency Strategy.

In 2005, the Awards' first year, two winners were selected in each category by evaluating IEI company projects against a clear set of criteria. These criteria include the project's energy intensity reductions, potential for broader use, contribution to the environment, innovation, cost-effectiveness and the quality of the submission.

The following pages recognize these true leaders and present their stories. We hope that their success will inform, inspire and motivate other industrial organizations to take similar action to improve their own energy efficiency.

INNOVATOR
AWARD
WINNER

42%

Rate of Return
through Energy Savings

Cascades Inc.

With annual worldwide energy expenditures topping $400 million, there is little wonder that pulp and paper giant Cascades Inc. has made energy management a top priority.

The Kingsey Falls, Quebec-based company relies on its Energy Action Group. The dozen staff members, mostly engineers, work full time uncovering energy efficiency opportunities throughout the company's facilities in North America and Europe. "The Group was established in 1998 as an energy 'SWAT' team dedicated to finding and capitalizing on energy savings," said Pierre Boulay, Energy Action Group Director.

Cascades' energy efficiency program is built on a "3R" platform: reduce, recuperate and replace. Facilities look for ways to reduce consumption and recuperate energy before turning to the more expensive replacement of equipment. However, when replacement is needed, the Energy Action Group can turn to a corporate energy fund established solely for energy efficiency projects.

"The fund ensures that energy projects do not get overlooked, or lose out because of competition for capital with production-related investments," Boulay said. "Under the fund, potential energy projects can now be weighed against other energy reduction opportunities to determine which ones make the most sense. The fund, not the mills, assumes the costs and risk of energy projects, and the mills are more willing to make changes because we take the risk."

Cascades has earmarked $2 million per year for the first five years of the fund, which is replenished and grown by capturing energy savings. Accurate energy performance data are critical to determining energy savings, so every project under the fund includes provisions for real-time energy consumption measurement. Cascades is also implementing energy management practices outlined in CIPEC's *Energy Management Information Systems* manual to model mill processes and measure actual performance against the model in order to identify and isolate problem areas. Twelve mills will install and operate the system's software by the end of 2006.

To date, projects financed by the fund have yielded a 42 percent rate of return, with an average payback period of less than 30 months. "We have achieved more savings than we expected," Boulay said. "It is like a big snowball rolling downhill, gaining momentum and growing."

INNOVATOR AWARD WINNER

150

Energy Saving Possibilities

Dofasco Inc.

Dofasco Inc. is no stranger to raising the bar on energy efficiency. Over the years, the Hamilton, Ontario-based steelmaker has combined active CIPEC cooperation with innovative ideas, improvement projects and employee participation to build a solid energy management track record.

The company's recent creative adaptation of CIPEC's Dollars to $ense workshops as part of the Primary Energy Improvement Program, launched in 2004, is a case in point. Working with CIPEC's workshop team, Dofasco developed a customized training program that took a dynamic, pyramidal approach to driving energy management information to the shop floor. "We believed that to increase energy efficiency activity through our business units, we had to improve awareness and make training available at all levels of our operations," said Carolyn Barnes, Dofasco's Energy Conservation Manager. "By using a 'train the trainer' approach, we are able to achieve this objective effectively and affordably."

Dofasco's three-tiered approach began with an intensive, customized "Spot the Energy Savings Opportunities" Dollars to $ense workshop. CIPEC delivered it to five employees designated as Business Unit Energy Coordinators – one from each of the company's primary manufacturing business units. In turn, these "tier 1" trainers delivered practical, department-specific training to cross-functional groups of staff members. The several-hundred-strong "tier 2" team were asked to apply this information in their job functions and to carry the knowledge to the shop floor. The third tier of the program is providing on-line energy awareness training to all 7,000 Dofasco employees.

The customized, Dofasco-specific workshops used support materials adapted from CIPEC content. The workshops also incorporated demonstration equipment purchased by the company. Dofasco has estimated that the potential to save is between $4 million and $8 million per year through the program.

"The people taking the training have identified many new opportunities to improve energy efficiency," Barnes said. "The training session in our steelmaking business unit alone came up with more than 150 energy saving possibilities and 44 practical ideas that were approved for immediate implementation."

The establishment of energy goals by each business unit and the incorporation of energy metrics on the monthly "company scorecard" performance report help keep energy efficiency on the management agenda and sustain the momentum created by the training program. Dofasco has communicated the program's activities through the company's newsletter, employee contacts and communications meetings. "We want to get people thinking about energy in all that they do," Barnes said. "Our goal is to instill an energy efficiency culture throughout our business units."

INNOVATOR
AWARD
WINNER

80%

More Efficient
Energy System

Dura-Lite Heat Transfer Products Ltd.

Dura-Lite™, the Calgary, Alberta-based manufacturer of charge air coolers with a 7-year/1-million-mile warranty for high-horsepower diesel engines, really knows heat transfer! Thus it is not surprising that the manufacturer applied innovative thermal strategies in the design of its new 6,030-m² (65,000 sq. ft.) facility.

"Our initial objective was to make our working environment more comfortable for our staff," said Dura-Lite President Kelly Sissons. "We discovered that with outside-the-box thinking, we could do this while substantially reducing energy consumption."

Dura-Lite decided to break new ground by employing a combination of geothermal energy and heat recovered through process integration. Space heat is supplied through the building slab by a geothermal heat platform supplemented by captured process heat. Virtually everywhere energy is used in the plant, waste heat is recovered and put back to work to heat process water and keep the building warm. The company's vacuum brazing oven, which operates at 649°C (1,200°F), provides the largest opportunity for heat recovery. And waste heat from other processes – and even hot air that rises to the ceiling – is captured and re-used.

Recovered heat is also used to help optimize production processes. "We keep the exterior of our brazing oven heated to 130°F," Sissons said. "This eliminates warm-up time and keeps the oven ready to use year-round."

The building envelope is designed for energy efficiency, with a state-of-the-art double-insulated roof and R20 walls. "Our heating system requires a very complex, computer-controlled system to operate," Sissons said. "Fortunately, we had great people – really smart people on our staff and from outside – who made it work."

The heating system's success is breathtaking, exceeding even Dura-Lite's expectations. "According to Natural Resources Canada's evaluation (based on Dura-Lite's Industrial Building Incentive Program application), Dura-Lite's building integrated energy system is over 80 percent more efficient than a standard system used for a building of the same size and function," Sissons said.

"Beyond the efficiencies we have achieved, we do produce and recover more heat than we can actually use," Sissons said. Later joking, he said he was considering asking businesses in the area if they could use some of Dura-Lite's excess heat.

INNOVATOR AWARD WINNER

6.2%

Reduced Energy Consumption

General Motors of Canada Limited

General Motors of Canada Limited has a long history of improving energy efficiency and reducing GHG emissions. The key to the company's success has been its long-standing commitment to monitoring and tracking its energy consumption.

GM Canada has been refining its approach to monitoring and tracking since the 1980s, when the data required for effective energy management relied on manual meter reading. Today, GM Canada sees itself as a leader in implementing advanced monitoring and tracking equipment. The company's latest innovation is the introduction of a Web-based, real-time Utilities Monitoring System (UMS). Completed in 2003, the UMS gives energy team members at each plant access to energy consumption data from all of the company's Canadian operations.

"The UMS has improved our ability to continuously reduce our energy demands," said Bryan Swift, the company's Director of Environmental Activities. "The system has been instrumental in reducing our energy expenditures, and it paid for itself through energy savings in less than a year."

Using the UMS, energy team members can review consolidated data for natural gas, electricity, steam, compressed air and water consumption. Data are updated every 15 minutes, providing almost real-time access to the latest information. The UMS was rolled out at GM Canada's Autoplex facility in Oshawa, Ontario, and then expanded to include the company's facilities in St. Catharines and Windsor.

Monitoring energy consumption enabled GM Canada to pilot new energy-saving initiatives that were previously hard to pursue because impacts on production could not be measured. Under the UMS, potential impacts on production can be identified nearly instantly, preventing disruptions and their associated costs.

"Projects like the very successful UMS will help us meet future challenges in balancing energy use reduction and other environmental priorities," Swift noted. Between 2003 and 2004, the system helped GM Canada reduce its energy consumption by about 6.2 percent and its GHG emissions by 2.6 percent. Through facility rationalization and a long list of energy efficiency projects, GM Canada has reduced GHG emissions by 42 percent since 1990 – even with increases in production.

INNOVATOR
AWARD
WINNER

22%

Decreased Natural Gas Consumption

Gerdau Ameristeel Corporation

Gerdau Ameristeel Corporation's Cambridge facility in Ontario is an energy management pioneer for successfully harnessing local landfill gas to offset its natural gas consumption. By partnering with the Municipality of Waterloo, Gerdau invested in a comprehensive system that extracts, pressurizes and transports landfill gas directly from the landfill site to the reheating furnaces at its rolling mill plant.

"The Regional Municipality of Waterloo approached us in the mid-1990s to see if we would be interested in purchasing previously flared-off gas from the landfill site adjacent to our facility," said Bob Downie, the company's Environmental Co-ordinator. "When we analysed the data provided, we realized the energy available in the landfill gas had tremendous potential." The region later put the landfill gas out for public tender, and Gerdau Ameristeel was the successful bidder.

In 1995, the region installed a system to extract and flare off the methane gas produced by the decomposing waste. In 1999, Gerdau Ameristeel installed a comprehensive system to extract, pressurize and clean the gas, and deliver it via a new pipeline from the landfill site to the reheating furnace at its rolling mill plant. The original installation was designed to deliver about 1,000 cubic feet per minute (cfm). When studies showed that more gas was available, Gerdau Ameristeel invested another $1 million in 2004 to increase flow rates to a maximum of more than 1,800 cfm, with a target average rate of 1,400 cfm.

Gerdau Ameristeel, a steel recycler, has taken other major steps to reduce its energy consumption. The electric arc furnace, used to melt scrap metal, uses electricity as the primary energy source. To reduce electrical energy consumption, the company added natural gas and oxygen burners and a carbon/oxygen injection system (which produces heat by chemical reaction). The company has also upgraded the control systems on its furnaces, leading to more precise temperature control and reduced energy consumption.

Gerdau Ameristeel has recently focused efforts on its process flow to enable "billet hot charging" – moving hot, freshly cast billets directly from casting to the rolling mill. About half of all billets entering the rolling mill are now hot charged, substantially reducing the mill's energy consumption.

The landfill gas project, in addition to billet hot charging and other process improvements throughout the mill, decreased reheat furnace natural gas consumption by 22 percent per tonne of product in 2004 compared with 2003. In total, energy-saving initiatives enabled the facility to improve overall energy intensity by 4.4 percent in 2004.

INNOVATOR AWARD WINNER

20%

Improved Energy Efficiency

Maple Leaf Consumer Foods – Winnipeg Pork Plant

The energy team at Maple Leaf Consumer Foods pork plant in Winnipeg, Manitoba, is constantly seeking ways to reduce the facility's energy consumption and environmental footprint. "We are always looking for new ideas to keep us flexible and thinking 'outside the box,'" said Sal Nanda, the plant's Chief Engineer and Energy Manager.

One such idea has helped the plant reclaim and re-use waste process heat. Working with incentives from NRCan and Manitoba Hydro's Power Smart Eco-Efficiency Solutions program, the Winnipeg plant conducted a site walk-through audit. It aimed to identify potential savings associated with energy, water, wastewater, GHG emissions and solid wastes.

"We found that hot gas discharge from the plant's 'high side' ammonia refrigeration compressors, which was diverted to rooftop condensers and vented to the outside air, provided a promising energy efficiency opportunity," Nanda said. The system operates at full load around the clock, creating a constant source of heat and providing an ideal opportunity for heat recovery.

Based on a follow-up study, Maple Leaf Consumer Foods installed a heat exchanger system to capture heat from ammonia gas before the rooftop condensers cool it. The new installation diverts the captured energy to the plant's water supply, where it helps heat a 15,000-litre hot water tank. A monitoring system calculates and records actual energy savings in real time, enabling operators to verify that the heat recovery system is operating correctly.

The heat exchanger system can convert 151 litres per minute of incoming water from 13°C to over 38°C. "By reclaiming waste heat, the heat exchanger has lowered natural gas consumption in the plant's boiler system by 22 percent and reduced the need for boiler chemicals," Nanda noted. The project delivered a payback of 1.5 years.

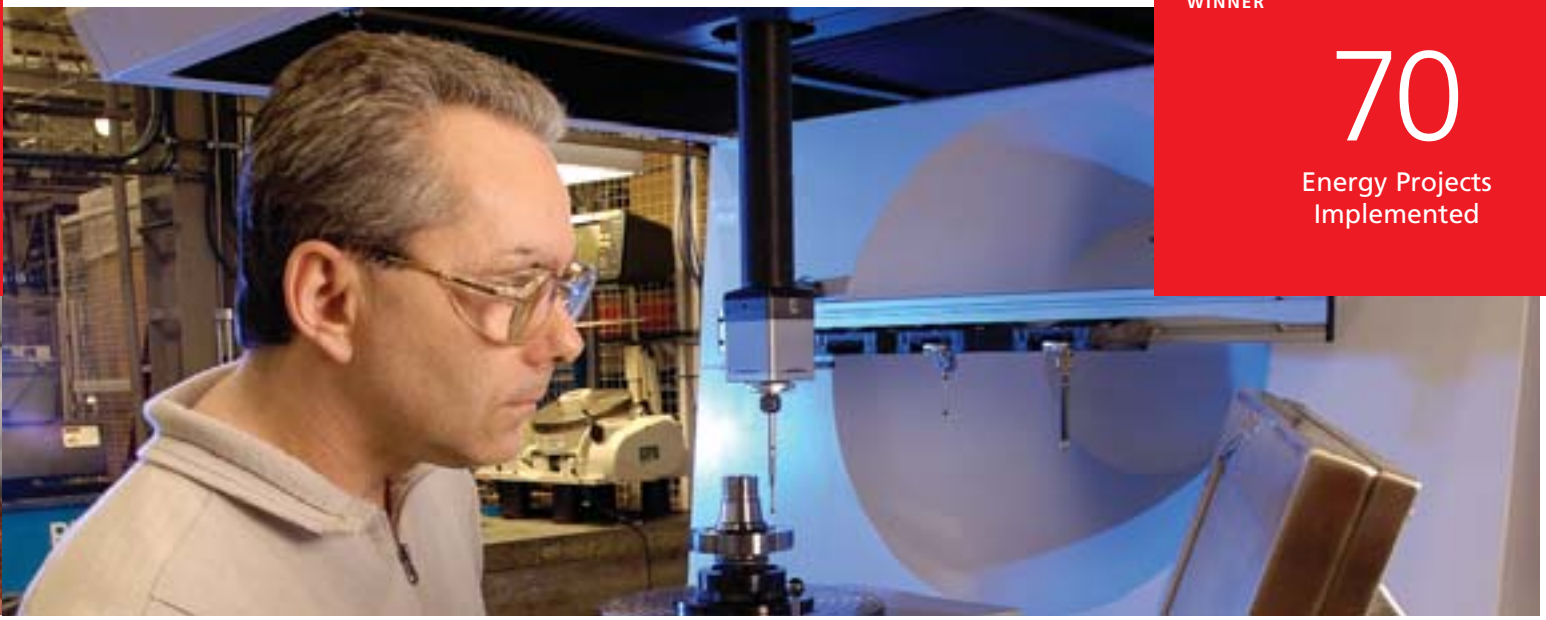
The Winnipeg heat recovery project is just one of many that reveals the passion for innovation and commitment to energy efficiency that pervades the entire Canada-wide Maple Leaf Foods organization. Company-wide, Maple Leaf Consumer Foods is taking full advantage of CIPEC programs, such as customized Dollars to $ense workshops, the Industrial Energy Audit Incentive, and the Industrial Energy Innovators initiative.

"CIPEC is known for its passionate and dedicated people," Nanda said. "And so are we. It's a natural partnership that has helped us to improve our energy efficiency by 20 percent over the last five years."

INNOVATOR
AWARD
WINNER

70

Energy Projects
Implemented



Pratt & Whitney Canada Corp.

Pratt & Whitney Canada Corp. (P&WC) had a challenge. "We have a great deal of energy-demand fluctuation within our operations," said Yvan Landry, P&WC's Facilities Engineering Manager. "This makes it difficult to predict consumption, develop budgets and contract for energy supplies."

The company found the solution to unpredictability in a novel energy monitoring, tracking and modelling tool. Installed at three company plants in Longueuil and Saint-Hubert, Quebec, the new tool employs a unique mathematical model to predict long-term energy consumption. It tracks and models seven key operational parameters, enabling the company to anticipate and better manage energy demand.

The company's new-found ability to accurately track and forecast energy consumption has had a significant impact on P&WC's costs as well as its energy efficiency. "The system enables us to segregate energy consumption by business activity and by department," Landry said. "This makes it possible to take advantage of tax incentives for production activities and to manage our loads to access off-peak electricity rates."

The tool also enables the company to see exactly how and when energy is used and to charge departments for their actual energy use, rather than on a per-square-foot basis. Energy charges are now linked to consumption, giving departments an added motivation to improve energy efficiency. "We can now identify where consumption activities need to be improved and measure the impact of the energy saving initiatives we are implementing in the plant," Landry noted. "This capability makes it easier to justify additional energy efficiency investments."

Since its installation in January 2004, the tool has led the company to implement 70 energy projects. These include the installation of energy-efficient boiler systems; better lighting controls; improvements to HVAC, compressed air and other systems; and a high-profile employee awareness campaign. In total, P&WC's energy efficiency investments have delivered energy savings of more than $1 million.

INNOVATOR AWARD WINNER

14%

Natural Gas Savings

Teknion Corporation

Teknion Corporation has decreased the energy intensity and environmental impact of its plants by combining its aggressive energy efficiency program with a corporate environmental charter and ISO 14001 ("Environmental Management Systems") registration.

"The ISO 14001 process was instrumental in changing our organizational culture," said Doug Hietkamp, Director, Sustainable Development, at Teknion. "It helped to bring our various divisions together to work toward a common goal. It led us to establish our GreenWorks environmental team."

GreenWorks is an internal network of champions who advance energy efficiency and environmental sustainability throughout all of its facilities. GreenWorks was instrumental in getting its 17 Canadian sites and one American site registered to the ISO 14001 standard over 2002–2003 and in establishing an environmental charter. The charter combines overarching best practices with specific, measurable targets that facilities strive to achieve. Among them is strategic alignment to Leadership in Energy and Environmental Design (LEED). This buildings program is administered by the Canada Green Building Council and the Design for the Environment program. It incorporates ISO 14001 standards.

Each Teknion division is responsible for addressing five "corporate environmental aspects," including natural gas and electrical consumption, water use and the reduction and diversion of waste. Efforts to improve performance and meet environmental commitments have led to a number of energy efficiency measures. For example, Teknion eliminated one of its five paint lines and substituted a cleaning agent in the painting process that allows the ovens to operate at lower temperatures. Efforts within its divisions to introduce inexpensive energy-saving technology, improve operating practices and reduce energy waste have also led to significant energy consumption reductions.

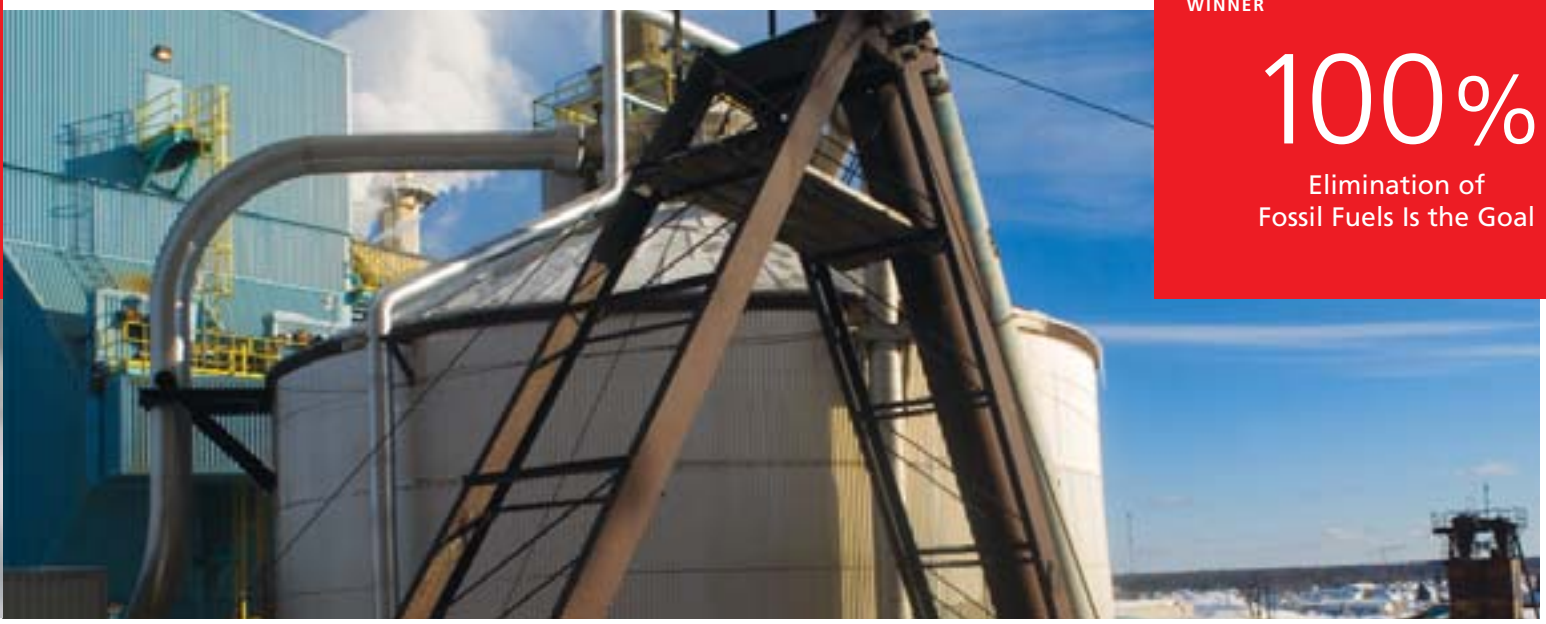
"We saved a significant amount of energy in 2004 and 2005, with little or no capital investment," Hietkamp said. "And we are not perfect yet. We still see substantial opportunities for additional improvements."

CIPEC participation is also playing an important role in Teknion's energy efficiency efforts. "We see significant value in a number of CIPEC tools, including audit incentives, the Web site and other information resources," Hietkamp said. "The savings are definitely there."

INNOVATOR
AWARD
WINNER

100%

Elimination of
Fossil Fuels Is the Goal



Tembec Inc.

Forest products company Tembec Inc. has used CIPEC as an energy efficiency springboard. "CIPEC provides us with an excellent point of reference to show us what's going on in energy efficiency," said Les Kosiak, Tembec's Corporate Energy Specialist. "We make use of CIPEC technical support, reference information and financial incentives whenever we can."

Tembec established an internal energy management group three years ago to develop a company-wide energy strategy. "We began with pulp and paper operations, which account for about 85 percent of our energy consumption," Kosiak said. "We're now broadening our efforts to include our wood products and chemicals divisions."

Tembec's Marathon Pulp Inc. mill concentrated on improving the efficiency of its steam systems by installing new dryer coil designs, optimizing package boilers and implementing new measurement and control systems. The mill also installed a waste-heat recovery exchanger in its bleach plant and added a pre-coat removal system at the lime mud filter.

Tembec's Smooth Rock Falls mill also focused on improving its steam systems and modified its evaporators and digester heaters and pressurized condensate systems. The results of these efforts were impressive enough to earn the mill a PAPTAC Energy Conservation Award (first place).

The company's Spruce Falls Operations concentrated its efforts on reducing mill-heating costs. Staff at the mill implemented a number of projects, including isolating and diverting heat from inactive buildings, sealing off older active buildings, increasing the redistribution of heated air, monitoring and controlling unit heaters, and improving temperature-control set points to accommodate weather conditions.

At the Saint-Raymond mill, the target was reducing electrical consumption. The mill converted its pulping and bleaching sequence from an Alkaline Peroxide Mechanical Pulp (APMP) to a Preconditioning Refiner Chemical APMP by installing a high-consistency bleaching tower between the process's two refining stages. This move has reduced electrical energy consumption and bleaching chemical use.

The mill reduced power consumption in its bleached chemithermomechanical pulp (BCTMP) process – a process that converts wood chips to fibre – by impregnating wood chips with caustic at the refining stage.

Tembec's Temcell mill in Témiscaming, Quebec, made process changes to reduce its electricity use. The mill reduced the amount of power needed for the BCTMP process, also by impregnating wood chips with caustic at the refining stage. While the change required that there be more chemical treatment downstream, the energy-cost benefits still exceeded the increased processing costs.

Energy management at all Tembec mills is now a key corporate priority, and the company has set ambitious goals. "Our corporate targets meet or exceed those set by the Kyoto Protocol," Kosiak said. "We want to do a better job of energy management than our competitors. Our long-term goal is the 100 percent elimination of fossil fuels in our operations."

INNOVATOR AWARD WINNER

$4.2

Million in Annual Savings

Unilever Canada – Rexdale Plant

Since Unilever chief engineer Doug Dittburner launched the Watt Watchers Energy Team program at Unilever Canada's Rexdale, Ontario, Becel margarine plant, employees have become adept at finding ways to reduce harmful GHG emissions and improve the company's bottom line.

Dittburner had invited the plant's 170 employees to offer ideas about how Unilever Rexdale could reduce its consumption of fuel and electricity. "You cannot control how much energy costs; you can only control how much you use," Dittburner said. "When you initiate a program of this scope, it's important to include the employees using the equipment in the conversation."

Dittburner and other interested employees used CIPEC's Dollars to $ense workshops as a starting point. "In the beginning, we relied heavily on the CIPEC template, which we think works beautifully," said Dittburner. "CIPEC spells out what you need to know, what you need to do and how to do it. You build on the basics, enjoy a few successes and get more and more buy-in from employees. It's a team effort."

Under the Watt Watchers' banner, the plant has undertaken 120 employee-inspired energy efficiency projects since 1999. The first project was to fit the plant's boiler with a condensing economizer. The economizer recovers heat that would otherwise be lost up the boiler stack and uses it to preheat boiler feed water. In another project, the plant recently began collecting heat from its air compressors and transporting it through a new network of ducts to its loading docks, where it is used for space heat.

Today, Dittburner has in his database hundreds of employee-inspired energy conservation ideas – almost all of which are practical. Ideas range from simple light bulb changes to projects that involve huge capital investments.

In the first five years of the program, the plant saved $4.2 million. This includes a 46 percent reduction in the plant's consumption of natural gas, a 23 percent reduction in electricity consumption and a 48 percent reduction in waste. As well, the strong foundation built at the Rexdale plant supports the energy reduction programs at six other Unilever Canada facilities.

Sector Reports

An Overview of CIPEC Data Gathering: You Can't Manage What You Can't Measure

Accurate measurement and meaningful data are fundamental to measuring energy improvements. Data used in this report are collected primarily by Statistics Canada, with funding from NRCan, and supplemented by information from associations participating in CIPEC as well as other government bodies.

Statistics Canada data are collected through the annual Industrial Consumption of Energy Survey, which covers approximately 4,000 establishments in the manufacturing sector. The survey gathers information by establishment on energy fuel consumption in natural units for 13 fuel types in 87 manufacturing industries. Survey results are used to track energy efficiency improvements, calculate carbon dioxide emissions and inform the public about energy conservation.

In its continuing efforts to make it easier for companies to respond to the survey, Statistics Canada began streamlining the questionnaire and the data collection process in data reference year 2004. These changes include such things as standardizing some special industry questionnaires, making provisions for respondents to explain major changes in energy consumption to minimize follow-up enquiries, and converting fuels to a standard unit of measure.

Data analysis and interpretation involves the collective effort of NRCan's Office of Energy Efficiency, CIPEC trade associations and the Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC) at Simon Fraser University in Burnaby, British Columbia. CIEEDAC then produces energy intensity indicators for each sector based on production and gross domestic product. Primary funding for CIEEDAC comes from the Office of Energy Efficiency, with additional contributions from industry associations that participate in CIPEC and from the provinces of Quebec and British Columbia.

Much of the data is available on-line. Statistics Canada data are published in CANSIM table 128-0005 – **Energy fuel consumption of manufacturing industries in natural units, by North American Industry Classification System (NAICS)** and table 128-0006 – **Energy fuel consumption of manufacturing industries in gigajoules, by North American Industry Classification System (NAICS)**. The link to Statistics Canada is www.statcan.ca/english/ads/cansimll/index.htm. The Office of Energy Efficiency publishes *Energy Efficiency Trends in Canada* on an annual basis at oee.nrcan.gc.ca/corporate/statistics/neud/dpa/trends_agg_ca.cfm. Data from CIEEDAC are available at www.cieedac.sfu.ca/CIEEDACweb/mod.php?mod=userpage&menu=16&page_id=9.

Aluminum

Profile

Canada's aluminum sector is one of the world's leaders in aluminum production. The combined output of the industry's plants in the provinces of Quebec and British Columbia makes a major contribution to Canada's national and local economies.

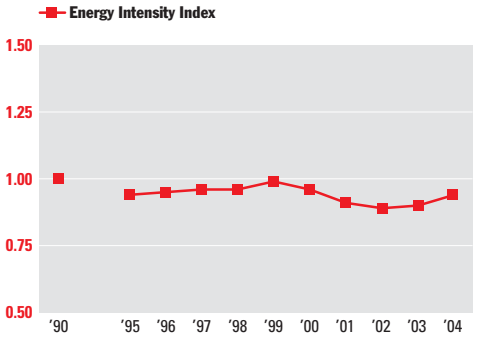
Highlights

- Primary aluminum production increased by 65 percent, while energy consumption increased by only 55 percent between 1990 and 2004.
- Energy intensity, which rose from 2003 to 2004 due to a 7.2 percent decline in production coupled with a 3.7 percent decrease in energy consumption, still showed a 6 percent improvement compared to 1990.
- Almost all of the aluminum sector's energy needs are met with electricity, accounting for slightly less than 90 percent of the sector's energy consumption in 2004.

Aluminum Sector – NAICS 331313

Energy Intensity Index (1990–2004)

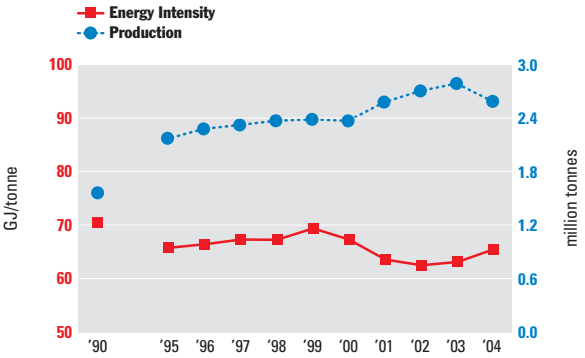
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Natural Resources Canada, *Production of Canada's Leading Minerals.* December 2004; Informetrica Limited, *T1 Model Database and National Reference Forecast.* Ottawa, November 2005.

Aluminum Sector – NAICS 331313

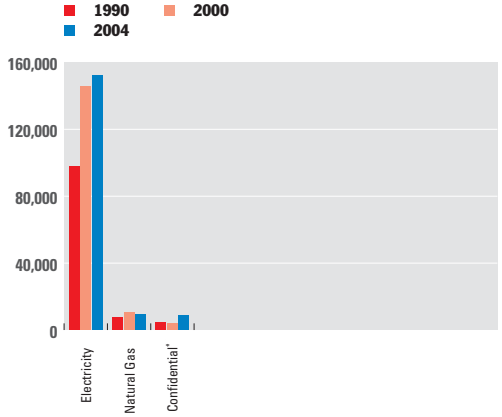
Energy Intensity and Production Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Natural Resources Canada, *Production of Canada's Leading Minerals.* December 2004; Informetrica Limited, *T1 Model Database and National Reference Forecast.* Ottawa, November 2005.

Aluminum Sector – NAICS 331313

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

* Confidential includes: Heavy Fuel Oil (HFO), Middle Distillates (LFO), and Propane (LPG).

Brewery

Profile

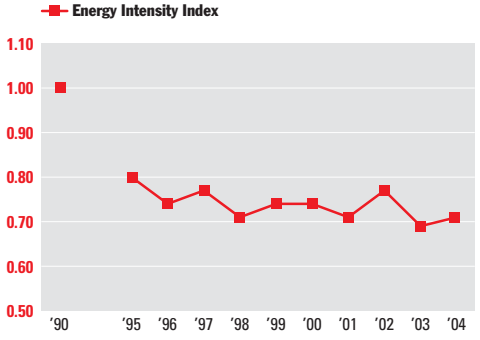
The Canadian brewing industry prides itself on its world-class beers, its leadership in educating consumers to drink responsibly, its three-century history in Canada, its diversity and its impressive environmental record.

Highlights

- Compared with 1990, the Canadian brewing industry now uses 29 percent less energy to produce a hectolitre of beer.
- In 2004, the industry consumed 5,742 terajoules (TJ) of energy, consisting of 63 percent natural gas and 24 percent electricity.
- The brewing industry is committed to an energy reduction target of 1.5 percent annually from 2004 through 2006.
- Process integration studies have enabled Canadian brewers to find substantial energy efficiency opportunities.

Brewery Sector – NAICS 312121

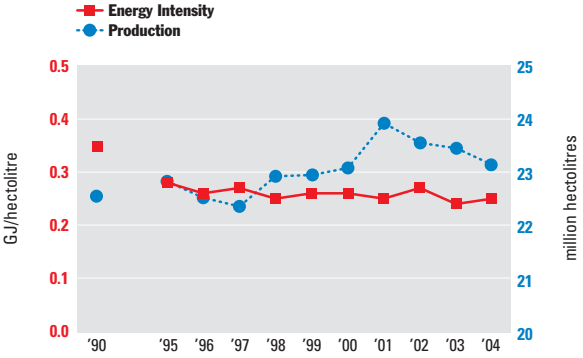
Energy Intensity Index (1990–2004)
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Brewers Association of Canada, Ottawa, July 2005.

Brewery Sector – NAICS 312121

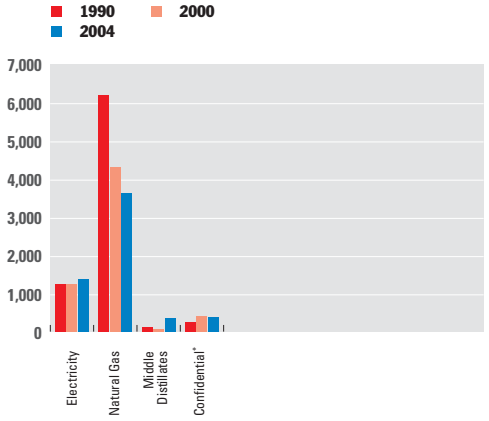
Energy Intensity and Production Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Brewers Association of Canada, Ottawa, July 2005.

Brewery Sector – NAICS 312121

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
* Confidential includes: Heavy Fuel Oil (HFO), Propane (LPG) and Steam.

Cement

Profile

The cement industry is the cornerstone of Canada's domestic construction industries and a significant exporter that contributes substantially to the country's balance of payments.

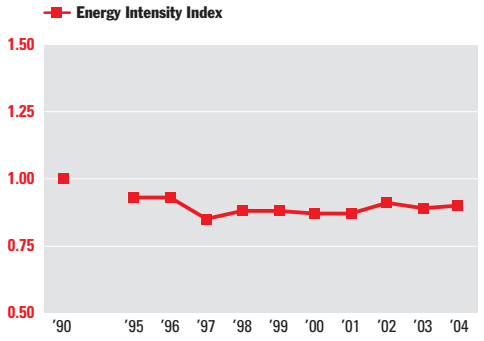
Highlights

- The cement industry produced 13.7 million tonnes of clinker in 2004, showing an increase of 4.2 percent over 2003 and a 30.6 percent increase since 1990.
- Energy consumption in the cement sector increased by 17.6 percent between 1990 and 2004 to 69,331 TJ.
- Energy intensity over the same period decreased by 10 percent from 5.61 to 5.05 gigajoules per tonne clinker.
- Canada's cement industry held the sector's first three Dollars to $ense customized workshops in Ontario, British Columbia and Quebec in 2004.

Cement Sector – NAICS 327310

Energy Intensity Index (1990–2004)

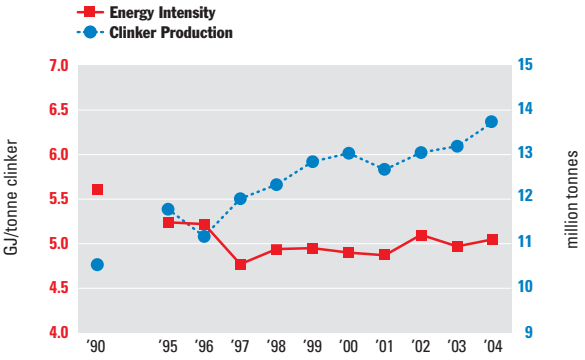
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Cement Sector – NAICS 327310

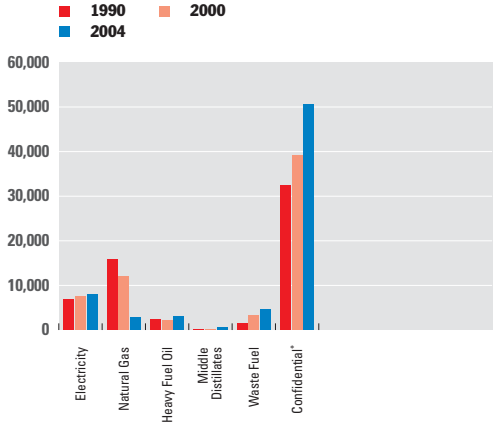
Energy Intensity and Production Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Cement Sector – NAICS 327310

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

* Confidential includes: Coal, Coal Coke, Petroleum Coke, Propane (LPG), and Wood Waste.

Chemical

Profile

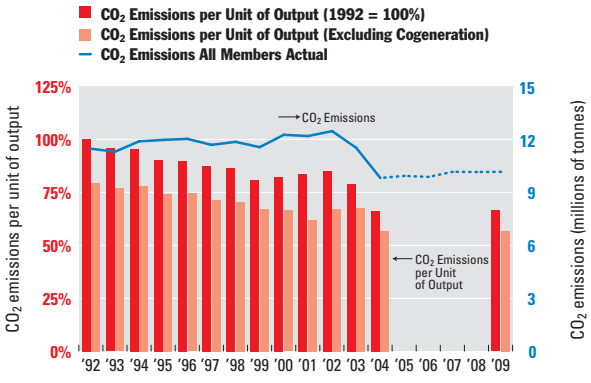
The chemical sector encompasses a diverse industry that produces organic and inorganic chemicals, plastics and synthetic resins. The Canadian Chemical Producers' Association (CCPA) is the trade association that represents manufacturers in this sector. Its member companies produce more than 90 percent of industrial chemicals manufactured in Canada.

Highlights

- The chemical sector's product output increased 33 percent since 1992.
- Despite the increase in product output, total carbon dioxide emissions from CCPA members decreased by 14 percent between 1992 and 2004.
- In 2004, member companies' GHG emissions – millions of tonnes of carbon dioxide equivalent emissions – declined by 54 percent compared to 1992.

Chemical Sector – NAICS 325100, 325200

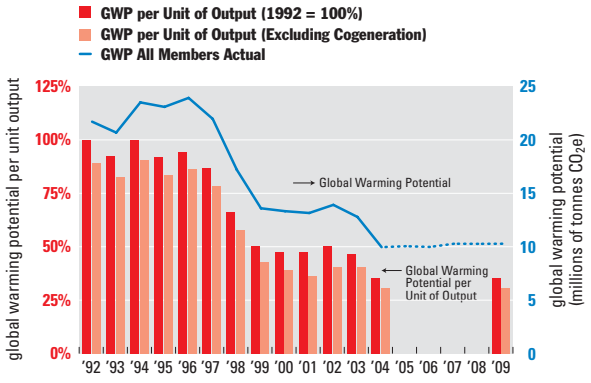
Carbon Dioxide Emissions vs. Product Output



Data source:
Data provided by CCPA member operations. CCPA Reducing Emissions, December 2005.

Chemical Sector – NAICS 325100, 325200

Global Warming Potential vs. Product Output



Data source:
Data provided by CCPA member operations. CCPA Reducing Emissions, December 2005.

Construction

Profile

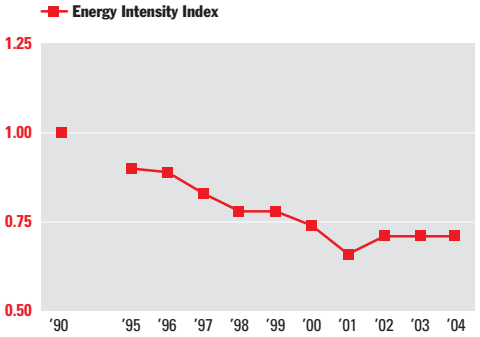
The construction sector is Canada's largest industry, composed of a diverse array of companies whose work touches every economic sector and region of the country.

Highlights

- Since 1990, the construction sector reduced its energy consumption by 10.5 percent while GDP increased by 25.7 percent.
- The reduction in energy use, coupled with the strong increase in GDP, led to an energy intensity improvement of 29 percent between 1990 and 2004.
- The year 2004 marked the completion of the construction industry benchmarking study, entitled *Road Rehabilitation Energy Reduction Guide for Canadian Road Builders.*
- Increasingly, construction companies are incorporating energy-saving techniques in their building projects. Certification programs such as BOMA's Go Green, or the LEED rating system (Leadership in Environmental and Energy Design), are becoming more prevalent on Canadian construction sites.

Construction Sector – NAICS 230000

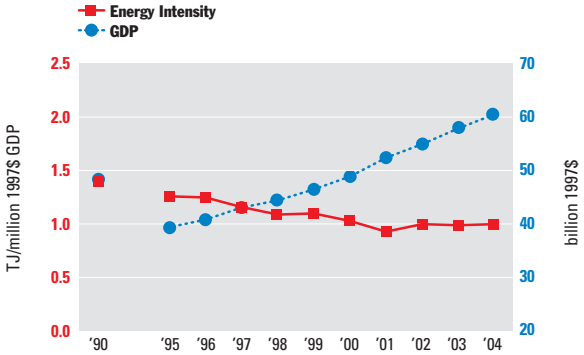
Energy Intensity Index (1990–2004)
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

Construction Sector – NAICS 230000

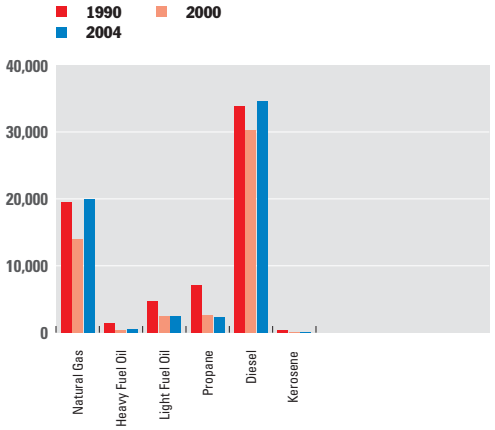
Energy Intensity and Economic Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast.* Ottawa, November 2005.

Construction Sector – NAICS 230000

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

Dairy

Profile

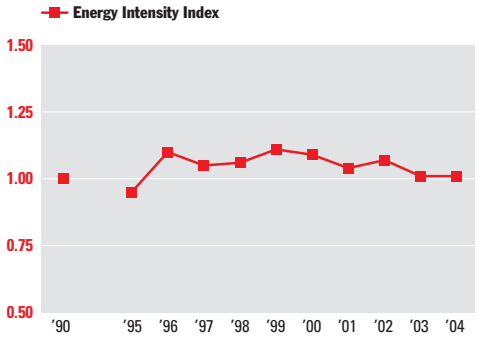
Canada's dairy product manufacturing sector spans Canada from coast to coast, operating facilities and employing people across the country.

Highlights

- Canada's dairies produced 76.6 million hectolitres of milk and cream in 2004, about 4.3 percent more than in 1990.
- Between 1990 and 2004, the sector's energy intensity increased by 1 percent, largely due to consumer demand for more energy-intensive products.
- Compared to 2002, 6.4 percent less energy was used in 2004 to produce a hectolitre of milk and cream.

Dairy Sector – NAICS 311500

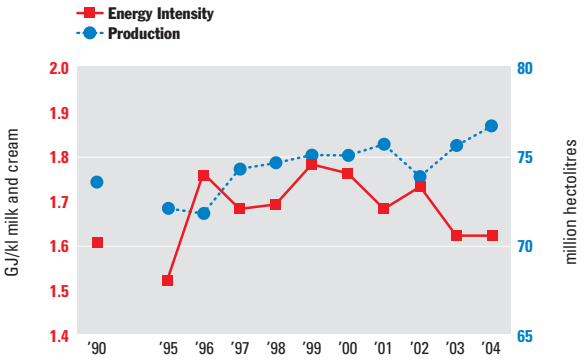
Energy Intensity Index (1990–2004)
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Dairy Sector – NAICS 311500

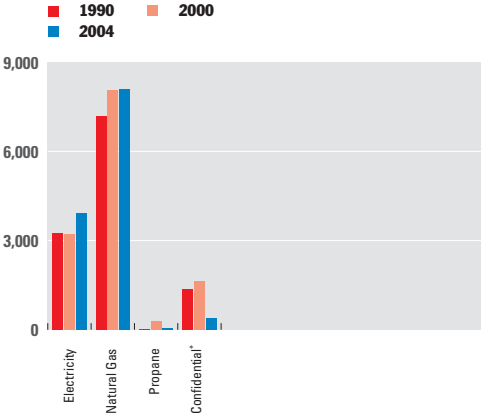
Energy Intensity and Production Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Dairy Sector – NAICS 311500

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
* Confidential includes: Heavy Fuel Oil (HFO) and Middle Distillates (LFO).

Electrical and Electronics

Profile

The electrical and electronics sector includes a diverse array of companies that produce electrical appliances, lighting, consumer electronics, communications and electronic equipment, cabling, office equipment, industrial equipment and other electrical products. The industry is a major exporter and a vital, growing contributor to the national economy.

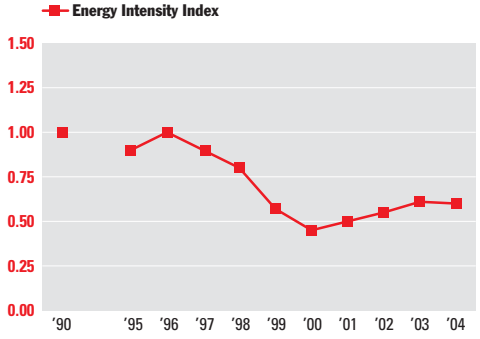
Highlights

- In 2004, the industry consumed 13,453 TJ of energy, a 7.8 percent increase over 2003.
- Between 1990 and the end of 2004, the sector's overall energy consumption increased only marginally (1.7 percent) despite substantial growth in GDP.
- These factors led to an energy intensity improvement of 40 percent over the period.
- While energy intensity rose between 2001 and 2003, it returned to an improving trend with a 1.0 percent decrease in 2004 compared to 2003.

Electrical and Electronics Sector – NAICS 334, 335

Energy Intensity Index (1990–2004)

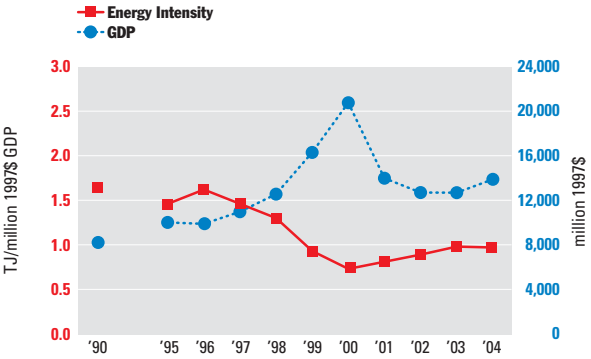
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

Electrical and Electronics Sector – NAICS 334, 335

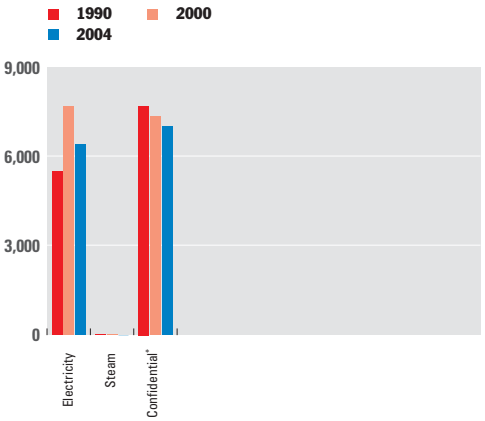
Energy Intensity and Economic Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Electrical and Electronics Sector – NAICS 334, 335

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

* Confidential includes: Heavy Fuel Oil (HFO), Middle Distillates (LFO), Propane (LPG), Natural Gas and Wood Waste.

Electricity Generation

Profile

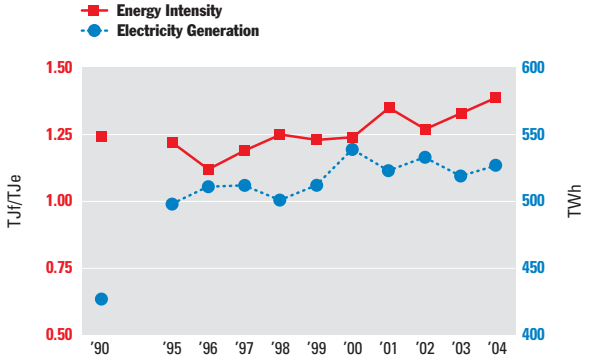
The electricity generation sector produces the electrical energy that powers industries, businesses and homes across Canada.

Highlights

- The sector used water, fossil fuel, nuclear and alternative energy sources to produce 527 terawatt hours of electricity in 2004.
- The sector has increased generated electrical power by 23.5 percent since 1990.
- Over the same time frame, energy intensity increased 12.1 percent.
- Since 1997, net generation from fossil fuel sources has increased significantly, while hydroelectric and nuclear generation have declined.
- Gross annual GHG emissions and GHG emissions intensity (CO_2e/Net System Generation) have risen since 1997.
- GHG emissions intensity for fossil fuel generation declined slightly compared to 1990.

Electricity Generation Sector – NAICS 22111

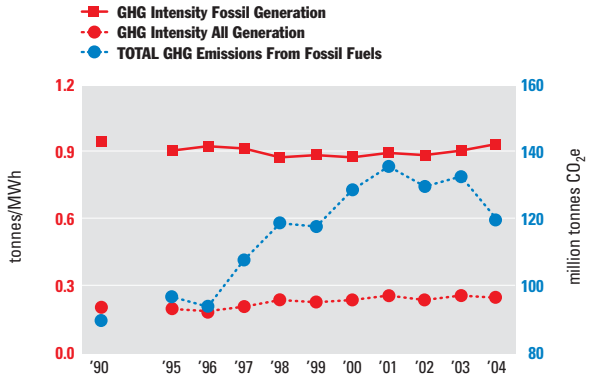
Utility Production and Energy Intensity (1990–2004)



Data source:
Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *A Review of Energy Consumption and Production Data: Canadian Electricity Generation Industry 1990–2004.* February 2006.

Electricity Generation Sector – NAICS 22111

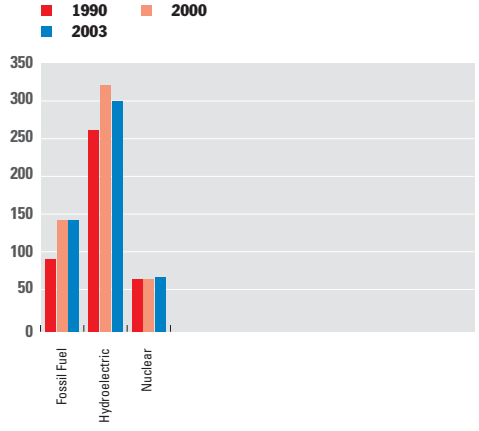
Utility GHG Emissions vs. Utility Production (1990–2004)



Data source:
Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *A Review of Energy Consumption and Production Data: Canadian Electricity Generation Industry 1990–2004.* February 2006.

Electricity Generation Sector – NAICS 22111

Utility Generation Sources



Data source:
Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *A Review of Energy Consumption and Production Data: Canadian Electricity Generation Industry 1990–2004.* February 2006.

Fertilizer

Profile

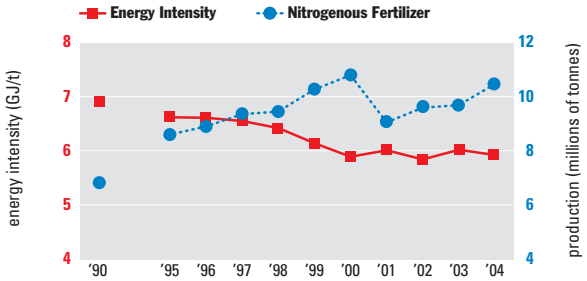
Canada's fertilizer industry is one of the world's major producers and exporters of nitrogen, potash and sulphur fertilizers.

Highlights

- The Canadian fertilizer sector ranks among the lowest GHG emitters per unit of fertilizer output in the world.
- Gross nitrogen fertilizer production increased from 6.8 million tonnes in 1990 to 10.5 million tonnes in 2004.
- Natural gas and other fuel sources used for production of nitrogenous fertilizer totalled 61,981 TJ in 2004, versus 47,186 TJ in 1990, an improvement in energy intensity of approximately 14.5 percent.
- Potash production levels in 2004 were 10.5 million tonnes, nearly 54 percent greater than that in 1990.
- For potash production, energy indicators show an improvement in energy intensity averaging more than 1 percent per year since 1990.
- In 2004/2005, the Canadian Fertilizer Institute, in partnership with CIPEC, completed data resolution projects to confirm that data collected by, and available to, Canadian government regulators are accurate and consistent, and to identify opportunities for the improvement in the accuracy and efficiency of data gathering processes.

Nitrogenous Fertilizer – NAICS 325313

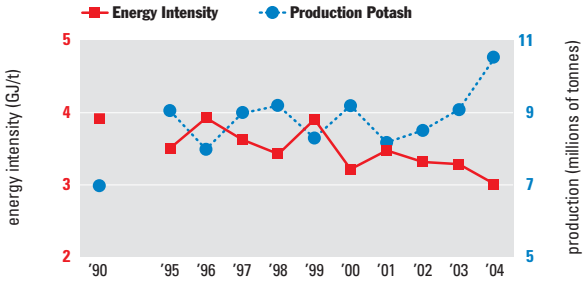
Energy Intensity and Physical Output



Data source: Canadian Fertilizer Institute (CFI), December 31, 2004.
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

Potash Mines – NAICS 212396

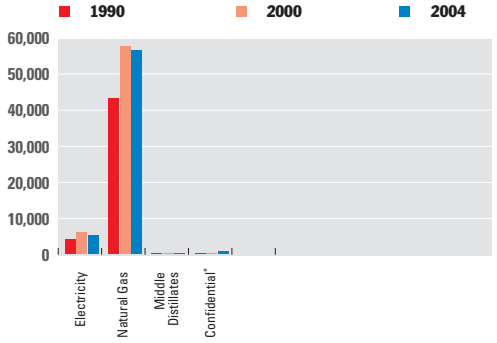
Energy Intensity and Physical Output



Data source: Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Nitrogenous Fertilizer – NAICS 325313

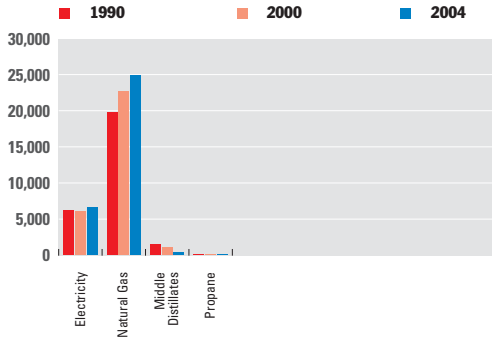
Energy Sources in Terajoules per Year (TJ/yr)



Data source:
(1) Natural Gas – 1990–2004, CFI, March 2006.
(2) Other Fuels – 1990–2004. Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.
* Confidential includes: Heavy Fuel Oil (HFO), Propane and Steam.

Potash Mines – NAICS 212396

Energy Sources in Terajoules per Year (TJ/yr)



Data source: Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Food and Beverage

Profile

Canada's food and beverage sector includes manufacturers that produce a diverse range of products, including meat, poultry, fish, fruit and vegetables, flour and bakery products, oils and sugars, coffee, snack foods, soft drinks and confections.

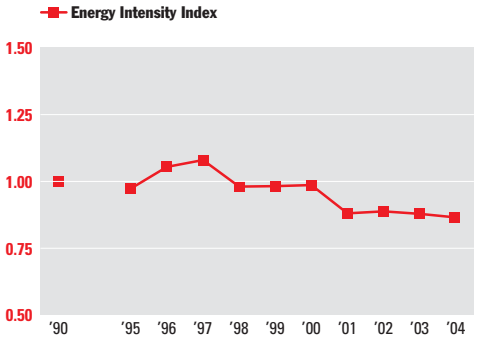
Highlights

- Canada's food processing industry continued to increase its GDP in 2004.
- The sector's total energy consumption increased to 108,283 TJ in 2004 compared with 105,905 TJ in 2003.
- Over the past 14 years, the sector's total energy consumption increased by 14 percent, due largely to a significant increase in electricity consumption.
- From 1990 to 2004, food processors improved their collective energy intensity by 13 percent.

Food and Beverage Sector – NAICS 311, 3121

Energy Intensity Index (1990–2004)

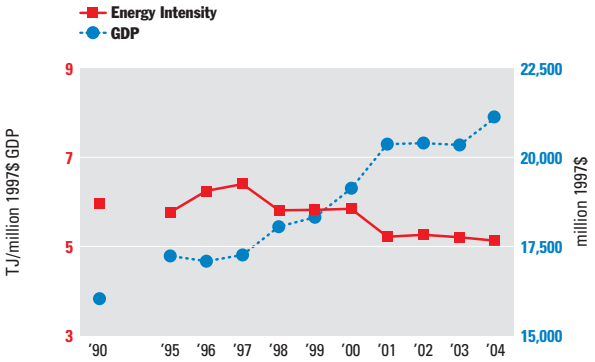
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Food and Beverage Sector – NAICS 311, 3121

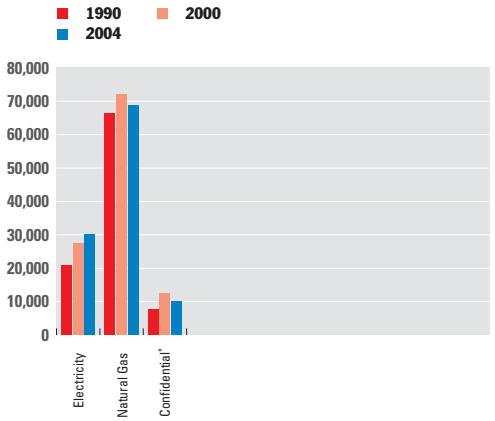
Energy Intensity and Economic Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Food and Beverage Sector – NAICS 311, 3121

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

* Confidential includes: Heavy Fuel Oil (HFO), Middle Distillates (LFO), Propane (LPG) and Steam.

Foundry

Profile

Metal castings are the first step in the value-added manufacturing chain and are utilized in the manufacture of most durable goods. Markets and industries served by foundries include the automotive sector, construction, agriculture, forestry, mining, pulp and paper, heavy industrial machinery and equipment, aircraft and aerospace, plumbing, soil pipe, municipal road castings, defence, railway, petroleum and petrochemical, electricity distribution and a myriad of specialty markets.

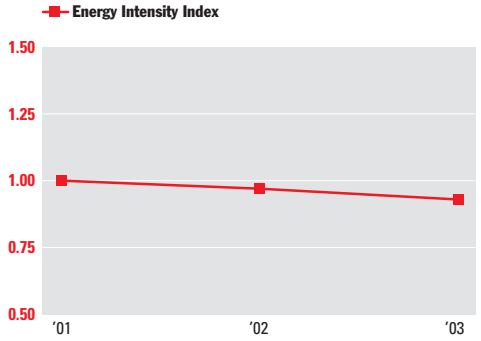
Highlights

- ➔ Canada's foundries no longer use GHG-generating fuels such as coal or coke in their operations, and they have eliminated the use of steam produced by coal-generated electricity.
- ➔ Escalating oil, natural gas and power costs as well as a rising Canadian dollar are motivating companies to undertake energy efficiency activities such as installing more efficient equipment, adopting better production methods, fuel switching and establishing waste-energy capture programs.
- ➔ An energy efficiency networking group (EENG) for the sector was founded in the summer of 2004 and uses Web conferencing to connect foundries from Quebec, Ontario and the West.

Foundry Sector – NAICS 331500

Energy Intensity Index (2001–2003)

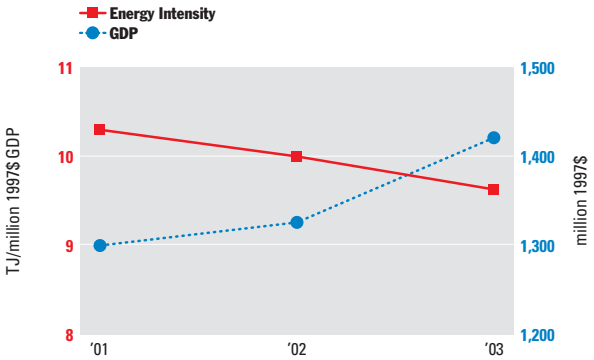
Base Year 2001 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Foundry Sector – NAICS 331500

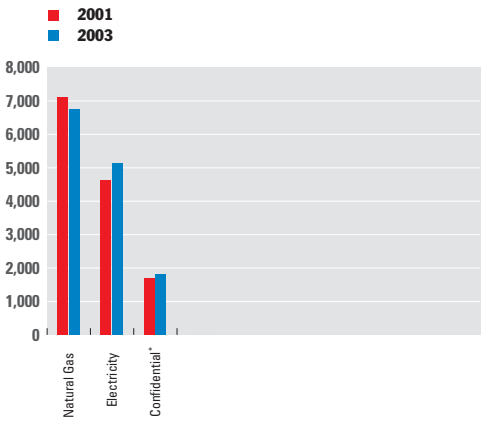
Energy Intensity and Economic Output (2001–2003)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Foundry Sector – NAICS 331500

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

* Confidential includes: Heavy Fuel Oil (HFO), Middle Distillates (LFO), Coal Coke and Propane (LPG).

General Manufacturing

Profile

The general manufacturing sector comprises a variety of industries, including leather, clothing, furniture, printing activities, construction materials, floor coverings, insulation, glass and glass products, adhesives, plastics and pharmaceuticals. The sector encompasses approximately 2,000 small, medium and large companies.

Highlights

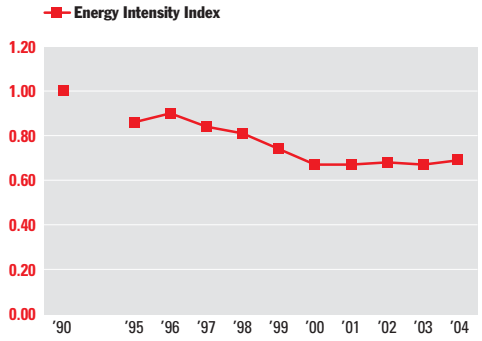
- The general manufacturing sector's production (GDP million 1997$) grew 54.2 percent between 1990 and 2004.
- Energy intensity fell by 31 percent over the same period.
- Companies included in the general manufacturing sector consumed 214,205 TJ of energy in 2004, an increase of 6.3 percent compared to 2003.
- The sector made substantial improvements to its energy intensity prior to 2000.
- Since 2001, energy intensity has remained relatively stable.
- Thirty-seven new Industrial Energy Innovators signed on in 2004/2005, a 19 percent increase.
- The sector has expanded to include a new task force in Atlantic Canada, which met for the first time in 2004.

* NAICS Category Name

Leather & Allied Product	NAICS 316
Clothing & Manufacturing	NAICS 315
Furniture & Related Product	NAICS 337
Printing & Related Support Activities	NAICS 323
Fabricated Metal Product	NAICS 332
Machinery	NAICS 333
Non-metallic Mineral Product not Elsewhere Classified	NAICS 3271, 3272, 32732, 32733, 32739, 3274, 32742, 3279
Miscellaneous Manufacturing	NAICS 339
Chemical Manufacturing not Elsewhere Classified	NAICS 32522, 325314, 32532, 3254, 3255, 3256, 3259
Tobacco Product Manufacturing	NAICS 3122
Converted Paper Product Manufacturing	NAICS 3222
Plastic Products	NAICS 3261

General Manufacturing Sector – NAICS*

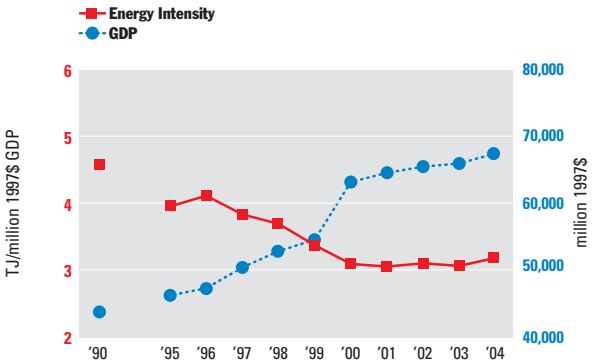
Energy Intensity Index (1990–2004)
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

General Manufacturing Sector – NAICS*

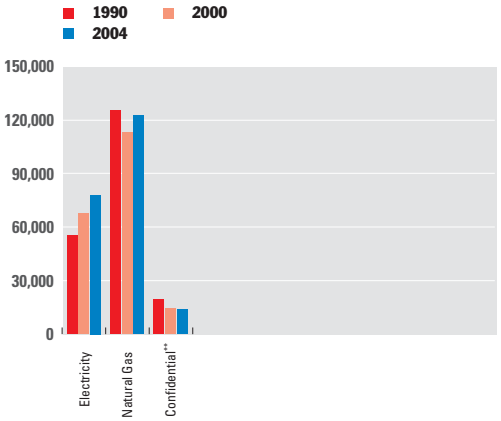
Energy Intensity and Economic Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

General Manufacturing Sector – NAICS*

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

** Confidential includes: Coal, Coke, Petroleum Coke, Heavy Fuel Oil (HFO), Middle Distillates (LFO), Propane (LPG), Wood and Steam.

Lime

Profile

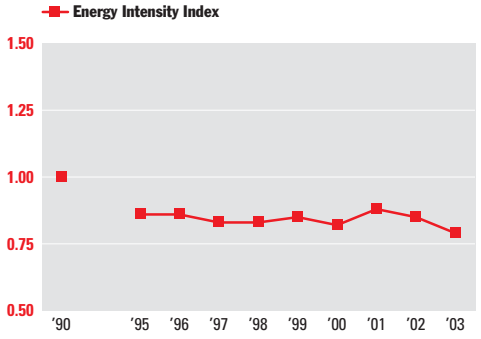
Canada's merchant lime sector supplies essential raw materials for the steel and mining industry, the pulp and paper industry, water treatment, environmental management and other basic industries.

Highlights

- According to energy data available in 2003, it took 13,654 TJ of energy to produce 2,050 kilotonnes of lime.
- Lime sector production rose 10.9 percent between 1990 and 2003, while total energy consumed dropped by 12.1 percent.
- Energy intensity in 2003 improved by 6.8 percent compared to 2002, and 20.7 percent compared to 1990.

Lime Sector – NAICS 327410

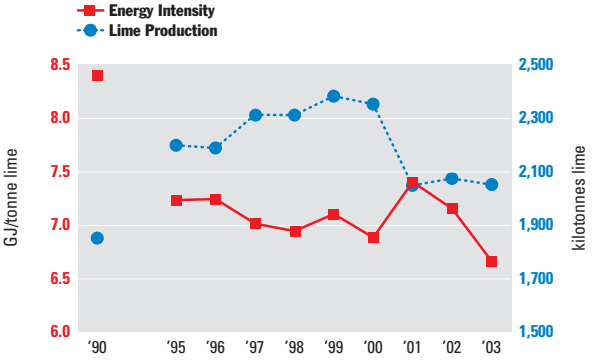
Energy Intensity Index (1990–2003)
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004*. Ottawa. October 2005.
Production – Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004*. Simon Fraser University. December 13, 2005.

Lime Sector – NAICS 327410

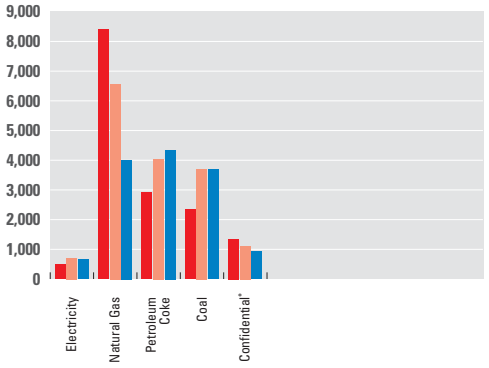
Energy Intensity and Physical Output (1990–2003)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004*. Ottawa. October 2005.
Production – Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004*. Simon Fraser University. December 13, 2005.

Lime Sector – NAICS 327410

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004*. Ottawa. October 2005.

* Confidential includes: Heavy Fuel Oil (HFO), Middle Distillates (LFO), Propane (LPG) and Coal Coke.

Mining

Profile

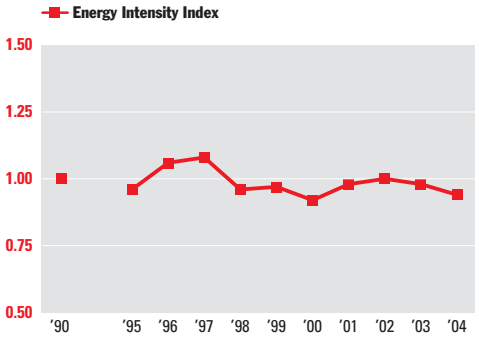
Canada's minerals and metals industry produces scores of different mineral commodities for domestic and export markets in facilities located across the country.

Highlights

- Canadian metal ore production has fallen from 282 million tonnes in 1990 to 224 million tonnes in 2004, a decrease of 20.8 percent.
- Energy consumption fell by 25.2 percent over the same period leading to an energy intensity improvement of nearly 6 percent.
- In cooperation with the Mining Association of Canada, three large energy audits were completed in the 2004/2005 fiscal year.
- In 2004, two benchmarking studies for the mining sector were published. These reports are entitled *Benchmarking the Energy Consumption of Canadian Open-pit Mines* and *Benchmarking the Energy Consumption of Canadian Underground Bulk Mines.*

Mining Sector – NAICS 212200

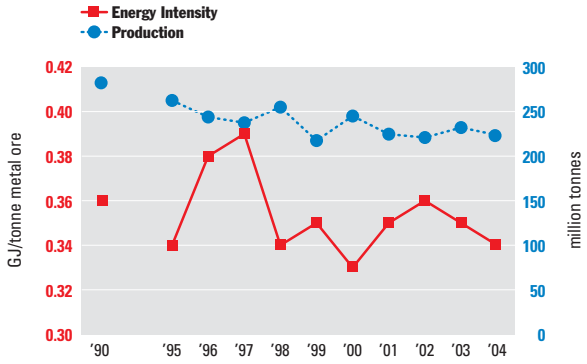
Energy Intensity Index (1990–2004)
Base Year 1990 = 1.00



Data source:
Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Mining Sector – NAICS 212200

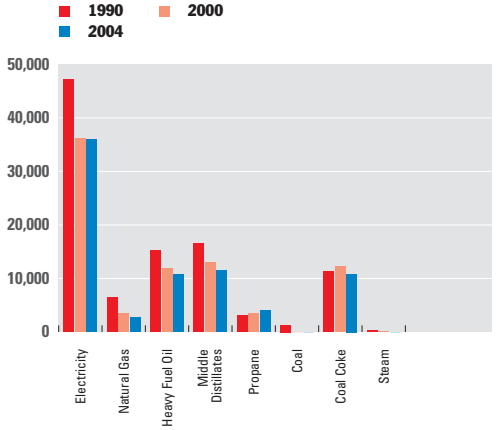
Energy Intensity and Production Output (1990–2004)



Data source:
Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Mining Sector – NAICS 212200

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Oil Sands

Profile

Canada's oil sands sector includes several plants in northern Alberta and one heavy oil upgrader in Saskatchewan. The sector is a major employer and a significant contributor to Canada's exports and GDP.

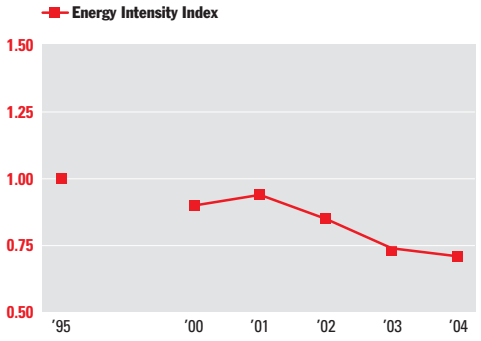
Highlights

- Natural Resources Canada has worked with the Alberta Energy and Utilities Board to publish its energy use indicators for the oil sands sector.
- While the energy used in the sector has increased by 50 percent since 1995, production more than doubled, leading to an energy intensity improvement of 29 percent.
- Since 1995, bitumen production has become a larger share compared to upgraded product. This has resulted in the sector's moving away from coke and process gas, towards natural gas, which now accounts for 39.3 percent of total energy consumption.

Oil Sands Sector – NAICS 211114

Energy Intensity Index (1995–2004)

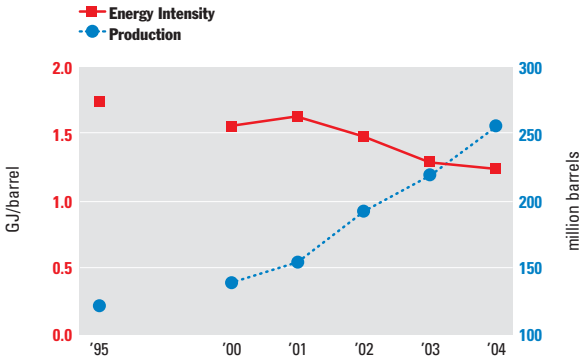
Base Year 1990 = 1.00



Data source:
Alberta Energy and Utilities Board 2005 (Fort McMurray office).

Oil Sands Sector – NAICS 211114

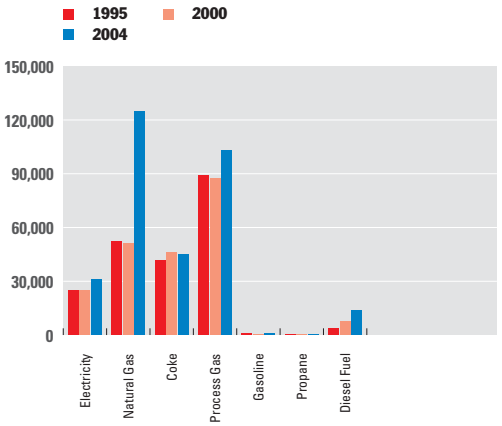
Energy Intensity and Production Output (1995–2004)



Data source:
Alberta Energy and Utilities Board 2005 (Fort McMurray office).

Oil Sands Sector – NAICS 211114

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Alberta Energy and Utilities Board 2005 (Fort McMurray office).

Petroleum Products

Profile

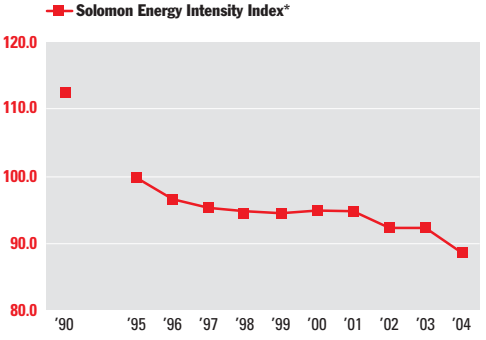
Canada's petroleum products sector markets gasoline, diesel, heating oil, jet fuels, lubricating oil and other related products through a network of approximately 15,000 wholesale and retail outlets nationwide.

Highlights

- Since 1990, the petroleum products sector's energy consumption – using lower heating values (LHV) – has increased by 6.0 percent while production increased by 23.7 percent.
- Production has increased by almost four times the levels for energy consumption since 1990, leading to an improvement of 21.2 percent in the sector's energy intensity.
- The sector's energy intensity improved a notable 4 percent in 2004 compared to 2003.

Petroleum Products Sector – NAICS 324110

Solomon Energy Intensity Index (1990, 1995–2004)
Base Year 1990 = 112.6

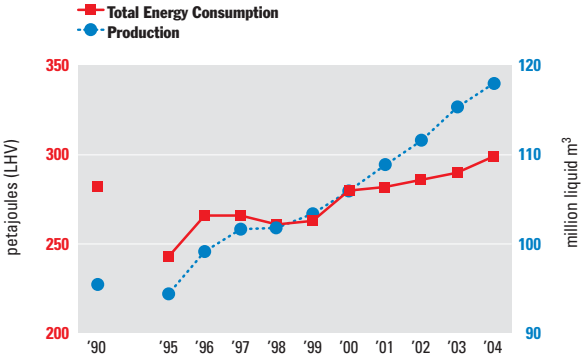


Data source:
Review of Energy Consumption in Canadian Oil Refineries and Upgraders: 1990, 1994 to 2004. Prepared for the Canadian Petroleum Products Institute (CPPI) and Canadian Industry Program for Energy Conservation by John Nyboer. Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

* Intensity of production generated by Solomon Associates is **not** based on the energy and production data displayed in the *Production and Energy Consumption* graph.

Petroleum Products Sector – NAICS 324110

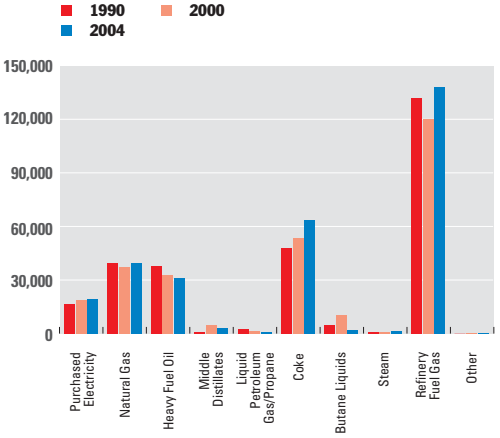
Production and Energy Consumption (1990, 1995–2004)



Data source:
Review of Energy Consumption in Canadian Oil Refineries and Upgraders: 1990, 1994 to 2004. Prepared for the Canadian Petroleum Products Institute (CPPI) and Canadian Industry Program for Energy Conservation by John Nyboer. Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Petroleum Products Sector – NAICS 324110

Energy Sources in Terajoules per Year (TJ/yr) (LHV)



Data source:
Review of Energy Consumption in Canadian Oil Refineries and Upgraders: 1990, 1994 to 2004. Prepared for the Canadian Petroleum Products Institute (CPPI) and Canadian Industry Program for Energy Conservation by John Nyboer. Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* Simon Fraser University. December 13, 2005.

Plastics

Profile

The Canadian plastics processing sector is characterized by many different processes and applications that use an ever-increasing variety of raw materials. The major markets served by the plastics industry are packaging, construction and automotive. This sector includes over 146,000 people employed by approximately 3,800 companies.

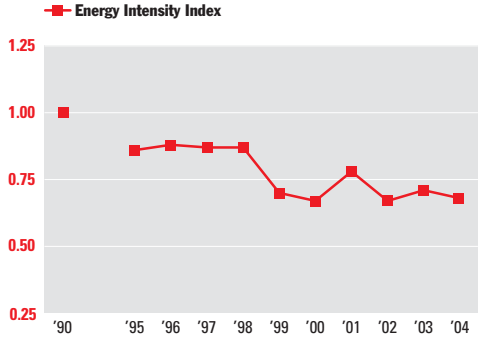
Highlights

- Although energy use in the plastics sector increased by 71.1 percent between 1990 and 2004, GDP increased by two and a half times.
- These factors led to an improvement in energy intensity of 31.6 percent over the period.
- Natural gas and electricity account for almost all of the energy used in the plastics sector, representing 98.8 percent of energy consumed in 2004.

Plastics Sector – NAICS 326100

Energy Intensity Index (1990–2004)

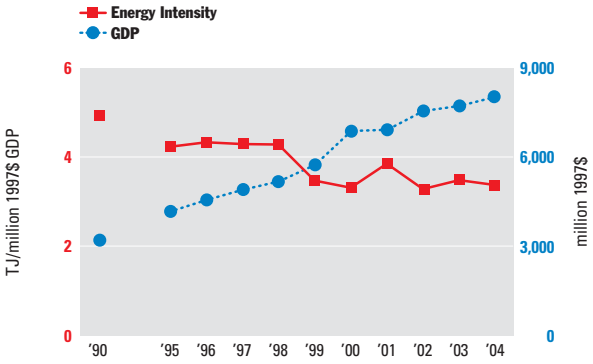
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Plastics Sector – NAICS 326100

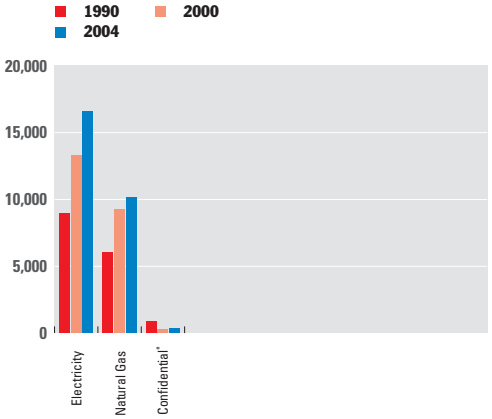
Energy Intensity and Economic Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Plastics Sector – NAICS 326100

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

* Confidential includes: Heavy Fuel Oil (HFO), Middle Distillates (LFO), Propane (LPG) and Steam.

Pulp and Paper

Profile

Pulp and paper, a key component of the forest products industry, is a major contributor to Canada's economy. Besides market pulp, the sector produces newsprint, specialty papers, paperboard, building board and other paper products.

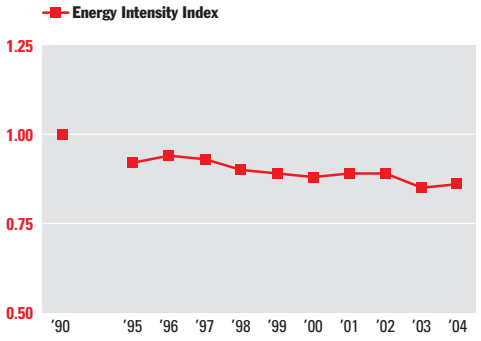
Highlights

- Pulp and paper is Canada's leading industrial user of renewable energy, with biomass and small hydro power making up 60 percent of the sector's energy consumption.
- The industry's strategy of substituting biomass for fossil fuels and adopting more self-generation are key to its success in controlling higher energy costs.
- The sector's energy intensity improved 14.3 percent over the same period, meeting its 1 percent annual improvement target.
- Between 1990 and 2004, sector companies increased their production by 28 percent while reducing GHG emissions by 30 percent.
- A sector benchmarking study of nearly 50 mills across Canada was completed in 2005.
- In 2004, the sector held a three-day energy efficiency course in Prince George, British Columbia.

Pulp and Paper Sector – NAICS 322100

Energy Intensity Index (1990–2004)

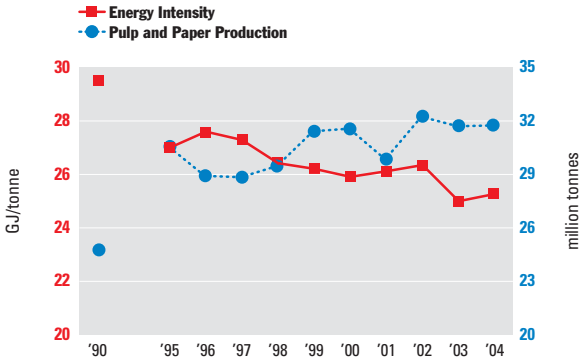
Base Year 1990 = 1.00



Data source:
Forest Products Association of Canada's *Energy Monitoring Report, 1990–2004.*

Pulp and Paper Sector – NAICS 322100

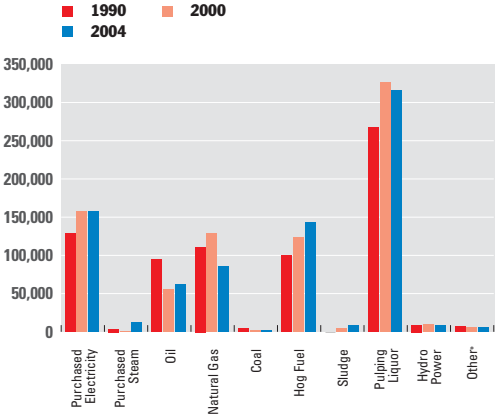
Energy Intensity and Physical Output (1990–2004)



Data source:
Forest Products Association of Canada's *Energy Monitoring Report, 1990–2004.*

Pulp and Paper Sector – NAICS 322100

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Forest Products Association of Canada's *Energy Monitoring Report, 1990–2004.*

* Other includes: Distillates, Diesel, LPG, Other Purchased Energy and Other Self-generated Energy.

Rubber

Profile

The rubber products industry is a major contributor to the Canadian economy. It represents over $5 billion in shipments and employs approximately 25,700 people. The industry is also very active in international trade with imports of $4.0 billion and exports of $3.3 billion.

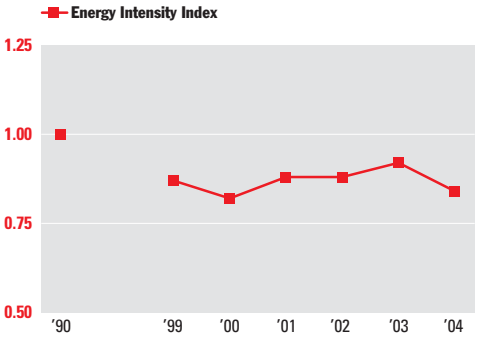
Highlights

- In 2004, the sector consumed 10,533 TJ of energy, more than double the consumption in 1990.
- Over the same period, production almost tripled, leading to an overall improvement in energy intensity of nearly 16 percent.
- Between 2003 and 2004, production of rubber products increased by 3.1 percent, while energy use in the sector decreased by 5.4 percent. This led to a decrease in energy intensity of 8.2 percent between 2003 and 2004.
- Natural gas and electricity represent over 83 percent of the sector's energy consumption.

Rubber Sector – NAICS 326200

Energy Intensity Index (1990–2004)

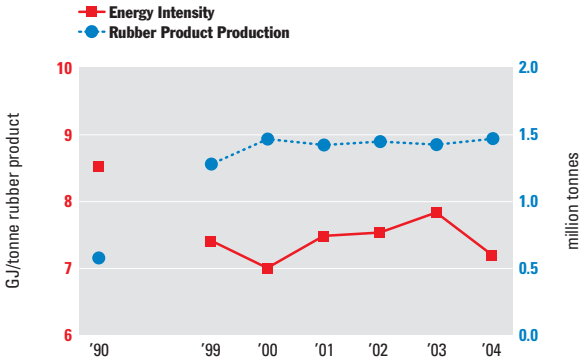
Base Year 1990 = 1.00



Data source:
Rubber Association of Canada, July 26, 2005.

Rubber Sector – NAICS 326200

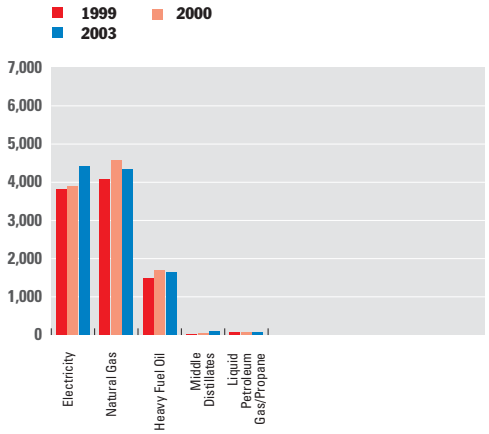
Energy Intensity and Physical Output (1990–2004)



Data source:
Rubber Association of Canada, July 26, 2005.

Rubber Sector – NAICS 326200

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Rubber Association of Canada, July 26, 2005.

Note: Due to data collection methodology, data are not available for 1990.

Steel

Profile

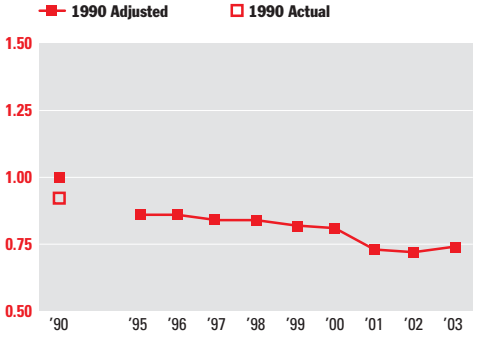
Canada's steel sector is one of the country's largest industries. Sector companies supply flat-rolled (sheet and plate), long (re-bar and structural steel) and specialty and alloy (stainless and tool steels) products for major markets in the automotive, appliance, oil and gas, machinery, construction and packaging industries.

Highlights

- Steel industry output grew 18 percent between 1990 and 2003.
- Over the same period, the sector lowered its energy intensity by 26.2 percent.
- The sector's production declined 1.3 percent in 2003 compared to 2002, while energy consumed increased 1.1 percent, due mainly to increases in the consumption of coke oven gas and electricity.
- This led to a 2.3 percent increase in energy intensity between 2002 and 2003.
- Over the 2004/2005 fiscal year, the industry completed an energy performance benchmarking study and initiated a follow-up study into the potential impacts of penetration by benchmarked energy efficiency technologies.

Steel Sector – NAICS 331100

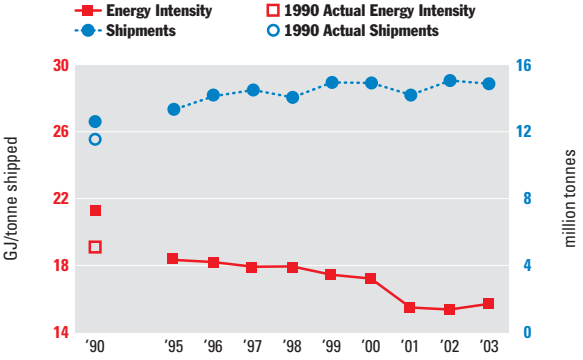
Energy Intensity Index (1990–2003)
Base Year 1990 (adjusted) = 1.00



Data source:
Energy – 90 actual and 1995–2003 Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* December 13, 2005, per Statistics Canada, Cat. No. 57-003XPB, October 2005.
Shipments – Statistics Canada. *Primary Iron and Steel.* Cat. No. 41-001-XIB, Vol. 58, No. 12, March 2004.
1990 Adjustment of Energy and Shipments – Canadian Steel Producers Association.
Please note: The 2004 data are under review.

Steel Sector – NAICS 331100

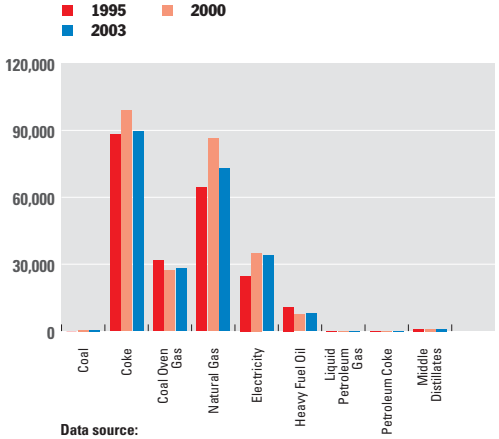
Energy Intensity and Physical Output (1990–2003)



Data source:
Energy – 90 actual and 1995–2003 Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* December 13, 2005, per Statistics Canada, Cat. No. 57-003XPB, October 2005.
Shipments – Statistics Canada. *Primary Iron and Steel.* Cat. No. 41-001-XIB, Vol. 58, No. 12, March 2004.
Please note: The 2004 data are under review.

Steel Sector – NAICS 331100

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy – Canadian Industrial Energy End-Use Data and Analysis Centre (CIEEDAC). *Development of Energy Intensity Indicators for Canadian Industry 1990–2004.* December 13, 2005, per Statistics Canada, Cat. 57-003XPB, October 2005.
Canadian Steel Producers Association 2003.
Please note: The 2004 data are under review.

Textiles

Profile

Canada's textile industry produces the fibres, yarns, fabrics and textile articles purchased by users and customers as diverse as automotive manufacturing, clothing, construction, environmental protection, road building and retail.

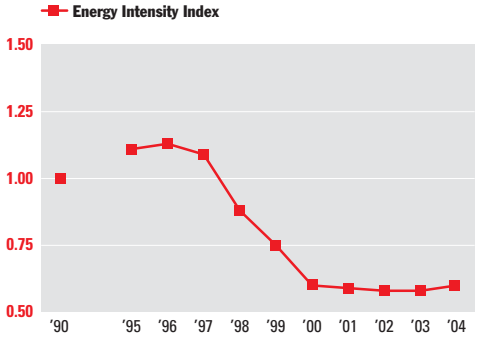
Highlights

- The textile industry improved its energy intensity by 40.0 percent between 1990 and 2004.
- The sector's energy use dropped by 39.3 percent during the same period, while the industry's GDP rose slightly.
- Following a major improvement between 1997 and 2000, energy intensity has stabilized and is showing a slight upward trend.
- The Textiles Sector Task Force remains committed to an energy intensity reduction target of 1 percent per year through 2010.

* The new North American Industry Classification System (NAICS) classifies textile producers under Artificial and Synthetic Fibres/Filaments Manufacturing (NAICS 32522), Textile Mills (NAICS 313) and Textile Product Mills (NAICS 314). NAICS sub-group 32522 includes producers of synthetic fibres and filaments. NAICS Group 313 comprises establishments that are primarily engaged in manufacturing, finishing or processing yarn or fabrics. NAICS Group 314 includes establishments primarily engaged in manufacturing textile products (except clothing) such as carpets, household textiles, etc. Changes to the classification of industries by Statistics Canada from the Standard Industrial Classification (SIC) to NAICS mean that energy data for the synthetic fibre and filament yarn industries are no longer available separately. The statistics contained in this profile cover only NAICS Groups 313 and 314 as described above.

Textiles Sector – NAICS 313, 314*

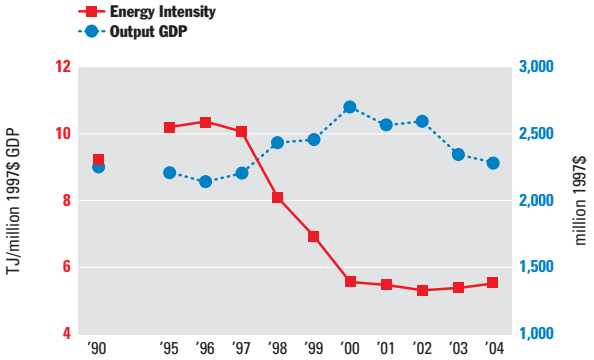
Energy Intensity Index (1990–2004)
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Textiles Sector – NAICS 313, 314*

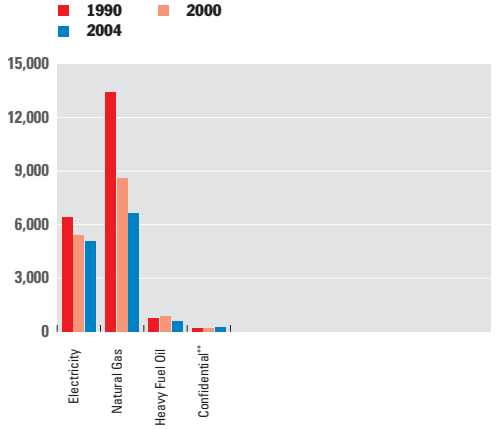
Energy Intensity and Economic Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Textiles Sector – NAICS 313, 314*

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

** Confidential includes: Middle Distillates (LFO), Propane (LPG), Wood and Steam.

Transportation Equipment Manufacturing

Profile

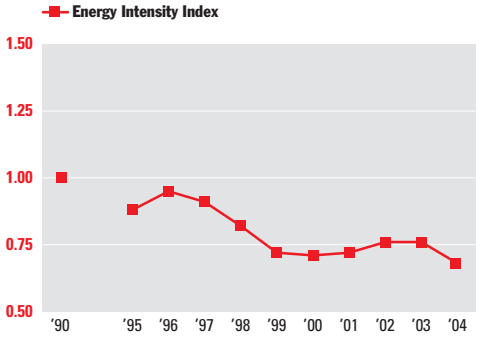
The Canadian transportation equipment manufacturing sector includes companies that manufacture aircraft, aircraft parts, automobiles, motor vehicle parts, trucks, buses, trailers, railroad rolling stock, ships and pleasure boats.

Highlights

- In 2004, the sector consumed 60,176 TJ of energy, up 17.8 percent from 1990.
- However, over the same period, the sector's GDP increased by 72.6 percent, leading to an overall improvement in energy intensity of 31.8 percent.
- Between 2003 and 2004, energy consumption in the motor vehicle industry decreased by 7.3 percent, while energy consumption in the automotive parts industry increased by 3.1 percent.
- The transportation equipment manufacturing sector had an improvement in energy intensity of 10.6 percent between 2003 and 2004.
- In cooperation with the Automotive Parts Manufacturers' Association, a benchmarking study, entitled *Best Practice Benchmarking in Energy Efficiency Canadian Automotive Parts Industry*, was completed in the 2004/2005 fiscal year.

Transportation Equipment Manufacturing Sector – NAICS 336000

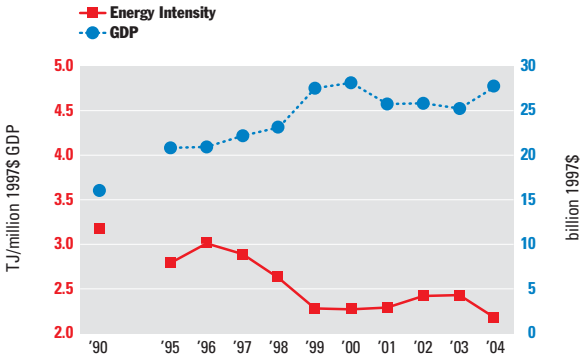
Energy Intensity Index (1990–2004)
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004*. Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Transportation Equipment Manufacturing Sector – NAICS 336000

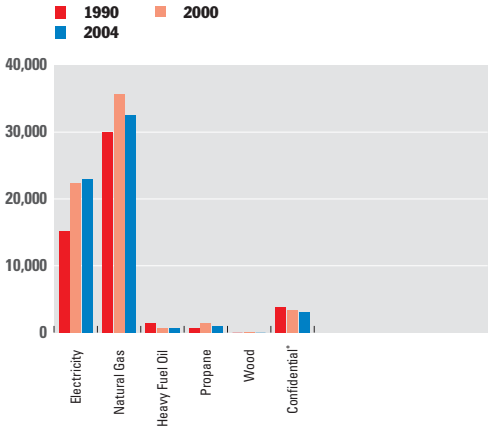
Energy Intensity and Economic Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004*. Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Transportation Equipment Manufacturing Sector – NAICS 336000

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004*. Ottawa. October 2005.

* Confidential includes: Coal, Coal Coke, Middle Distillates (LFO) and Steam.

Upstream Oil and Gas: Conventional Sector

Profile

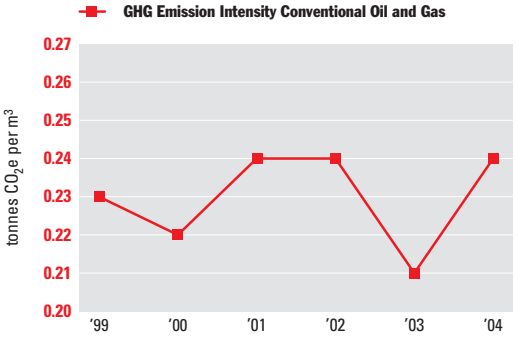
The upstream oil and gas sector includes the companies that find and develop Canada's vast oil and gas resources. The sector is broadly divided between conventional oil and gas production, and oil sands production and upgrading. This section deals with the conventional side. The oil sands sector is covered separately elsewhere in this report. Products and services derived by downstream sectors from the output of this industry include heating and transportation fuels, building supplies and materials, clothing, and vital medicines. The exploration and production industry is represented by the Canadian Association of Petroleum Producers (CAPP) and the Small Explorers and Producers Association of Canada (SEPAC).

Highlights

- → The data for the oil and gas sectors show fluctuations in GHG emissions intensity over the past few years.
- → Emissions intensity of conventional oil and gas production continues to fluctuate around the average level of the past five years, returning in 2004 to the level in 2002 after a drop in 2003.
- → The number of Industrial Energy Innovators in the sector doubled in the 2004/2005 fiscal year to 82.

Upstream Oil and Gas Sector – NAICS 211113

GHG Intensity Index (1999–2004)



Data source:
CAPP, 2005. *2005 CAPP Stewardship Progress Report: Building Trust One Step at a Time.* Canadian Association of Petroleum Producers.

Wood Products

Profile

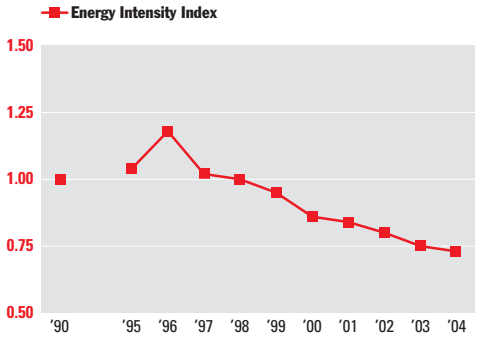
The wood products sector includes three industry groups: establishments engaged in sawing logs into lumber and similar products; companies that make products that improve the natural characteristics of wood by manufacturing veneers, plywood, reconstituted wood panel products and engineered wood assemblies; and establishments that make a diverse range of wood products, such as millwork.

Highlights

- Canada's wood products sector consumed 133,518 TJ of energy in 2004 including 61,709 TJ of biomass, representing 46 percent energy self-sufficiency.
- Companies continue to install biomass energy systems based on wood waste, displacing the use of costly natural gas and oil.
- Despite rising energy consumption driven by increased production since 1990, the sector's energy efficiency efforts have led to substantial improvements in energy intensity.
- Between 1990 and 2004, the sector's energy intensity improved by 26.9 percent, doubling the sector's CIPEC target for annual improvement.
- The sector worked to improve statistical reporting with the completion of a data strengthening exercise in the 2004/2005 fiscal year.

Wood Products Sector – NAICS 321000

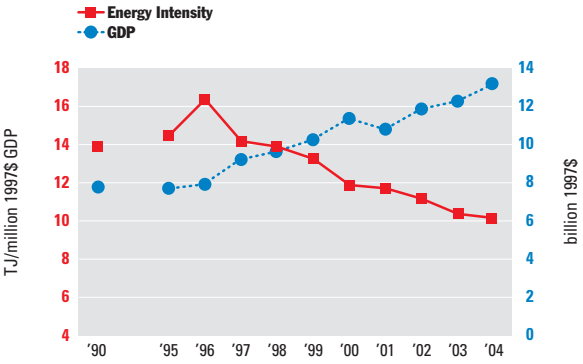
Energy Intensity Index (1990–2004)
Base Year 1990 = 1.00



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Wood Products Sector – NAICS 321000

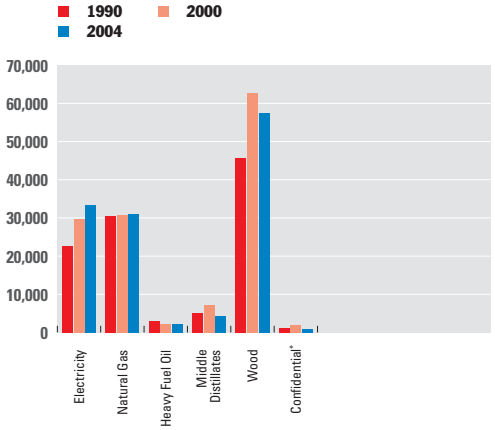
Energy Intensity and Economic Output (1990–2004)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.
Production – Informetrica Limited, *T1 Model Database and National Reference Forecast*, Ottawa, November 2005.

Wood Products Sector – NAICS 321000

Energy Sources in Terajoules per Year (TJ/yr)



Data source:
Energy Use – Statistics Canada, *Industrial Consumption of Energy Survey 1990, 1995–2004.* Ottawa. October 2005.

* Confidential includes: Propane (LPG) and Steam.

How CIPEC Works

CIPEC is an umbrella organization overseeing a partnership between government and private industry aimed at improving Canada's industrial energy efficiency. CIPEC comprises sectoral task forces, each of which represents companies engaged in similar industrial activities, that participate through their trade associations. The Task Force Council, with representatives from each CIPEC sector, provides a common forum for sectors to share ideas and recommends ways to address common needs. Overall direction is provided by an Executive Board, which is made up of private sector leaders who are champions of industrial energy efficiency within their sectors and who provide advice on industrial energy efficiency programs and related issues to the Government of Canada.

In the CIPEC partnership, change emerges from consensus and joint action built through open and honest communication. CIPEC continues to be the focal point for industry's response to Canada's climate change efforts. Our role is to promote the evolution of energy efficiency and to recognize and reward those who lead the way.

We carry out this mandate in part through a strong communications and awareness program anchored in our twice-monthly *Heads Up CIPEC* newsletter that is sent out to over 10,000 subscribers.

CIPEC also raises awareness of the goals and benefits of improved energy use in other ways. The Task Force Council and individual sectors are constantly at work to broaden participation, encourage the sharing of information and bolster awareness of the role and achievements of CIPEC industries. The frequency of CIPEC meetings and other gatherings continues to increase, with an average of three CIPEC events occurring per week during the past reporting period.

CIPEC volunteers include successful business leaders and others recognized on the national stage. The profile of these leaders and their strong belief in CIPEC's principles give us a strong edge in attracting new industry participants and in continuing the successful partnership between industry and government.

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Industrial Energy Innovators

Through NRCan's Office of Energy Efficiency, the Industrial Energy Innovators initiative focuses on transforming sector-level commitments made by task forces into company-level action by helping to overcome obstacles to energy efficiency at the company level.

As of March 31, 2006, 1,080 industrial facilities from the manufacturing, mining, construction and energy-producing sectors have signed on as Industrial Energy Innovators.

For information on the benefits of becoming an Industrial Energy Innovator, contact the Office of Energy Efficiency by e-mail at cipec.peeic@nrcan.gc.ca or visit the Web site at oee.nrcan.gc.ca/cipec.

Industrial Energy Innovators by Sector

Aluminum
Alcan inc.
Alcoa – Aluminerie de Baie-Comeau
Alcoa – Aluminerie Deschambault inc.
Alumicor Limited
Aluminerie Alouette inc.
Aluminerie de Bécancour inc.
Corus S.E.C. Produits d'aluminium laminé
Indalex Limitée – Pointe-Claire

Brewery
Big Rock Brewery Ltd.
La Brasserie Labatt
Labatt Breweries of Canada
Molson Canada – Edmonton
Molson Canada – Ontario
Moosehead Breweries Limited
Sleeman Brewing and Malting Co. Ltd.
The John Allen Brewing Company
Unibroue Inc.

Cement and Concrete
Dufferin Concrete
ESSROC Canada Inc.
Gordon Shaw Concrete Products Ltd.
Lafarge Canada inc.
Lehigh Inland Cement Limited
Lehigh Northwest Cement Limited
St. Lawrence Cement Inc.
St. Marys Cement Corporation

Chemicals
Abrex Paint & Chemical Ltd.
Alcan Chemicals
Benjamin Moore & Cie Limitée
Big Quill Resources Inc.
Brenntag Canada Inc.
Chinook Group Limited
Degussa Canada Inc.
Dominion Colour Corporation
– Ajax
– Toronto
Eka Chimie Canada Inc. – Valleyfield
Grace Canada Inc. – Valleyfield
Huntsman Corporation Canada Inc.
ICI Canada Inc.
MDS Nordion Inc.
Nacan Products Limited
NOVA Chemicals Corporation
Osmose-Pentox Inc.
Oxy Vinyls Canada Inc.
Pharmascience Inc.
PolyOne Canada Inc.
Rohm and Haas Canada Inc.
Saskatchewan Minerals
(Division of Goldcorp Inc.)
The International Group, Inc.

Construction
ATCO Structures Inc.
GSW Building Products
IKO Industries Ltd.
– Brampton
– Hawkesbury
Lockerbie & Hole Industrial Inc.
Mira Timber Frame Ltd.
Northland Building Supplies Ltd.
Poutrelles Delta Inc.
Waiward Steel Fabricators Ltd.

Dairy
Agrinor Inc. (Laiterie Alma)
Agropur Coopérative Agro-alimentaire
Amalgamated Dairies Limited
Atwood Cheese Company
Baskin-Robbins Ice Cream
Entreprise Le Mouton Blanc
Foothills Creamery Limited
Hewitt's Dairy Limited
Laiterie Chagnon Ltée
Lone Pine Cheese Ltd.
Neilson Dairy Ltd.
Parmalat Dairy & Bakery Inc.
Pine River Cheese & Butter Co-operative
Roman Cheese Products Limited
Salerno Dairy Products Ltd.
Silani Sweet Cheese Ltd.

Electrical and Electronics
Alstom Canada inc.
ASCO Valve Canada
Broan-NuTone Canada
CAE Inc.
Camco Inc.
Candor Industries Inc.
Century Circuits Inc.
Circuits GRM Enr.
Crest Circuit Inc.
General Electric Canada – Peterborough
GGI International
Honeywell Limited
IBM Canada Limitée
Milplex Circuits (Canada) Inc.
Nortel
Osram Sylvania Ltd.
PC World
S&C Electric Canada Ltd.
Tyco Thermal Controls (Canada) Ltd.
Vansco Electronics Ltd.

Electricity Generation
Ontario Power Generation

Fertilizer
Agrium
Canadian Fertilizers Limited
IMC Esterhazy Canada Limited Partnership
IMC Potash Canada Limited
IMC Potash Colonsay ULC
Potash Corporation of Saskatchewan Inc.
– Allan Division
– Cory Division
– Lanigan Division
– New Brunswick Division
– Patience Lake Division
– Rocanville Division

Food and Beverage
Abattoir Louis Lafrance & Fils Ltée
Abattoir Saint-Germain inc.
ACA Co-operative Limited
Agri-Marché
Agrilait Coopérative agricole
Alberta Processing Co.,
(Division of West Coast Reduction Ltd.)
Aliments Ouimet-Cordon Bleu Inc.
Aliments Reinhart Foods Limited/Ltée
Allen's Fisheries Limited
Andrés Wines Ltd.
API Grain Processors
Avalon Dairy Ltd.
Beta Brands Limited
Better Beef Ltd.
Black Velvet Distilling Company
Border Line Feeders Inc.
Browning Harvey Limited
– Corner Brook
– Grand Falls-Windsor
– St. John's
Bunge Canada
Burnbrae Farms Limited
– Lyn
– Mississauga
C&M Seeds
Cadbury Adams Canada Inc.
Campbell Company of Canada
Canamera Foods
Canbra Foods Ltd.
Cantor Bakery
Canyon Creek Soup Company Ltd.
Cargill Animal Nutrition
– Camrose
– Lethbridge
Cargill Foods
– High River
– Toronto
Carson Foods
Casco Inc.
Cavendish Farms
Centennial Foods, a Partnership
Champion Petfoods Ltd.

Coca-Cola Bottling Company
– Calgary
– Toronto
Cold Springs Farm Limited
ConAgra Foods Canada Inc.
Connors Bros., Limited
Continental Mushroom Corporation (1989) Ltd.
Cuddy Food Products Inc.
Diaego Canada Inc.
Don Chapman Farms Ltd./Lakeview Vegetable Processing Inc.
Eastern Protein Foods Limited
Effem Inc.
– Bolton
– Newmarket
Export Packers Foods Limited
Family Muffins & Desserts Inc.
Family Tradition Foods (Tecumseh) Inc.
Farmers Co-Operative Dairy Limited
– Halifax
Fishery Products International Ltd.
– Port Union
– Triton
Frito Lay Canada
– Cambridge
– Lethbridge
– Lévis
– Mississauga
– New Minas
– Pointe-Claire
– Taber
Funster Natural Foods Inc.
Furlani's Food Corporation
G.E. Barbour Inc.
Greenview AquaFarm Ltd.
H.J. Heinz Company of Canada Ltd.
Handi Foods Ltd.
Heritage Frozen Foods Ltd.
Hershey Canada Inc.
Hiram Walker & Sons Limited
Hubberts Industries
Humpty Dumpty Snack Foods Inc.
– Summerside
Ice Water Seefoods Inc.
Kerry Québec Inc.
Kitikmeot Foods Ltd. – Cambridge Bay
Kivalliq Arctic Foods Ltd. – Rankin Inlet
Kraft Canada Inc.
La Rocca Creative Cakes
Laprise Farms Ltd.
Leahy Orchards Inc./Les Vergers Leahy Inc.
– Franklin
Legacy Cold Storage Ltd.
Legal Alfalfa Products Ltd.
Les Brasseurs Du Nord Inc.
Les Distilleries Schenley Inc.
Les Oeufs-Bec-O inc.
Les produits Zinda Canada Inc.
Lilydale Cooperative Ltd.
Lucerne Foods
Lyalta Gardens
Lyo-San Inc.
Maison des Futailles
Maple Leaf Foods Inc.
– Canada Bread Company Ltd.
– Garden Province Meats Inc.
– Landmark Feed Inc.
– Larsen Packers Limited
– Maple Leaf Consumer Foods
– Maple Leaf Pork
– Maple Leaf Poultry
– Rothsay
– Shur-Gain
Maple Lodge Farms Ltd.
Marsan Foods Limited
McCain Foods (Canada)
Menu Foods
Mitchell's Gourmet Foods Inc.
Montréal Pita Inc
Nestlé Canada Inc.
– Midwest Food Products Inc.
Northern Alberta Processing Co.
Nunavut Development Corporation
– Rankin Inlet
Oakrun Farm Bakery Ltd.
Ocean Nutrition Canada Ltd. – Dartmouth
Okanagan North Growers Cooperative
Olymel
Omstead Foods Limited
Otter Valley Foods Inc.
Palmerston Grain
Pangnirtung Fisheries Ltd.
Parrish & Heimbecker Limited
Pepe's Mexican Foods Inc.
Pepsi-Cola Canada Beverages
PepsiCo Foods of Canada Inc.
– Peterborough
– Trenton
Prairie Mushrooms (1992) Ltd.
Principality Foods Ltd.
Quality Fast Foods
Ranchers Beef Ltd.
Rich Products of Canada Limited
Rol-land Farms Limited
Sakai Spice (Canada) Corporation
Schneider Foods
– Ayr
– Kitchener
– Mississauga
– Port Perry
– St. Marys
– Toronto
Silani Sweet Cheese Ltd.
Sleeman Maritimes Ltd.
Stag's Hollow Winery and Vineyard Ltd.
Stratus Vineyards Limited
Sun Valley Foods Canada
Sunny Crunch Foods Ltd.
Sunrise Bakery Ltd.
Sun-Rype Products Ltd.
Sunterra Meats
Supraliment s.e.c.
Sysco Kelowna
Thomson Meats Ltd.
Town Line Processing Ltd.
Transfeeder Inc.
Trochu Meat Processors
Trophy Foods
Unifeed & Premix
Unilever Canada
Versacold Group
Viandes Kamouraska Inc.
Vincor International Inc.
Westcan Malting Ltd.
Westglen Milling Ltd.
Weston Foods Inc.

Foundry

Ancast Industries Ltd.
Bibby Ste-Croix
Breyer Casting Technologies Inc.
Century Pacific Foundry Ltd.
Crowe Foundry Limited
Dana Brake Parts Canada Inc.
Deloro Stellite Inc.
ESCO Limited
– Port Coquitlam
– Port Hope
Gamma Foundries Company
Grenville Castings Limited
M.A. Steel Foundry Ltd.
Magotteaux Ltée
Metal Technologies Woodstock Ltd
Ramsden Industries Limited
Stackpole Limited
Vehcom Manufacturing
Wabi Iron & Steel Corporation
Welland Forge

General Manufacturing

3M Canada Co.
– Brockville
– Etobicoke
– London
– Morden
– Perth
A1 Label Inc.
Acadian Platers Company Limited
Advanced Panel Products Ltd.
Advanced Precast Inc.
Alcan Packaging Canada Ltd. – Weston
American Color Graphics Inc.
Anchor Lamina Inc.
– Cambridge
– Mississauga
– Windsor

Industrial Energy Innovators by Sector (continued)

Anchor Lamina Inc. Reliance Fabrications – Tilbury
Armstrong World Industries Canada Ltd.
Art Design International Inc. – Saint-Hubert
Artopex Plus Inc.
Associated Tube Industries
Automatic Coating Limited
Avery Dennison Fasson Canada Inc.
Babcock & Wilcox Canada Ltd.
BainUltra Inc.
Banner Pharmacaps (Canada) Ltd.
BASF, The Chemical Company
Basin Contracting Limited
Batteries Power (Iberville) Ltée
Bentofix Technologies Inc.
Blount Canada Ltd.
BOC Gaz
Borden Cold Storage Limited
Canada Mold Technology
Canadian Uniform Limited
Cancoil Thermal Corporation
Canwood Furniture Inc.
Caraustar Industrial & Consumer Products Group
Carrière Union Ltée
Cassavant Frères s.e.c. – St-Hyancinthe
CCL Container Aerosol Division
Centre du Comptoir Sag-Lac inc. – Alma
Champion Feed Services Ltd.
Chandelles Tradition Ltée
ChromeShield Co. – Windsor
Church & Dwight Canada
Climatizer Insulation Inc.
CMP Solutions Mécanique Avancées Ltée
CMP Advanced Mechanical Solutions (Ottawa) Ltd.
CNH Canada, Ltd.
Columbia Industries Limited
Concert Airlaid Ltée
Control Skateboards Inc.
Courus s.e.c.
Coyle & Greer Awards Canada Ltd.
Crown Metal Packaging Canada LP
Descor Industries Inc.
DEW Engineering and Development Limited
– Miramichi
– Ottawa
Dipaolo CNC Retrofit Ltd.
Domric International Ltd.
Douglas Barwick Inc.
Durable Release Coaters Limited
Dykstra Greenhouses – St. Catharines
EJC Mining Equipment Inc.
Electrolux Canada Corp.
Eli Lilly Canada Inc.
EMCO Building Products Corp.
– Edmonton
– Pont-Rouge
– Ville LaSalle
Energizer Canada Inc.
Envirogard Products Ltd.
Escalator Handrail Company Inc.
Estée Lauder Cosmetics Ltd.
Euclid-Hitachi Heavy Equipment Ltd.
Ezeflow inc.
Federated Co-operatives Limited
Fenplast
Ferme Gilles et Francine Lahaie enr.
Ferme La RouQuine inc.
Ferraz Shawmut Canada Inc.
Fibrex Insulations Inc.
Flora Park Inc. – Sherrington
Formica
Galderma Production Canada Inc.
Garland Commercial Ranges Limited
General Services Inc.
Genfoot Inc.
Glueckler Metal Inc.
Greif Containers Inc.
Groupe Altech 2003
Henkel Canada Corporation, Consumer Adhesives
Hurteau & Associés Inc. (Fruits & Passion)
Ibis Products Limited
IKO Industries Ltd. – Brampton
Imaflex Inc.
Imperial Home Decor Group Canada Inc.
Imperial Tobacco Canada
Imprimerie Interweb inc.
Indalex Limited – Port Coquitlam
Independent Mirror Industries Inc.
Industrie Bodco inc. – St-François-Xavier
Industries Graphiques Cameo Crafts Limitée
Integria
Interface Flooring Systems (Canada) Inc.
International Paper Industries Limited
J.A. Wilson Display Ltd.
Jay Ge Electroplaters Ltd.
John Gavel Custom Manufacturing Ltd.
Jones Packaging Inc.
JTI-Macdonald Corp.
JTL Integrated Machine Ltd.
Kelcoatings Limited – London
Kindred Industries Ltd.
Kodak Canada Inc.
Korex Canada
Korex Don Valley ULC
La Compagnie Américaine de Fer et Métaux inc.
Larsen & D'Amico Manufacturing Ltd.
Leggett & Platt Canada Co.
Les Distributions Option Kit Inc.
Les Emballages Knowlton inc.
Les Serres Bergeron
– Notre-Dame-de-la-Salette
– Notre-Dame-du-Laus
Les Serres Daniel Lemieux Inc.
Les Serres Gola
Les Serres maedler (1989) inc.
Les Serres R. Bergeron Inc.
Les Serres Riel inc.
Les Serres St-Benoît-du-Lac
Les Serres Serge Dupuis
Les Technologies Fibrox Ltée
L'Oréal Canada Inc. – Ville St-Laurent
Madawaska Doors Inc.
Maksteel Service Centre
Marcel Depratto inc.
Maritime Geothermal Ltd.
Metex Heat Treating Ltd.
Metro Label Company Ltd.
Metroland Printing, Publishing & Distributing
Meuble Canadel inc.
Meuble Idéal Ltée
MLT International
Mobilier MEQ Ltée
Mondo America Inc.
Montebello Packaging
Nexans Canada Inc.
North American Decal
Norwest Precision Limited
Oakside Chemicals Limited – London
Oberthur Jeux et Technologies Inc.
Orica Canada Inc.
Owens-Corning Canada Inc.
– Canadiac
– Toronto
P. Baillargeon Ltée.
Pavage U.C.P. inc.
Pavex Ltée
Placage Chromex Inc.
Polycote Inc.
Polytainers Inc.
Pomatek
PowerComm Inc.
Procter & Gamble Inc.
– Belleville
– Brockville
PRO-ECO Limited
Profine Molds Inc.
Quick Build Technologies
RBTek
Resco Canada Inc.
Regal Greenhouses Inc.
RLD Industries Ltd.
Rothmans, Benson & Hedges Inc.
Roxul (West) Inc. – Grand Forks
Roy & Breton Inc.
Royal Machine Manufacturing Co.
Royal Tooling Co.
Royal Window Coverings (Canada) Inc.
Royalbond Co.
Russel Metals Inc. (Alberta)
S.C. Johnson and Son, Limited

Saint-Gobain Ceramic Materials Canada Inc.
Samuel Strapping Systems
Sandvik Materials Technology Canada
Sandvik Tamrock Canada Inc.
Sandvik Tamrock Loaders Inc.
Scapa Tapes North America
Serres Maryvon
Shorewood Packaging Corporation
– Brockville
Siemens Milltronics Process Instruments Inc. – Peterborough
Simmons Canada Inc.
Snap-on Tools of Canada Ltd.
Société Laurentide inc.
Soprema inc.
Specialty Porcelain Products Inc.
Sportspal Products
Steelcase Canada Ltd.
Suntech Heat Treating Ltd.
Surrette Battery Company Limited
Stowe Woodward/Mount Hope Inc.
Suntech Heat Treating Ltd.
Superior Radiant Products Ltd.
Systèmes et Câbles d'Alimentation Pirelli Canada
Teknion Concept
Teknion Québec
Teknion Corporation
Teknion Roy & Breton Inc.
– RBLogistek – St-Romuald, QC
– RBTek – St-Romuald, QC
– Roy & Breton – St-Vallier, QC
– Teknion Concept – Lévis, QC
– Teknion Québec – Montmagny, QC
TekWood
The Data Group of Companies – Brampton
Thermetco Inc.
Transcontinental Gagné
Transcontinental Interweb Toronto
Tri-Graphic Printing (Ottawa) ltd.
Trillium Health Care Products Inc,
– Brockville
– Newmarket
– Perth
– Prescott
Tuyaux Wolverine (Canada) inc.
Uni-Fab
Unifiller Systems Inc.
V.N. Custom Metal Inc.
VA TECH Ferranti-Packard Transformers Ltd.
VicWest Steel
Wabash Alloys Mississauga
Wescam Inc.
Wheeltronic Ltd.
Willy Haeck et Fils Inc.
Wyeth-Ayerst Canada Inc.
Zenon Environmental Inc.

Lime

Carmeuse Beachville (Spragge Operations) Limited
Carmeuse Lime (Beachville) Limited
Carmeuse Lime (Dundas) Limited
Chemical Lime Company of Canada Inc.
Graymont (NB) inc.
Graymont (QC) Inc.
Graymont Western Canada Inc.

Mining & Metallurgy

Aur Resources Inc.
Barrick Gold Corporation – Mine Doyon
BHP Billiton Diamonds Inc.
Boliden Limited
Echo Bay Mines Ltd.
Falconbridge Limited
– Brunswick Lead Met Operations – Belledune
– Brunswick Mining – Bathurst
– CCR Refinery – Montreal
– CEZ Refinery – Salaberry-de-Valleyfield
– Craig Mine – Onaping
– Fraser Mine – Onaping
– General Smelting – Montreal
– Horne Smelter – Rouyn-Noranda
– Kidd Creek Met Operations – Timmins
– Kidd Creek Mine – Timmins
– Montcalm Mine – Timmins
– Nickel Rim Mine – Onaping
– Onaping Mine – Onaping
– Raglan Mine – Rouyn-Noranda
– Strathcona Concentrator – Onaping
– Sudbury Smelter – Falconbridge
– TL Mine – Onaping
– Toronto
Falconbridge Technology Centre
– Falconbridge
Hillsborough Resources Limited
Hudson Bay Mining & Smelting Co., Limited
INCO Limited
Iron Ore Company of Canada
La Compagnie Minière Québec Cartier
Mines Wabush
Newmont Canada Limited, Golden Giant Mine
Noranda Inc. – Brunswick Mining
Noranda Inc. – Brunswick Smelter
Noranda inc. – Matagami Mines
Noranda Metallurgy Inc.
– Canadian Copper Refinery
Placer Dome Canada Limited
Sifto Canada Inc.
Syncrude Canada Ltd.
Teck Cominco Limited
Williams Operating Corporation
Zinc Électrolytique du Canada Ltée.

Petroleum Products

Bitumar Inc.
Canadian Tire Petroleum
Chevron Canada Resources
Husky Energy Inc.
Imperial Oil Limited
Irving Oil Limited
Northrock Resources Ltd.
Parkland Refining Ltd.
Petro-Canada
Pound-Maker Agventures Ltd.
Rider Resources Ltd.
Safety-Kleen Canada Inc.
Shell Canada Limited
Suncor Energy Inc.
Ultramar Ltd.

Plastics

A. Schulman Canada Ltd. – St. Thomas
ADS Groupe Composites Inc., division Pultrall
Atlantic Packaging Products Ltd.
Bérou International inc.
Candor Plastics Co.
Crown Plastics Extrusions Co.
D&V Plastics Inc.
DDM Plastics – Tillsonburg
Dominion Plastics Co.
Downeast Plastics Ltd.
Dynast Plastics Co.
Emballage St-Jean Ltée
Emballages Poliplastic Inc. – Granby
FRP Systems Ltd.
Gracious Living Industries
Husky Injection Molding Systems Ltd.
Imperial Plastics Co.
Industrial Plastics
IPEX Inc.
– London
– Toronto
Kord Products Inc.
Le-Ron Plastics Inc.
Majestic Plastics Co.
Matrix Packaging Inc.
Mold-Masters Limited – Georgetown
Montreal PVC
Neocon International – Dartmouth
Par-Pak Ltd.
Plastiflex Canada Inc.
Polybottle Group Limited
– Edmonton
– Vancouver
Polybrite
Prince Plastics Co.
Reagens Canada Ltd.
Regal Plastics Co.
Reid Canada Inc.

Industrial Energy Innovators by Sector (continued)

Residential Building Products
Richards Packaging Inc.
Royal Dynamics Co.
Royal EcoProducts Co.
Royal Flex-Lox Pipe Limited
Royal Foam Co.
Royal Group Resources Co.
Royal Group Technologies Limited
Royal Outdoor Products Co.
Royal Polymers Limited
Roytec Vinyl
Rubbermaid Canada Inc.
Silgan Plastics Canada Inc.
The Clorox Company of Canada, Ltd.
Thermoplast
Ultimate Plastics Co.
Ventra Plastics
– Kitchener
– Peterborough
– Windsor
W. Ralston (Canada) Inc.
Wedco Produits Moulés
Winpak Portion Packaging Ltd.

Pulp and Paper

Abitibi-Consolidated Inc.
– Alma
– Amos
– Baie-Comeau
– Beaupré
– Clermont
– Fort Frances
– Grand Falls-Windsor
– Grand-Mère
– Iroquois Falls
– Jonquière
– Kenora
– Mackenzie
– Montreal
– Shawinigan
– Stephenville
– Thorold
Bowater Canadian Forest Products Inc.
Cariboo Pulp and Paper Company Limited
Cascades inc.
– Cascades Boxboard Inc./Cascades Carton Plat inc.
– Cascades Fine Papers Group Inc./ Cascades Groupe Papiers Fins inc.
– Cascades Tissue Group Inc./Cascades Groupe Tissu inc.
Daishowa-Marubeni International Ltd.
Domtar inc.
– Espanola
– Lebel-sur-Quévillon
– Ottawa/Hull
Emballages Mitchel-Lincoln Ltée
Emballages Smurfit-Stone Canada inc.
Eurocan Pulp and Paper Company Limited
F.F. Soucy Inc.
Georgia-Pacific Canada, Inc. – Thorold
Hinton Pulp – Hinton
Interlake Paper
Irving Paper
Kruger Inc.
Lake Utopia Paper
Les Emballages Winpak heat Seal Inc.
– Vaudreuil-Dorion
Marathon Pulp Inc.
Maritime Paper Products Limited
Neenah Paper Company of Canada
Norampac Inc.
– Cabano Division
– Burnaby Division
Norampac OCD Division
NorskeCanada
Papiers Scott Limitée
– Crabtree
– Gatineau
– Lennoxville
Papiers Stadacona
Pope & Talbot Ltd.
Quesnel River Pulp Co. – Quesnel
Sac Drummond inc.
Slave Lake Pulp Corporation – Slave Lake
Smurfit-Stone
St. Anne-Nackawic Pulp Company
St. Marys Paper Ltd.
Standard Paper Box
Stora Enso Port Hawkesbury Ltd.
Tembec Paper Group – Spruce Falls
Tolko Manitoba Kraft Paper
UPM-Kymmene Miramichi Inc.
Weldwood of Canada Limited

Rubber

AirBoss Rubber Compounding
GDX Canada Inc.
Goodyear Canada Inc.
Hamilton Kent Canada Ltd.
Michelin North America (Canada) Inc.
NRI Industries Inc.
Soucy Techno in.
Trent Rubber Corp.

Steel

Abraham Steel & Services Ltd.
Algoma Steel Inc.
AltaSteel Ltd.
Atlas Specialty Steels
CHT Steel Company Inc.
Dofasco Inc.
Gerdau Ameristeel Corporation
– Cambridge
– Selkirk
– Whitby
Infasco
Ivaco Inc. – Ivaco Rolling Mills
– Montreal
– L'Orignal
Laurel Steel
Namasco Limited
Nelson Steel
– Nanticoke
– Stoney Creek
Norambar inc.
Ontario Chromium Plating Inc.
QIT – Fer et Titane inc.
Slater Steel Inc. – Hamilton Specialty Bar Division
Spencer Steel Ltd.
Stelco Hamilton
Stelco Inc.
Stelco Lake Erie
Stelfil Ltée
Stelpipe Ltd.
Stelwire Ltd.

Textiles

Albany International Canada Inc.
Albarrie Canada Limited
American & Efird Canada, inc.
AYK Socks Inc.
Barrday Inc.
Beaulieu Canada Inc. – Acton Vale
Bennett Fleet (Quebec) Inc.
Bridgeline Ropes Inc. – Deseronto
C.S. Brooks Canada Inc.
Calko (Canada) Inc.
Cavalier Textiles
Coats Bell
Collingwood Fabrics Inc.
Collins & Aikman Canada Inc.
Colorama Dyeing and Finishing Inc.
Consoltex Inc.
CookshireTex inc.
Délavage National Inc.
Denim Swift
Dentex
Domfoam International Inc.
Doubletex Inc.
DuPont Canada Inc.
Fabrene Inc.
Fibres Armtex Inc.
Geo. Sheard Fabrics (1994) Ltd. – Coaticook
Hafnere inc.
J.L. de Ball Canada Inc.
Jack Spratt Mfg Inc.
Lac-Mac Limited
– London
LaGran Canada Inc.
Lainages Victor Ltée
Lanart Rug Inc.
Les Tricots Conforts Absolu

Lincoln Fabrics Ltd.
Manoir Inc.
Manufacturier de bas de nylon Doris Ltée
Mondor Ltée
Montreal Woollens (Canada) Ltd.
– Cambridge
Morbern Inc.
Nova Scotia Textiles, Limited
PGI-DIFCO Tissus Performance Inc.
Prescott Finishing
Spinrite Inc.
St. Lawrence Corporation
Stanfield's Limited
Stedfast Inc.
Teinturiers Concorde inc.
Télio & Cie
Textiles Monterey (1996) inc.
The Cambridge Towel Corporation
Tri-Tex Co Inc.
Velcro Canada Inc.
Vitafoam Products Canada Ltd.
VOA Colfab Inc.
Waterloo Textiles Limited

Transportation

ABC Group Inc.
– ABC Air Management Systems Inc. (Multi-Flex)
– ABC Climate Control Systems Inc.
– ABC Flexible Engineered Products Inc. (Extrusion)
– ABC Group Exterior Systems
– ABC Group Interior Systems
– ABC Group Product Development
– ABC Metal Products Inc.
– ABC Plastic Moulding
  – Brydon
  – Orlando
– LCF Manufacturing Ltd.
  – Rexdale
  – Weston
– MSB Plastics Manufacturing Ltd.
– PDI Plastics Inc.
– Polybottle Group Limited
  – Edmonton
  – Vancouver
– Salflex Polymers Ltd.
– Salga Associates
– Supreme Tooling Group
Accuride Canada Inc.
Active Burgess Mould & Design
Advanced Brake Products Ltd.
A.G. Simpson Automotive Inc.
– Cambridge
– Oshawa
AGS Automotive Systems
Air Canada Technical Services
Alcoa Wheel Products Collingwood
Boeing Toronto Limited
Bombardier Aerospace
Bombardier Inc.
Bovern Enterprises Inc.
Bruin Engineered Parts Inc.
Burlington Technologies Inc. – Burlington
Cami Automotive Inc.
Camoplast Inc./Groupe Thermoplastique
Canadian General-Tower Limited
Canadian Pacific Railway
DaimlerChrysler Canada Inc.
Dana Canada Corporation
– Brantford
– Burlington
– Cambridge
– Oakville
Dortec Industries – Newmarket
Dresden Industrial
– Rodney
– Stratford
Dura Automotive Systems (Canada), Ltd.
Dura-Lite Heat Transfer Products Ltd.
DynaPlas Ltd.
Équipement Labrie Ltée
F & P Mfg., Inc.
Faurecia Automotive Seating
Flex-n-Gate Canada
– Bradford
– Tecumseh
Flex-n-Gate Seeburn
– Beaverton
– Tottenham
Ford Motor Company of Canada, Limited
Freightliner of Canada Ltd.
  – Sterling Trucks Division
General Motors of Canada Limited
Halla Climate Control Canada Inc. – Belleville
Héroux Devtek Inc. – Longueuil
Honda of Canada Mfg.
Hunjan International Inc.
Iafrate Machine Works Ltd.
International Truck and Engine Corporation Canada
Jefferson Elora Corporation (JEC)
LCF Manufacturing Ltd.
– Rexdale
– Weston
Lear Corporation
Litens Automotive Parnership – Woodbridge
Massiv Die-Form – Brampton
Modatek Systems
Montupet Ltée
MSB Plastic Manufacturing Ltd.
National Steel Car Limited
Nemak of Canada – Windsor
Niagara Piston Inc.
Northstar Aerospace (Canada) Inc. – Milton
NTN Bearing MFG Canada
Oetiker Limited
Omron Dualtec Automotive Electronics Inc.
Orenda Aerospace Corporation
Orion Bus Industries Inc.
Oxford Automotive Inc.
– Suspension Division
PDI Plastics Inc.
Polywheels Manufacturing Limited
Portec Produits Ferroviaires Ltée
Pratt & Whitney Canada Inc.
Presstran Industries
Prévost Car Inc.
Procor Limited
– Edmonton
– Joffre
– Oakville
– Regina
– Sarnia
Production Paint Stripping Ltd.
R. Reininger & Son Limited
Remtec Inc.
Rockwell Automation Canada Inc.
– Cambridge
– Stratford
Russel Metals Inc.
Salflex Polymers Ltd.
Salga Associates
Siemens VDO Automotive Inc.
– Tilbury
– Windsor
Simcoe Parts Service Inc.
Supreme Tooling Group
Sydney Coal Railway Inc.
The Butcher Engineering Enterprises Limited
Tool-Plas Systems Inc.
Toral Cast Integrated Technologies
Toyota Motor Manufacturing Canada Inc.
TRW Automotive
– St. Catharines
TS Tech Canada Inc.
Veltri Metal Products
– Glencoe
– Tecumseh
– Windsor
Ventra AFR – Ridgetown
Ventra Group Co. – Calgary
Volvo Cars of Canada Ltd.
Waterville TG Inc.
Woodbridge Foam Corporation
– Corunna
– Mississauga
– Tilbury
– Whitby
– Woodbridge
ZF Heavy Duty Steering Inc.

Upstream Oil and Gas

AltaGas Services Inc. – Wabasca
BP Canada Energy Company
Crescent Point Energy Trust – Provost
– Enchant
– Killan Field
– Provost

Industrial Energy Innovators by Sector (continued)

Connacher Oil and Gas Limited
ConocoPhillips Canada
– Medicine Hat
Devon Canada Corporation
Duke Energy Transmission Gas
– Calgary
– Chetwynd
– Fort Nelson
– Hope
– Mile 117
– Mile 126
– Pink Mountain
– Taylor
– Vancouver
Enbridge Pipelines Inc.
Husky Oil Operations Ltd. – Rainbow Lake
Keyspan Energy Canada – Nordegg
Newalta Corporation
– Abbotsford Service Centre
– Airdrie Service Centre
– Amelia Service Centre
– Brooks Service Centre
– Calgary Service Centre
– Cranbrook Service Centre
– Drayton Valley Service Centre
– Drumheller Service Centre
– Eckville Service Centre
– Edmonton Service Centre
– Elkpoint Service Centre
– Fort St. John Service Centre
– Gordondale Service Centre
– Grande Prairie Service Centre
– Halbrite Service Centre
– Hays Service Centre
– Nanaimo Service Centre
– Nilton Junction Service Centre
– North Vancouver Service Centre
– Pigeon Lake Service Centre
– Price George Service Centre
– Raymond Service Centre
– Red Earth Service Centre
– Redwater Service Centre
– Regina Service Centre
– Richmond Service Centre
– Sparwood Service Centre
– Stauffer Service Centre
– Stettler Service Centre
– Surrey Service Centre
– Taber Service Centre
– Valleyview Service Centre
– West Stoddart
– Willesden Green Service Centre
– Winfield Service Centre
– Zama Service Centre
Nexen Canada Ltd.
Northrock Resources Ltd.
– Calgary
– Niton Junction
Paramount Resources Ltd.
Pengrowth Corporation
Penn West Petroleum Ltd.
– Minnehik Buck Lake
Talisman Energy Inc.
– Calgary
– Carlyle
– Chauvin
– Chetwynd
– Edson
– Grande Prairie
– Lac La Biche
– Shaunavon
– Turner Valley
– Warburg
– Windsor
Taurus Exploration Ltd
– Consort
– Veteran
Trans World Oil & Gas Ltd. – Hays

Wood Products

100 Mile Lumber – 100 Mile House
Alberta Plywood Ltd.
– Edmonton
– Slave Lake
Babine Forest Products Company
– Burns Lake
Blue Ride Lumber – Whitecourt
Canfor Corporation
Chetwynd Forest Industries – Chetwynd
Decker Lake Forest Products Ltd.
– Burns Lake
Erie Flooring and Wood Products
Finewood Flooring & Lumber Limited
Fiready Inc.
Flakeboard Company Limited
Fraser Lake Sawmills – Fraser Lake
Granule L.G. Inc. – St-Féicien
Groupe Savoie Inc.
Hinton Wood Products – Hinton
Houston Forest Products – Houston
Industries Maibec inc. – St-Pamphile
Interforest Ltd.
K&C Silviculture Ltd.
– Oliver
– Red Deer
Les Ateliers Blais & Simard Ébénisterie
Les Entreprises Interco inc.
Louisiana Pacific Canada Ltd.
Marcel Lauzon Inc.
MDF La Baie inc.
New Skeena Forest Products Inc.
Nexfor Inc.
North Atlantic Lumber Inc.
Northstar Lumber – Quesnel
Pacific Inland Resources – Smithers
Palliser Lumber Sales Ltd. – Crossfield
Planchers Mercier Inc. – Montmagny
Quesnel Laminators – Quesnel
Quesnel Plywood – Quesnel
Quesnel Sawmill – Quesnel
Ranger Board – Whitecourt
Rip-O-Bec inc.
Riverside Forest Products Limited
Scierie Girard Inc. – Shipshaw
Seehta Forest Products – Red Earth
Skeena Sawmills – Terrace
Sundre Forest Products Inc. – Sundre
Tembec Industries Inc. – Chapleau
Tolko Industries Ltd.
– Armstrong
– Heffley Creek
– High Level
– High Prairie
– Kelowna
– Lumby
– Meadow Lake
– Merritt
– Quesnel
– Slave Lake
– Vernon
– Williams Lake
West Fraser LVL – Rocky Mountain House
West Fraser Mills Ltd.
– Chasm Division – 70 Mile House
– Quesnel
West Fraser Timber Co. Ltd.
West Pine MDF – Quesnel
Weyerhaeuser Canada Ltd.
Williams Lake Plywood

CIPEC Trade Associations

Aerospace Industries Association of Canada

Alberta Food Processors Association

Aluminium Association of Canada

Atlantic Dairy Council

Automotive Parts Manufacturers' Association

Baking Association of Canada

Brewers Association of Canada

Canadian Association of Metal Finishers

Canadian Association of Petroleum Producers

Canadian Chamber of Commerce

Canadian Chemical Producers' Association

Canadian Construction Association

Canadian Council of Grocery Distributors

Canadian Electricity Association

Canadian Energy Pipeline Association

Canadian Fertilizer Institute

Canadian Foundry Association

Canadian Gas Association

Canadian Healthcare Engineering Society

Canadian Lime Institute

Canadian Manufacturers & Exporters

– Canadian Manufacturers & Exporters – Alberta Division

– Canadian Manufacturers & Exporters – British Columbia Division

– Canadian Manufacturers & Exporters – Manitoba Division

– Canadian Manufacturers & Exporters – New Brunswick Division

– Canadian Manufacturers & Exporters – Newfoundland Division

– Canadian Manufacturers & Exporters – Nova Scotia Division

– Canadian Manufacturers & Exporters – Ontario Division

– Canadian Manufacturers & Exporters – Prince Edward Island Division

Canadian Meat Council

Canadian Petroleum Products Institute

Canadian Plastics Industry Association

Canadian Steel Environmental Committee (Canadian Steel Producers Association)

Canadian Textiles Institute

Canadian Vehicle Manufacturers' Association

Cement Association of Canada

Council of Forest Industries

Electro-Federation Canada

Fisheries Council of Canada

Food and Consumer Products Manufacturers of Canada

Forest Engineering Research Institute of Canada

Forest Products Association of Canada

Forintek Canada Corporation

Mining Association of Canada

North American Insulation Manufacturers Association

Ontario Agri Business Association

Ontario Food Producers' Association

Packaging Association of Canada

Québec Forest Industries Association

Rubber Association of Canada

Small Explorers and Producers Association of Canada

Wine Council of Ontario

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Glossary of Terms

Annual Census of Mines
NRCan survey that collects information on NAICS 2122 (Metal Mining) and NAICS 2123 (Non-Metal Mineral Mining and Quarrying). Full name is Annual Census of Mines, Quarries and Sand Pits.

Annual Survey of Manufactures (ASM)
Statistics Canada survey. Provides information on the consumption of purchased fuels and electricity (CPFE) for approximately 230 sub-sectors at the four-digit NAICS code levels.

Base Year
A reference year. For the Framework Convention on Climate Change, 1997 is the base year.

Carbon Dioxide (CO_2)
A compound of carbon and oxygen that in its normal gaseous state is clear and colourless. CO_2 is formed whenever carbon-bearing fuels are burned. It can also be formed via other reactions that do not involve combustion.

Carbon Dioxide Equivalent (CO_2e)
A metric measure used to compare the emissions of the different GHGs based upon their global warming potential. Global warming potentials are used to convert GHGs to CO_2e.

Economic Energy Intensity
Energy consumption per unit of economic output.

Embodied Energy
The energy consumed to transform all upstream raw materials into the final product; in a life-cycle approach, it would be the "cradle to grave" energy burden.

Energy Intensity
Energy consumption per unit of output.

Energy Intensity Indicator
A dimensionless ratio equal to the energy intensity in a particular year divided by the energy intensity of the base year. The energy intensity indicator for the base year equals 1.0.

Energy Performance Measures
Any variety of metrics that would indicate an aspect of energy performance.

Framework Convention on Climate Change
United Nations convention to address climate change, signed by more than 150 countries at the United Nations Conference on Environment and Development in Rio de Janeiro in June 1992. Canada became the eighth country to ratify the Convention, which entered into force on March 21, 1994, thereby committing to work toward stabilizing GHG emissions at 1990 levels by the year 2000.

Greenhouse Gas (GHG)
A GHG absorbs and radiates heat in the lower atmosphere that otherwise would be lost in space. The greenhouse effect is essential for life on this planet since it keeps average global temperatures high enough to support plant and animal growth. The main GHGs are carbon dioxide (CO_2), methane (CH_4), chlorofluorocarbons (CFCs) and nitrous oxide (N_2O). By far the most abundant GHG is CO_2, accounting for 70 percent of the greenhouse effect.

Gross Domestic Product (GDP)
The total value of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for capital consumption, labour and property located in Canada. It includes the total output of goods and services by private consumers and government, gross private domestic capital investment and net foreign trade. GDP figures are reported in real 1986 dollars.

Higher Heating Value
The amount of heat that is obtained when a specified amount of fuel is combusted with its stoichiometrically correct amount of air, both being at 15°C before the heat release is measured (also called gross calorific value or gross heating value).

Industrial Consumption of Energy (ICE) Survey
Statistics Canada survey on energy use. Covers purchased and non-purchased energy for approximately 24 industrial sub-sectors.

Large Final Emitters
Large final emitters are companies that produce goods in emissions-intensive sectors, including primary energy production, electricity production and selected areas of mining and manufacturing production.

Glossary of Terms (continued)

Large Final Emitters Group
The Large Final Emitters Group of Environment Canada was established in late 2002 and is responsible for working with key industry sectors to reduce annual GHG emissions. Through its discussions with industry, provinces and territories and other stakeholders, the Large Final Emitters Group will design policies and measures that encourage reductions of this magnitude, are administratively efficient and clear, and help to maintain the competitiveness of Canadian industry.

Lower Heating Values
The higher heating value minus the latent heat of vaporization of the water vapour formed by the combustion of any hydrogen present in the fuel. For a fuel with no hydrogen, the higher and lower heating values are the same (also called the lower calorific value or the net heating value).

Natural Resources Canada (NRCan)
The predominant natural resource department of the Government of Canada. NRCan has a mandate to promote the sustainable development and responsible use of Canada's mineral, energy and forestry resources and to develop an understanding of Canada's land mass.

Nitrogen Dioxide (NO_2)
One of a group of gases called nitrogen oxides, which are composed of nitrogen and oxygen. Like sulphur dioxide, nitrogen oxides can react with other chemicals in the atmosphere in the presence of sunlight to form acidic pollutants, including nitric acid.

North American Industry Classification System (NAICS)
A classification system that categorizes establishments into groups with similar economic activities. The structure of the NAICS, adopted by Statistics Canada in 1997 to replace the 1980 Standard Industrial Classification (SIC) system, has been developed by the statistical agencies of Canada, Mexico and the United States.

Physical Energy Intensity
Energy consumption per unit of physical output.

Quarterly Report on Energy Supply and Demand (QRESD)
Provides an energy balance of all energy consumption in Canada. QRESD data on the manufacturing industries are gathered principally by the Industrial Consumption of Energy (ICE) survey. These data are supplemented by other surveys on the disposition of energy (from utilities) and the production of petroleum products.

Specific Energy Consumption
Energy consumption per physical unit of output (also called physical energy intensity).

Standard Industrial Classification (SIC)
A classification system that categorizes establishments into groups with similar economic activities.

Statistics Canada
Statistics Canada is the country's national statistical agency, with programs organized into three broad subject areas: demographic and social, socio-economic and economic. Under the *Statistics Act*, Statistics Canada is required to collect, compile, analyse, abstract and publish statistical information on virtually every aspect of the nation's society and economy. All information given to Statistics Canada through surveys, the census or any other source is confidential. Statistics Canada does not release any information that identifies an individual or organization.

Sulphur Oxides (SO_x)
A product of combustion of fuels that contain sulphur. Sulphur oxides are a major component of acid rain.

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