

Annual Report
1999

Canada's Climate Change
Voluntary Challenge and Registry Inc.



VCF-MVF Inc.



Mission:



*Provide the means
for promoting, assessing
and recognizing
the effectiveness of
the voluntary
approach in addressing
Canada's climate change
objective.*

Acknowledgements

This report provides a summary of VCR Inc. activities for the year 1999 and builds upon the work of our previous annual report published in 1998 and upon other VCR Inc. publications released during the year. Many of the same people who provided input to the 1998 report have provided information for this year's report. We are especially indebted to the following individuals, who contributed towards the writing of the first chapter on sector profiles:

- ◆ Mr. Eric Barry of the Canadian Textiles Institute;
- ◆ Ms. Alicje Cornelissen of the Canadian Portland Cement Association;
- ◆ Mr. Peter Darbyshire of the Canadian Lime Institute;
- ◆ Mr. Wayne Kenefick of Continental Lime Limited on behalf of the Canadian Lime Institute;
- ◆ Ms. Jennifer Keyes of the Canadian Gas Association;
- ◆ Mr. Tom Michelussi of Altus Environmental Engineering on behalf of both the Canadian Petroleum Producers Association and the Canadian Petroleum Products Institute;
- ◆ Ms. Susan Olynyk of Dofasco Inc. on behalf of the Canadian Steel Producers Association;
- ◆ Mr. Dan Paszkowski of the Mining Association of Canada;
- ◆ Mr. David Sansom of Sansom and Associates Limited on behalf of the Canadian Chemical Producers' Association;
- ◆ Ms. Bonnie Stowkowy of the Canadian Energy Pipeline Association;
- ◆ Mr. Christian Van Houtte of the Aluminium Association of Canada; and
- ◆ Ms. Lucie Veilleux of the Canadian Pulp and Paper Association.

Readers' Comments

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*Economic
and environmental
sustainability
go hand in hand.*



Retrospective 1999

We are delighted to report that we have not only met our objectives for 1999, but that we have surpassed them! We now find ourselves turning to the new millennium with great anticipation and are looking forward to an even more active year in 2000.

With the implementation of our more rigorous Champion-level reporting system and the widespread distribution of our new Registration Guide, we have already succeeded in broadening and deepening the reporting of voluntary efforts across Canada. Since the implementation of this new system in July 1999, we have awarded Bronze, Silver or Gold Champion-level reporting status to a total of 97 registrants for their outstanding commitment towards the voluntary reduction of greenhouse gas (GHG) emissions.

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Our Leadership Awards Program has also proven to be a great success. At our first Leadership Awards Ceremony in February 1999, we presented awards to fourteen organizations and individuals, ranging from municipal governments and educational institutions to major corporations - a shining example of the strong level of dedication that exists within both the private and public sectors to reduce GHG emissions.

It was also during this year that we conducted our first annual stakeholder survey. A total of 401 completed surveys were returned to us and, taken together, this represented a 31 per cent response rate - excellent by industry standards. We have since studied the responses carefully and modified our operations to reflect the suggestions made by our stakeholders. We have also completed our second annual VCR Inc. survey designed to measure any changes in stakeholder satisfaction with our activities, and a summary of the results is included in this report.

It is in our partnership with other organizations, however, that we have devoted the greater part of our efforts this past year. We have worked to establish seamless reporting linkages with a variety of organizations working in this field. These have included the Association of Canadian Community Colleges, the Federation of Canadian Municipalities' Partners for Climate Protection Program, Natural Resources Canada's Office of Energy Efficiency and Technology Early Action Measures, the Canadian Industry Program for Energy Conservation, the Ontario Centre for Environmental Technology Advancement, the World Energy Council, the Energy Council of Canada's Action by Canadians on Climate Change (the ABC Program) and the Greenhouse Gas Emission Reduction Trading (GERT) Pilot. Several other linkages are in the development stage. We look forward to strengthening these ties in the years to come, while establishing new ones along the way.

There is no doubt that we will continue to learn and to evolve. The voluntary approach is indeed a critical element of Canada's climate change effort and is consistent with the need to ensure that economic and environmental sustainability go hand in hand.

We thank you for your continued support over the past year, and we wish you and your families all the best in the new millennium.



Ron Munkley,
Chair, VCR Inc. Board of Directors



Robert A. Flemington, P. Eng.
President, VCR Inc.



*Significant voluntary
GHG emission
reductions
are being achieved
within all sectors.*

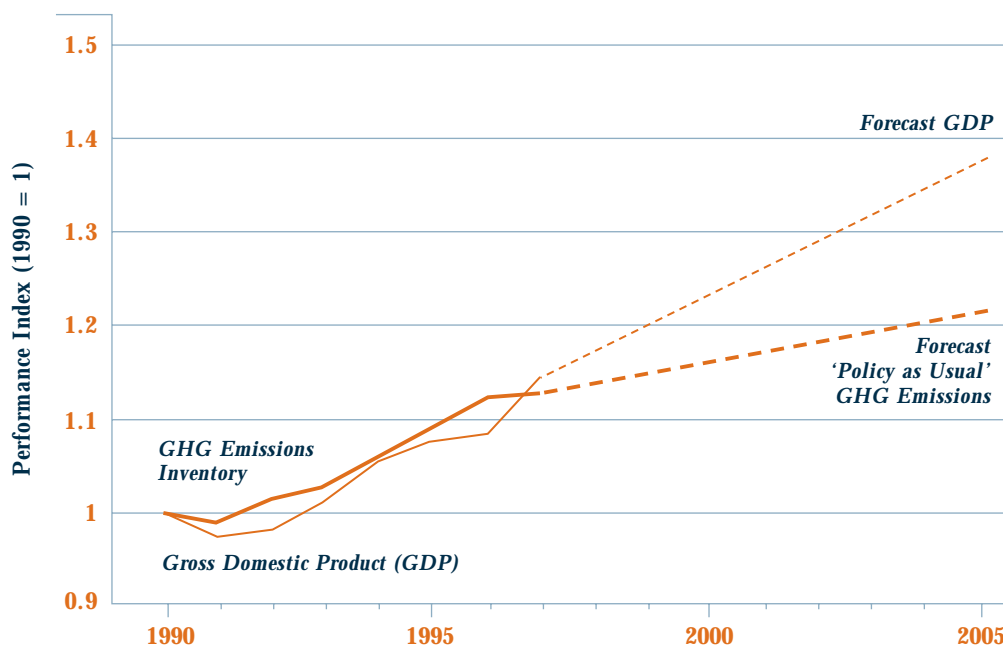
1 > Sector Profiles

1.1 Context

Having reviewed in depth the Champion-level reports registered at VCR Inc., it is clear that significant voluntary GHG emission reductions are being achieved within all sectors and in all regions of the country. Sustained, long term growth of the Canadian economy, on the other hand, has counter-balanced impressive reductions in the GHG emissions intensity of Canada's output. While some sectors of the economy have been able to reduce their absolute GHG emissions relative to 1990, virtually all of them have reduced their emissions on a per unit of output basis. Figure 1-1 illustrates the relationship between growth in Gross Domestic Product (GDP)¹, Canada's National GHG Inventory², and the "Policy as Usual"³ outlook for GHG emissions that will result from the production of Canadian goods and services between 1997 and 2005 for domestic consumption and growing export markets.

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Figure 1-1: GHG Emissions Trends



In order to document historical emissions, the 1997 Canadian Greenhouse Gas Emissions and Removals Inventory (CGERI), released in mid-December 1999, was built primarily through the use of calculation methodologies found in the United Nations document entitled "1996 Intergovernmental Panel on Climate Change (IPCC) Revised Guidelines". In the energy use section of the inventory, resulting GHG emissions were typically calculated by converting gross energy consumption gathered by Statistics Canada into appropriate mass emissions of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and other GHGs. Other sources were used to estimate the GHG emissions related to non-combustion applications. The net result is an inventory with an overall uncertainty of about four per cent for the CO₂ portion, and significantly higher uncertainties for CH₄ at 30 per cent and for N₂O at 40 per cent.⁴ There is a real need to integrate the point source information found within registered Action Plans at VCR Inc. into the calculation of the CGERI in order to reduce the uncertainty and to develop ways in which to quantify the impact of voluntary actions toward Canada's goals. Environment Canada has formed a multi-stakeholder advisory group, including representation from VCR Inc., to address this need beginning early in 2000.

¹ Natural Resources Canada, *Canada's Emissions Outlook: An "Events-Based" Update for 2010*, Working Paper, (October 1998), pp. 9 and 11. ² F. Neitzert, K. Olsen and P. Collas, *Canadian Greenhouse Gas Inventory 1997: Emissions and Removals with Trends*, Environment Canada, (April 1999), p. 73. ³ Analysis and Modelling Group, *Canada's Emissions Outlook: An Update*, National Climate Change Process, (December 1999), p. 42. ⁴ F. Neitzert, K. Olsen and P. Collas, *Canadian Greenhouse Gas Inventory 1997: Emissions and Removals with Trends*, Environment Canada, (April 1999), p. 105.

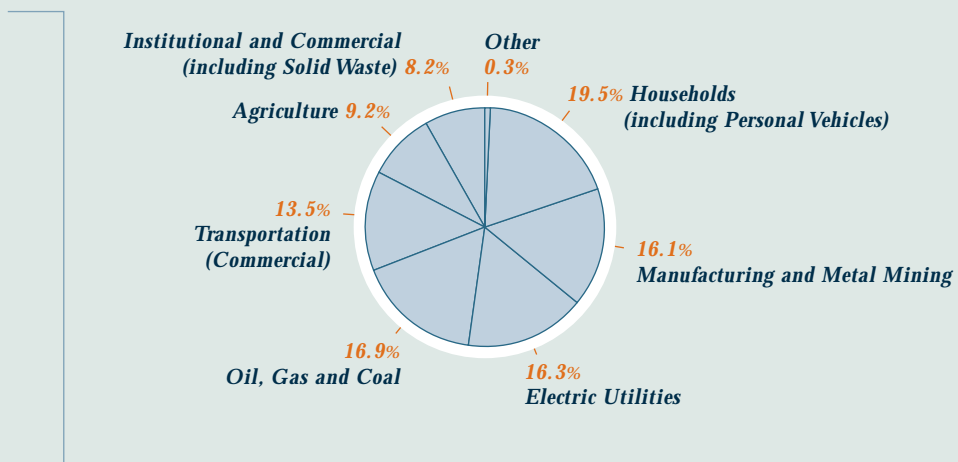
Similarly, when considering future emission trends, Natural Resources Canada, in its 1997 publication *Canada's Energy Outlook 1996 – 2020*, reviewed Action Plans posted in the early days of the Voluntary Challenge and Registry Program to provide projected rates of efficiency and process improvement for sectors. This analysis was not undertaken, however, in the preparation of NRCan's working paper, the "Events-Based Update", or in the most recent publication, *Canada's Emissions Outlook: An Update*, released in late December 1999.

There is a need to relate the forward planning that is reflected in VCR Inc.'s Challenge Registry reports to the GHG emission forecasting process in Canada. It is important to note, however, that many of the future GHG emission reductions contained in the Challenge Registry are already included in the calculation of the "Policy as Usual" forecast that is illustrated in Figure 1-1. As a result, it has proven difficult to quantify, on a national scale, the total GHG emissions that have been reduced exclusively by the measures documented in the Challenge Registry. However, it has been estimated that the impact of all GHG reduction initiatives resulting from the 1993 National Action Program on Climate Change will be 35 Mt annually by the year 2000, growing to 60 Mt by 2010 and to 97 Mt in 2020.⁵

One effective way in which to quantify the global impact of measures to reduce GHG emissions will lie in the introduction of a Baseline Protection system in Canada. This system will enable entities to quantify the impact of their past reduction projects and to register them in the Credit Registry at VCR Inc. Coupling this system with the quantification that is inherent in Champion-level reporting will allow VCR Inc. to help calculate both past and future emission reductions with a greater degree of confidence.

Figure 1-2 illustrates the influence that the various sectors represented in the Challenge Registry have had on Canada's 1997 national GHG emissions inventory.

Figure 1-2: Canadian GHG Emissions (1997)



Source: *Canadian Greenhouse Gas Inventory 1997*, December 1999, p. 73.

Table 1.1 shows the relationship between the total Canadian GHG emissions inventory and the percentage of reduction potential represented by the companies and organizations whose Action Plans may be found in the VCR Inc. Challenge Registry. Excluding individual householders and the Agricultural sector, it is estimated that 78 per cent of the opportunity for governments and organizations to reduce their emissions is represented.

While historical data is important in tracking progress and, to some extent, in projecting the future, it cannot reflect breakthroughs in the application of emerging technology, nor can it predict the future degree of sectoral engagement in the pursuit of GHG emission reductions.

⁵ Analysis and Modelling Group, *Canada's Emissions Outlook: An Update*, National Climate Change Process, (December 1999), p. 43.

Table 1.1: National GHG Emissions Inventory Breakdown

Sector	Details	1997 GHG Emissions ⁶ (Mt CO ₂ eq)	Portion of National Total	Estimate of Sector GHG Emissions Coverage within VCR Inc. Registry
Households	<i>Includes residential space and water heating (53Mt), and personal transportation (80Mt).⁷</i>	133	19.5%	-
Manufacturing and Metal Mining	<i>Includes aluminium, cement, chemical, forestry, general manufacturing, iron and steel, metal mining, pulp and paper, smelting and refining, textiles, vehicles and parts manufacturing.⁸</i>	110	16.1%	70% ⁹
Electric Utilities	<i>Includes all generation facilities operated by utility companies.</i>	111	16.3%	100% ¹⁰
Oil, Gas and Coal	<i>Includes production, transformation and pipeline transportation related to oil, gas and coal.¹¹</i>	115	16.9%	95% ¹²
Transportation (Commercial)	<i>Includes air, marine, rail, off-road and road vehicles. All fleet vehicle emissions are also included.</i>	92	13.5%	65% ¹³
Agriculture	<i>Includes non-combustion related emissions.</i>	63	9.2%	-
Institutional and Commercial (including Solid Waste)	<i>Includes energy-related emissions from federal, provincial and municipal governments (including 25Mt¹⁴ emissions related to waste water disposal); health and educational institutions; and commercial buildings.</i>	56	8.2%	45% ¹⁵
Other		2	0.3%	-
TOTAL		682¹⁶	100.0%	78%

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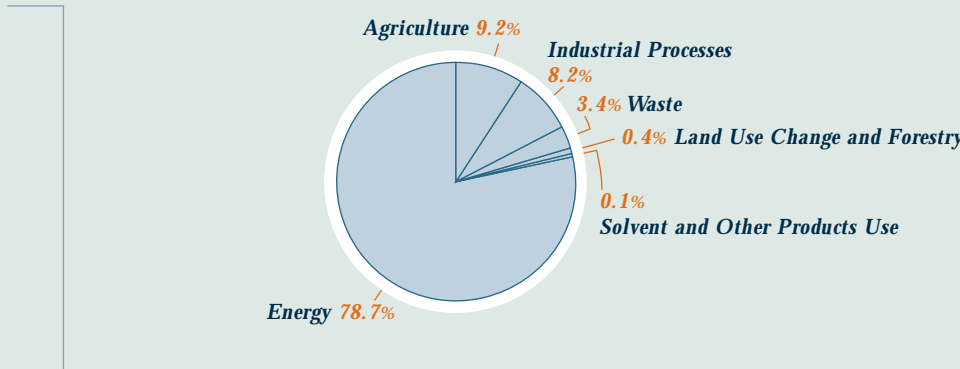
The following sector profiles are the result of aggregating the actions of individual organizations *from the bottom up*. Typically, a sector representative such as a trade association has gathered detailed information from its members concerning GHG emissions in order to create a roll-up of sector emissions by summing all the parts. This method is more resource intensive, but is often offset by the value of the information gathered. Sector representatives also reduce the cost of undertaking these inventories by simultaneously gathering related information not necessarily linked to GHG emissions. For example, the Railway Association of Canada compiles data on oxides of nitrogen and on ground-level ozone emissions at the same time as it compiles GHG emissions, and the Canadian Lime Institute gathers information for VCR Inc. and CIPEC simultaneously.

⁶ Analysis and Modelling Group, *Canada's Emissions Outlook: An Update*, National Climate Change Process, (December 1999), Chapter 3. ⁷ Analysis and Modelling Group, *Canada's Emissions Outlook: An Update*, Auto, Motorcycles and Light Duty Trucks, (December 1999), p. C-26. ⁸ The Canadian Petroleum Producers Association has reported 1997 emissions for Canada's petroleum refining sector to be 16.6 Mt. This sector total has been deducted from "Manufacturing and Mining" and added to "Oil, Gas and Coal" in Table 1.1. ⁹ Canadian Industry Program for Energy Conservation, *1997 Aggregated Results*, Presentation to CIPEC Task Group Leaders, (December 1998). ¹⁰ Canadian Electricity Association. ¹¹ The Canadian Petroleum Producers Association has reported 1997 emissions for Canada's petroleum refining sector to be 16.6 Mt. This sector total has been deducted from "Manufacturing and Mining" and added to "Oil, Gas and Coal" in Table 1.1. ¹² Weighted average using oil, gas and coal sector statistics. ¹³ VCR Inc. estimation. More analysis is required to relate mobile sources to the VCR Inc. Registry. ¹⁴ Analysis and Modelling Group, *Canada's Emissions Outlook: An Update*, Auto, Motorcycles and Light Duty Trucks, (December 1999), p. 36 (96.2 per cent of 26Mt) ¹⁵ Assumes 100 per cent of federal and provincial government emissions, and 10 per cent of other buildings. ¹⁶ An additional 20Mt reduction of CO₂ from Land Use Change and Forestry is not included in Inventory totals.

1.2 Energy

The energy production sector as a whole, including coal, downstream petroleum, electric utilities, energy pipelines, natural gas distribution, and upstream oil and gas, account for 33.2 per cent of Canada's national GHG emissions inventory. Energy production and consumption account for approximately 78 per cent¹⁷ of the entire Canadian GHG emissions from all sources. Figure 1-3 provides an insight into the role of each of the non-energy related sources with respect to the national GHG inventory.

Figure 1-3: Sources of GHG Emissions



Source: Canadian Greenhouse Gas Inventory 1997, December 1999, p. 5.

1.2.1 COAL

The coal sector represents the mining and processing of coal in Canada. The industry is comprised of two large companies and of several small coal producers. Five companies from this sector may be found in the Challenge Registry. Both of the large coal producers have registered Action Plans, one of which has earned Gold Champion-level Reporter status. Of the smaller coal producers, one is a VCR Inc. Gold Champion-level Reporter. These registrants represent virtually 100 per cent of the sector's total emissions.

“Providing jobs, energy and export revenue, the coal industry is a dynamic component of the Canadian economy. Its annual contribution to the GDP is over \$5.8 billion. Approximately 73,000 men and women are employed today as a result of the mining, use and export of coal.”¹⁸ Emissions from this sector result primarily from energy consumption in the form of coal, diesel fuel, electricity, natural gas and propane. Coal mining also produces fugitive methane emissions, the intensity of which varies significantly between mine sites. In 1997, emissions from energy consumption were 29 Mt CO₂ eq¹⁹, and fugitive emissions were 1.6 Mt CO₂ eq²⁰.

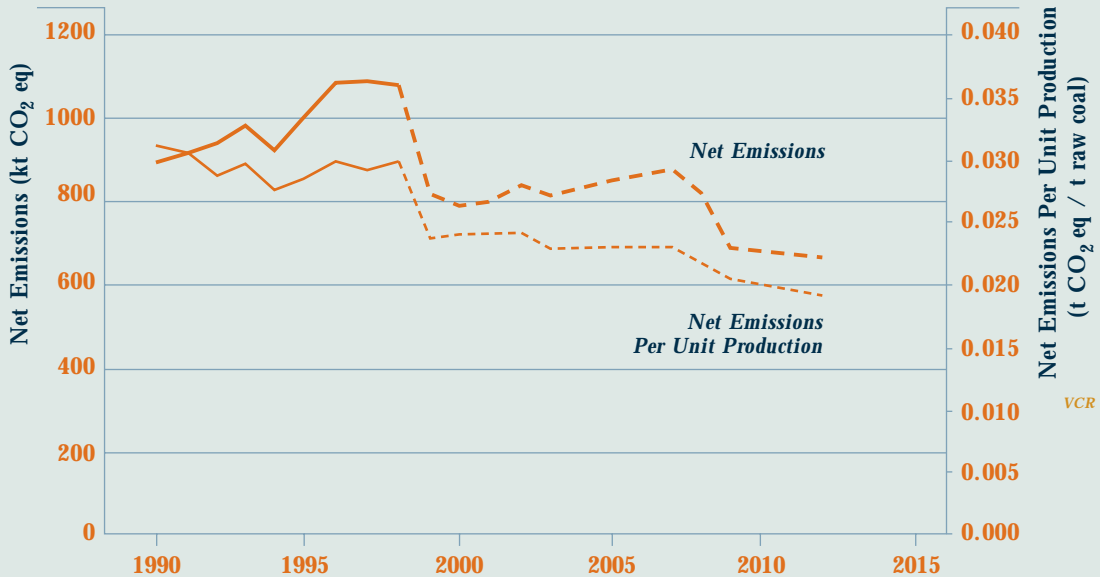
Figure 1-4 illustrates the dynamics of corporate planning in the timing of available reduction opportunities at Luscar Ltd., a major coal producer in Canada. While their emissions are above 1990 levels at present, Luscar anticipates that the measures that they have planned for the future will result in emissions well below that level.

One of the largest potential GHG emissions reduction initiatives that is currently being researched by this sector is the application of zero-emission coal energy processes. The Coal Association of Canada is now working with the Los Alamos National Laboratory to create a pilot zero-emission coal energy system. This study involves processing coal to produce hydrogen (H₂) and CO₂. The H₂ would be used in fuel cells to generate zero-emission electricity, and the waste CO₂ would then be reacted with a series of compounds, making use of waste heat and producing additional useful energy. At the end of the process, the CO₂ would be sequestered in an inert, solid compound resulting in no emissions to the atmosphere.

¹⁷ Analysis and Modeling Group, *Canada's Emissions Outlook: An Update*, National Climate Change Process, (December 1999), p. 9. ¹⁸ www.coal.ca, (December 12, 1999). ¹⁹ F. Neitzert, K. Olsen and P. Collas, *Canadian Greenhouse Gas Inventory 1997: Emissions and Removals with Trends*, Environment Canada, (April 1999), p. 112.

²⁰ F. Neitzert, K. Olsen and P. Collas, *Canadian Greenhouse Gas Inventory 1997: Emissions and Removals with Trends*, Environment Canada, (April 1999), p. 84

Figure 1-4: Luscar Ltd. - GHG Emissions



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Source: Luscar Ltd., Voluntary Challenge and Registry Action Plan 1999, October 14, 1999.

“Largely through internal greenhouse gas reductions, Luscar forecasts that its emissions will be reduced 6% below 1990 levels by the years 2008 to 2012.”

Luscar Ltd., October 1999

1.2.2 DOWNSTREAM PETROLEUM

The downstream petroleum sector continues to be an active participant in the voluntary reduction of GHG emissions and energy consumption. The industry has invested significant capital in its refineries across Canada in order to make energy efficiency improvements that will reduce both emissions and operating costs. At present, VCR Inc. has registered Action Plans from eight companies in this sector, all of which have followed up with Progress Reports. These registrants represent virtually 100 per cent of the sector’s total emissions. Since VCR Inc. introduced its Champion-level Reporting System, four of these registrants have earned Gold status, and one has earned Bronze status. The Canadian Petroleum Products Institute (CPPI) was also awarded Gold Champion-level reporting status in 1998.

The sector consists of petroleum refining, product distribution, and the marketing and retailing of products. Petroleum products include transportation fuels (such as motor gasoline, diesel fuel and aviation fuel), heating oils (such as light and heavy fuel oil), refinery Liquefied Petroleum Gases (LPGs), lubricants (such as oils and greases), asphalt and petrochemical feedstocks. There are 21 refineries in Canada, operated by 13 companies, with a combined capacity of 1.9 million barrels per day. There is at least one refinery in each province except for Manitoba, Prince Edward Island and the Territories. Montréal, Sarnia and Edmonton are the major refining centres in Canada, each operating more than one refinery.

The bulk of GHGs from this sector originates from the processing and production of petroleum products at the refineries. Emissions from the distribution, marketing and retail sales of petroleum products result from the use of transportation fuels and are included in the transportation sector. The data that follows, therefore, refers to the performance of the refineries alone.

The major source of direct GHG emissions originates from the combustion of natural gas and of heating oils for process heat in the refineries, while indirect emissions from the purchase of electrical power are the second highest source of GHGs.

Downstream production increased by seven per cent in 1998 (compared to 1990), while energy intensity (the amount of energy required to produce a cubic metre of product, i.e.: GJ/m³) improved by 12 per cent to 2.69 GJ/m³ in the same period. This has been achieved through the rationalization of production (shutting down inefficient refineries) and through the many energy efficiency capital projects implemented since 1990.

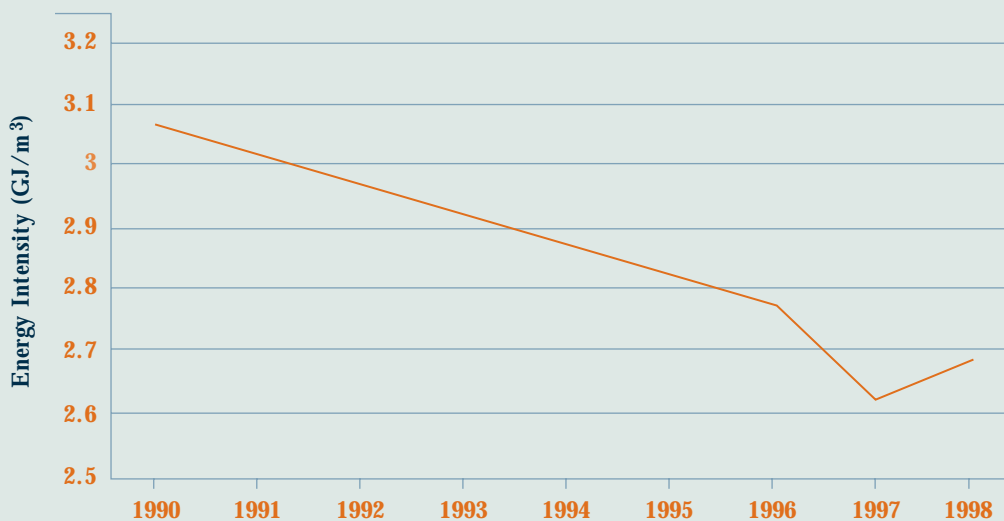
In 1995, CPPI member companies committed to improving refinery energy efficiency (in terms of the Solomon Energy Intensity Index or EII) by five per cent by the year 2000. They achieved this goal in 1997, a full three years ahead of schedule. In 1997, EII values for CPPI refineries improved by 2.2 per cent over 1996 to a value of 96.5, reflecting a total improvement of 15.7 per cent since 1990.

Energy efficiency (in terms of EII) for all Canadian refineries has also shown significant improvement since 1990. The combined EII (for all Canadian refineries) was 95.7 in 1998 (up from 94.5 in 1997), but still 17.4 EII units below the 1990 value. More energy was consumed on a per unit of production basis in 1998 due to the increased processing energy required to produce cleaner burning fuels.

Energy efficiency and emission reduction projects implemented by downstream companies in 1998 resulted in reductions of 4.4 Mt CO₂ eq per year. Total GHG emissions from Canadian refineries were equivalent to 16.1 Mt CO₂ eq in 1998 (down from 16.6 Mt in 1997). Projects planned to date for 1999 are expected to reduce emissions by a further 5.7 Mt CO₂ eq per year. For the year 2000 and beyond, projects identified to date will reduce emissions by a further 9.6 Mt CO₂ eq per year.

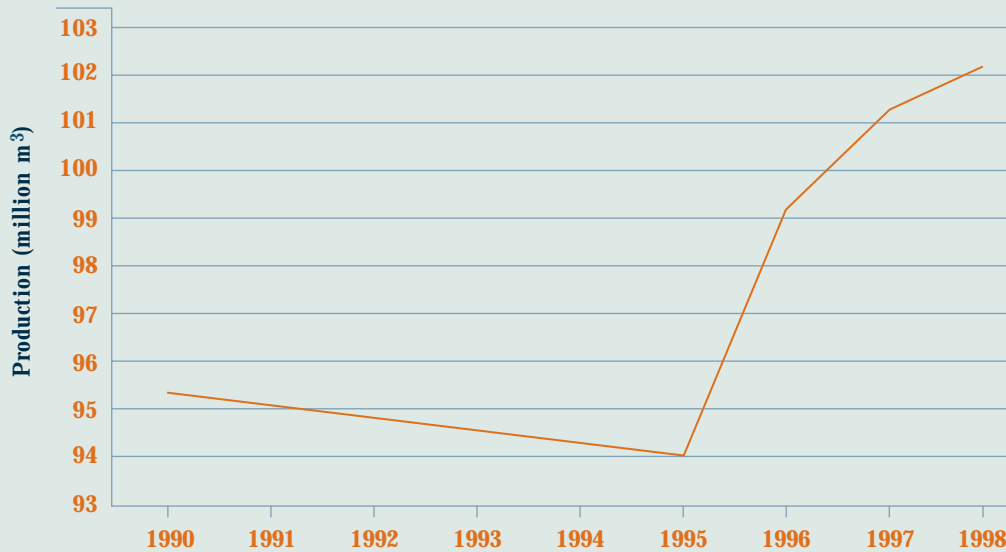
Energy efficiency per unit of production is illustrated in Figure 1-5 for this sector, while the growth in production is highlighted in Figure 1-6.

Figure 1-5: Energy Efficiency at Canadian Refineries (1990-1998)



Source: Canadian Industry Energy End-use Data and Analysis Centre (CIEEDAC), *Review of Energy Consumption in Canadian Oil Refineries and Upgraders 1998*, Simon Fraser University, 1998.

Figure 1-6: Production from Canadian Refineries (1990-1998)



Source: Michelussi, Tom. Canadian Petroleum Products Institute, 1999.

“It is important for industry to develop and implement effective strategies that will result in environmentally responsible actions, not only on the part of the company, but on the part of employees as well.”

Irving Oil Ltd., October 1999

1.2.3 ELECTRIC UTILITIES

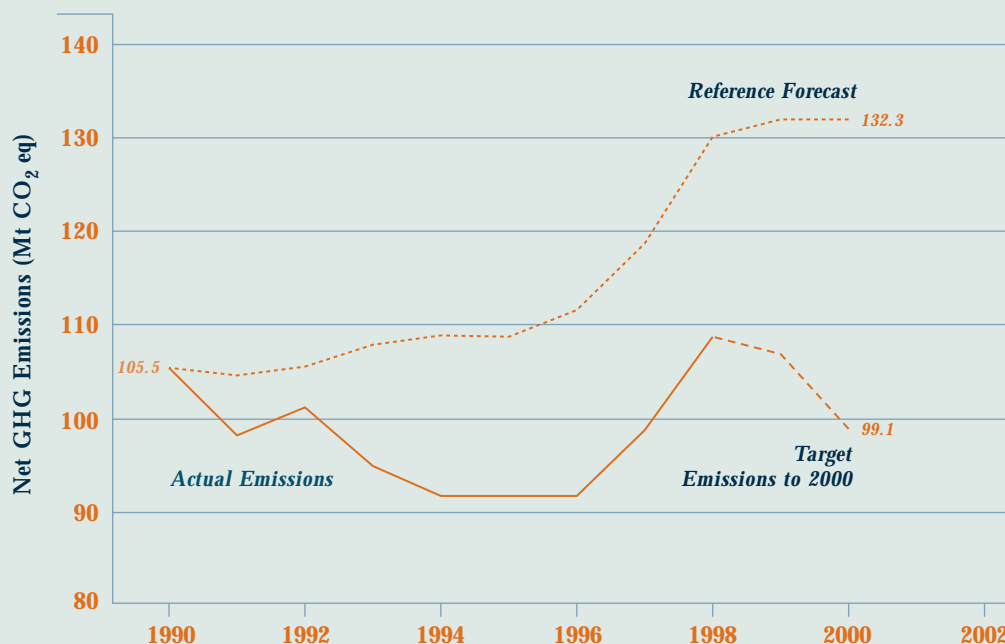
The electric utilities sector is responsible for the generation, transmission and distribution of electric power to residential, commercial, institutional and industrial customers across Canada. This sector is one of VCR Inc.'s most rigorous reporters. Of the ten major electric utilities, eight have registered Action Plans with VCR Inc., and six of these are Champion-level reporters. There are also numerous small electric utilities registered with VCR Inc., including the Northwest Territories Power Corporation – one of seven Champion-level reporters from this sector who earned Gold reporting status in 1999.

Electricity generation energy sources include fossil fuel, nuclear, hydro, biomass, wind and solar – the first three of which dominate the sector's energy mix. GHG emissions resulting from this sector stem almost exclusively from the combustion of fossil fuels that are used to generate electricity including coal, heavy oil, natural gas and diesel fuel. The GHGs emitted by the sector through combustion include large quantities of CO₂, smaller quantities of N₂O, and very small quantities of CH₄. The industry also uses sulphur hexafluoride (SF₆) for certain switches and transformers, small quantities of which escape into the environment during adverse conditions. These emissions are negligible compared to CO₂ emissions resulting from generation.

Figure 1-7 illustrates the Canadian Electricity Association forecast that, by the year 2000, net electricity sector emissions will be reduced by more than six per cent below 1990 levels – a considerable achievement considering that consumption of

electric energy has grown by an average two per cent per year since 1990 and is expected to continue at this rate throughout the Kyoto budget period (2008-2012).

Figure 1-7: Electric Utility Sector GHG Emissions



Source: Canadian Electricity Association, *Overview of 1998 Electricity Submissions of 1997 Year End Data to Canada's Voluntary Challenge Program, Figure 5: Impact of GHG Reductions in the Electricity Sector 1990-2000, April 1999, p. 10.*

Among the specific activities that are being undertaken by the companies in this sector to reduce GHG emissions are the following:

- ▶ Fuel switching to less carbon intensive fuels (especially in the Maritimes, where natural gas is expected to reduce heavy oil and coal consumption considerably).
- ▶ Connecting remote customers to the grid, especially in Manitoba and in the Northwest Territories where the grid energy supply (primarily hydro-electric generation) replaces local diesel-fired generation.
- ▶ Continuous improvements to the efficiency of electrical generation, transmission and distribution. (The impact of such improvements can be immense. For example, TransAlta's internal efficiency improvements program prevented the emission of nearly 500 kt CO₂ eq in 1998.)
- ▶ Continued electricity system deregulation, resulting in increased local generation. (These small generation systems typically use the latest technology in reliable renewable energy or natural gas cogeneration systems. Each of these is considerably more efficient than conventional fossil fuel thermal generating stations. Since local power is generated closer to the customer, transmission losses are reduced considerably, resulting in a more efficient electrical system. Electricity deregulation also allows customers to choose their power supply, including the purchase of "green" energy.)
- ▶ Offsets, both foreign and domestic. (By the year 2000, Canadian electric utilities will have secured nearly 15 Mt CO₂ eq through the adoption of offsets.)
- ▶ Improvement of customer efficiencies that reduces both generation requirements and transmission losses. (For example, a 10 MW reduction in energy consumption for a remote customer may result in a generation load reduction of 11 MW or more.)

Ontario Power Generation and Ontario Hydro Services Company remain committed to meeting their year 2000 net greenhouse gas emissions targets, despite increased use of fossil fuels during their nuclear recovery program.

Ontario Hydro, March 1999

1.2.4 ENERGY PIPELINES

The energy pipeline sector owns and operates over 100,000 kilometres of pipeline and associated facilities across Canada.

At present, VCR Inc. has received Action Plans from 15 companies in this sector, ten of which have also registered Progress Reports. These registrants represent 100 per cent of the sector's total emissions. Since VCR Inc. introduced its Champion-level Reporting System, four of these registrants have earned Gold status, and an additional three have earned Silver.

With an asset value of over \$17 billion, these pipelines transport more than 6.0 trillion cubic feet of natural gas annually, and 800 million barrels of liquid hydrocarbons annually, to domestic and export markets. The products transported by Canada's pipeline industry in 1998 were valued at \$32 billion.

The Canadian Energy Pipeline Association (CEPA) reports that emissions produced by the pipeline industry stem from direct and indirect sources.²¹ As illustrated in Figure 1-8, natural gas pipelines produced direct emissions equivalent to 17.0 Mt CO₂ eq in 1998. These direct emissions comprise CO₂ produced largely by natural gas lines that use gas-powered compressors, pumps and heaters to drive product through the lines, and 5.2 Mt CO₂ eq²² of methane, the chief component of natural gas, released primarily as fugitive emissions.

Liquid hydrocarbon lines are mainly responsible for the industry's indirect emissions, since these pipelines use electric pumps. Indirect emissions are shown in Figure 1-9 and totaled 2.3 million tonnes CO₂ eq according to 1998 data collected by CEPA.

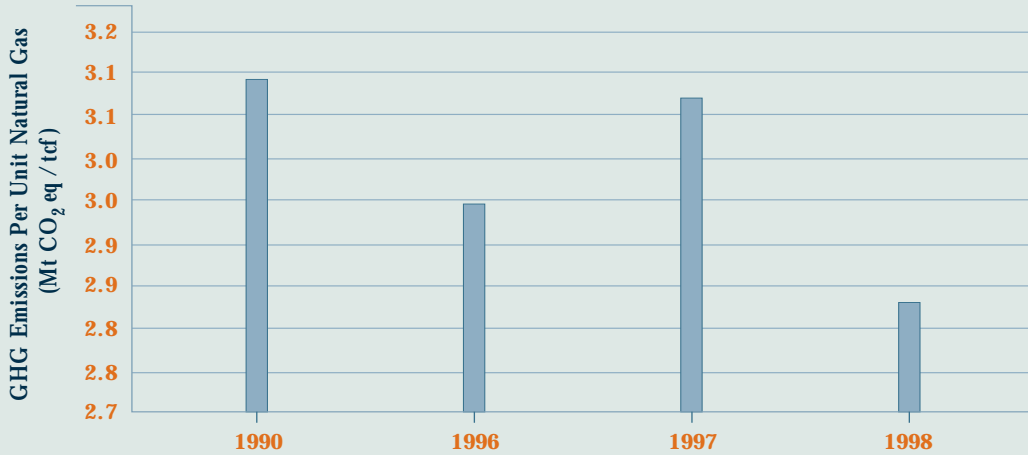
Total emissions have increased by 66 per cent from 1990 to 1998, primarily as a result of industry growth driven by consumer demand. During this time, the volume of liquid hydrocarbons and natural gas deliveries increased by 43 per cent and 76 per cent respectively. Other factors influencing GHG emissions include the following:

- ◆ Increased demand for Canadian oil and natural gas, primarily to fill incremental markets in the United States and to meet the increasing demand for cleaner fuels. Over 75 per cent of the increase in volumes delivered was exported to the U.S.
- ◆ Expansion of systems to reach consumers in more distant markets throughout North America has required the addition of pumps and compressors, one of the major sources of the sector's emissions.
- ◆ The production of natural gas is shifting to the northern parts of the Western Canadian Sedimentary Basin, resulting in longer transportation distances to reach markets and increased fuel consumption.
- ◆ The shift in the types of products shipped through liquid hydrocarbon lines from conventional light crude oil to heavier oils and bitumen blends has resulted in a higher flow resistance and requires additional power to travel the same distance, thereby increasing levels of indirect emissions.

²¹ When companies have a variety of business units, only the emissions from the transmission portion of a company's business are reported. ²² F. Neitzert, K. Olsen and P. Collas, *Canadian Greenhouse Gas Inventory 1997: Emissions and Removals with Trends*, Environment Canada, (April 1999), p. 31.

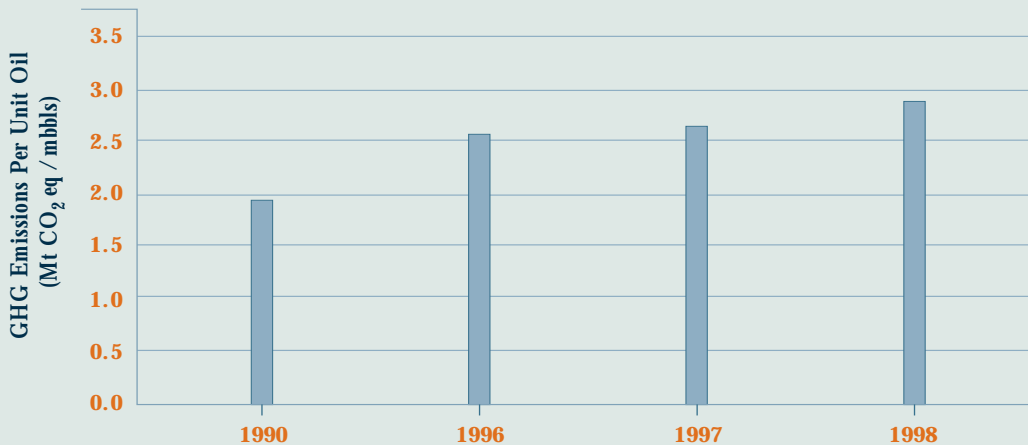
- ♦ The addition of new pipeline systems in Canada since 1990 is a trend that will continue, as the Maritimes and North East and Alliance pipeline systems come into operation. These new pipelines are being designed to take advantage of the latest GHG reduction technology, including better control of fugitive emissions.

Figure 1-8: Energy Pipeline Direct Emissions



Source: Stowkowy, Bonnie. Canadian Energy Pipeline Association, November 1999.

Figure 1-9: Energy Pipeline Indirect Emissions



Source: Stowkowy, Bonnie. Canadian Energy Pipeline Association, November 1999.

Since 1990, exports of oil and gas have increased dramatically, resulting in increased greenhouse gas emissions. However, the industry is working to reduce and offset these emissions.

Canadian Energy Pipeline Association, Fall 1998

1.2.5 NATURAL GAS DISTRIBUTION

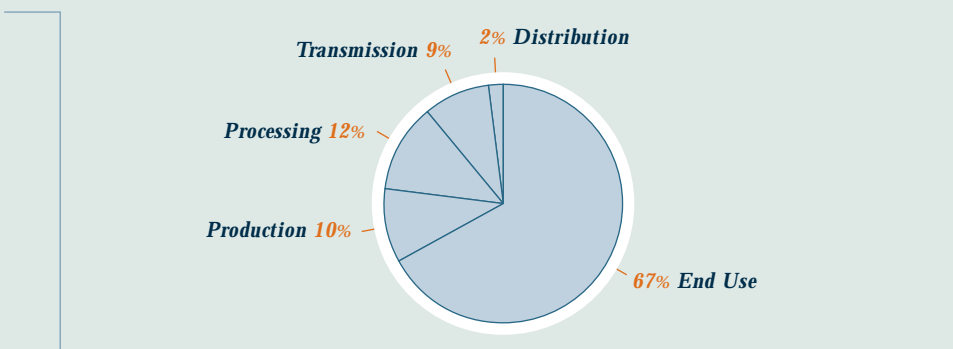
The natural gas distribution sector currently provides some 32 per cent of Canada's primary energy. At present, VCR Inc. has registered seven companies from this sector, each of which has registered Progress Reports. These registrants represent 80 per cent of the sector's total emissions. Since VCR Inc. introduced its Champion-level Reporting System, two of these registrants have earned Gold status.

The Canadian Gas Association (CGA) reports that growth in natural gas consumption is expected to continue at a rate of approximately two per cent per year. In addition, over 50 per cent of Canadian natural gas production is currently exported to the U.S., where Canadian natural gas meets about 13 per cent of American demand. The production, processing, transmission and use of natural gas contribute towards the emission of GHGs (see Figure 1-10). However, the volume of emissions stemming from the use of natural gas is small, particularly in relation to the benefits associated with the efficient use of natural gas. The principal GHG emitted from the natural gas cycle is CO₂, 67 per cent of which results from end use combustion at the burner tip. The total quantity of CO₂ from natural gas in Canada (industry and end use combined) in 1995 was 148.3 Mt, which is equivalent to about 30 per cent of all CO₂ emissions from anthropogenic Canadian sources and 0.7 per cent of the total global CO₂ emissions. Total CH₄ emissions from the natural gas cycle in Canada for 1995 were equal to 1.1 Mt or 13.8 per cent of all GHG emissions from natural gas on a CO₂ eq basis.

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It is anticipated that, on an emissions per unit of production basis, GHG emissions resulting from natural gas operations will continue to decrease as new measures are implemented. However, because of the continuing increase in demand for natural gas, it is not certain that there will be a decline in absolute emission volumes from this energy source. The total emissions from natural gas will still be lower, however, than if the increasing demand for energy were being met through the use of other more GHG emissions intensive fossil fuels.

Figure 1-10: GHG Emissions from Natural Gas



Source: Keyes, Jennifer. Canadian Gas Association, November 1999.

“Our 1999 Annual Update to [VCR Inc.]... moves the company closer to realization of our aggressive emission reduction targets and goals, despite the pressures of significant growth in the Company's customer base and volume sales.”

Enbridge Consumers Gas, September 1999

1.2.6 UPSTREAM OIL AND GAS

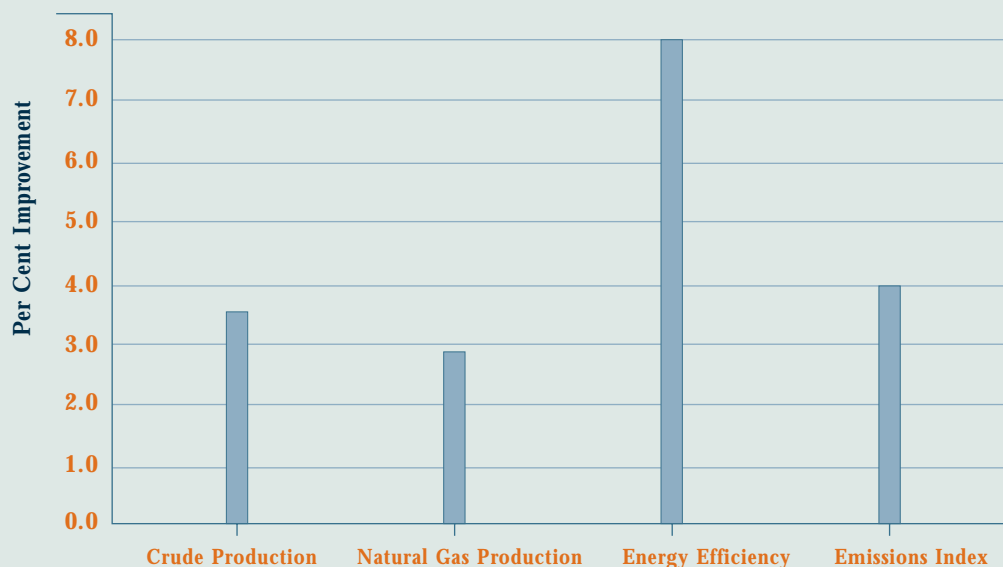
The upstream oil and gas industry has been an active participant in the voluntary approach towards GHG reduction. At present, VCR Inc. has registered Action Plans from 77 companies in this sector, 54 of which have registered Progress Reports. These registrants represent 93 per cent of the sector's total emissions. Since VCR Inc. introduced its Champion-level Reporting System, eleven of these registrants have earned Gold status, 14 have earned Silver status, and seven have earned Bronze status.

The members of this sector explore, produce and process crude oil and natural gas throughout Canada. Products include light crude oil, heavy crude, natural gas, sulphur, natural gas liquids and pentanes+ liquids. Approximately 81 per cent of Canada's liquid hydrocarbons are produced in Alberta, 14 per cent in Saskatchewan, and two per cent in British Columbia, while about 83 per cent of Canada's natural gas production comes from Alberta, 12 per cent from B.C. and four per cent from Saskatchewan. The major source of *direct* GHG emissions result from the combustion of natural gas (for the compression of gas and the heating of process fluids) and the loss of CH₄ from fugitive emissions; *indirect* GHG emissions associated with the purchase of electrical power represent the third highest source.

The Canadian Association of Petroleum Producers (CAPP) reports that in 1998, production of crude oil in Western Canada increased by 0.6 per cent, while natural gas production increased by 2.9 per cent over 1997. In addition to these volumes, offshore oil production from the Hibernia project in Eastern Canada started in earnest in 1998 and natural gas production from Sable Island will start in early 2000. Total Canadian crude oil production in 1998 was 3.5 per cent higher, while natural gas sales were 2.9 per cent higher than 1997.

Upstream oil and gas companies registered at VCR Inc. have shown significant improvement in recent years. Figure 1-11 illustrates that GHG performance from reporting upstream companies has improved. In fact, on an aggregate basis, energy efficiency has improved by eight per cent from 2.70 in 1997 to 2.49 GJ/m³ OE in 1998. Similarly, emissions on a production basis have declined by four per cent from 0.293 in 1997 to 0.280 tonnes CO₂ e/m³ OE in 1998. Production of crude oil and natural gas were up over three per cent throughout the same time period.

Figure 1-11: Change in Performance (1997-1998), Upstream Oil and Gas Industry



Source: Michelussi, Tom. Canadian Association of Petroleum Producers, November 1999.

Table 1.2 lists some of the reduction options that were implemented in 1998.

Table 1.2: Types of Reduction Options Implemented in 1998 by the Upstream Sector

Flare Reduction	Reduction of Process Methane Losses	Reduced Fuel Consumption	Reduced Electrical Power
Small-scale turbine power generation.	Installation of instrument air compressors.	Installation of high efficiency burners..	Installation of VFD motors.
Compression/vapor recovery for sales.	Compression/vapor recovery for sales.	New engine combustion technologies.	Installation of high efficiency motors.
Recovery for use as process fuel.	Installation of low/no bleed equipment.	Oil/gas battery production consolidation.	Re-sizing motors.
	Leak detection and repair (LDAR) programs.	Combustion/O ₂ content optimization for boilers.	Energy audits.
	New process technologies.	Energy audits.	
	Glycol dehydrator optimization.	Waste heat recovery.	

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Source: Michelussi, Tom. Canadian Association of Petroleum Producers, November 1999.

“...Oil and natural gas will continue to be the dominant contributors to the global energy supply well past 2010. Natural gas will contribute to lower emissions. In the case of oil, there currently is no low cost, lower GHG-emission primary energy supply alternative that could meet the world demand...”

Climate Change Secretariat, September 1999

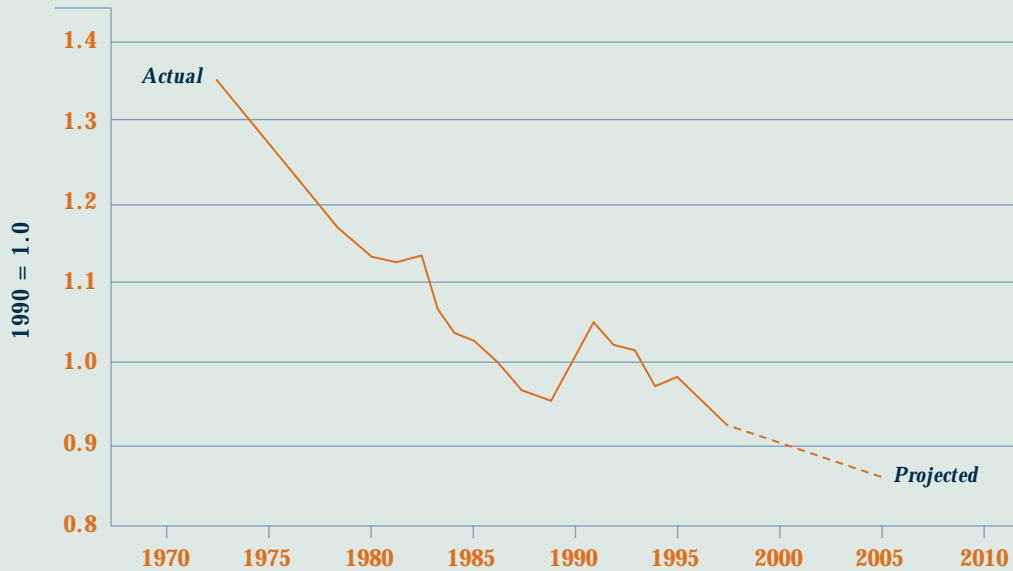
1.3 Manufacturing and Metal Mining

The manufacturing and metal mining sector includes aluminium, cement, chemical, forestry, general manufacturing, iron and steel, metal mining, pulp and paper, smelting and refining, textiles, and vehicles and parts manufacturing. As a whole, they account for 16.1 per cent of Canada’s national GHG emissions inventory.

This sector utilizes a unique peer group organization structure called the Canadian Industry Program for Energy Conservation (CIPEC) to encourage energy conservation and GHG emission reductions. This year, CIPEC is celebrating 25 years of continuous reductions in the energy intensity of its operations. It has capitalized on a new crop of “low hanging fruit” every year in order to achieve levels of GHG emissions virtually equal to that of 1990 in spite of a 20.6 per cent growth over the nine-year period from 1990 to 1998! (see Figure 1-12) The optimism and practical know-how that CIPEC brings to the climate change challenge is solid evidence of constructive innovation at work. Its impressive achievement dramatically illustrates what Joseph J. Romm states in his book *Cool Companies* that “... the entire notion that low hanging fruit is easily exhausted turns out to be a myth.”²³

²³ Joseph J. Romm, *Cool Companies: How the Best Businesses Boost Profits and Productivity by Cutting Greenhouse Gas Emissions*, Island Press, (1999), p. 12.

Figure 1-12: CIPEC Energy Intensity Index (1973-2005)



Sources: Canadian Industry Program for Energy Conservation, CIPEC Consolidated Performance 1990, Energy, Mines and Resources Canada, 1990.
Canadian Industry Program for Energy Conservation, 1997/1998 Annual Report, Natural Resources Canada, 1999, p. 4.

1.3.1 AUTO MANUFACTURING

The auto-manufacturing sector includes the original vehicle manufacturers, their suppliers, and the after-parts market. Several major automotive and truck assembly plants are located in Canada and a significant portion of their production is destined for U.S. markets.

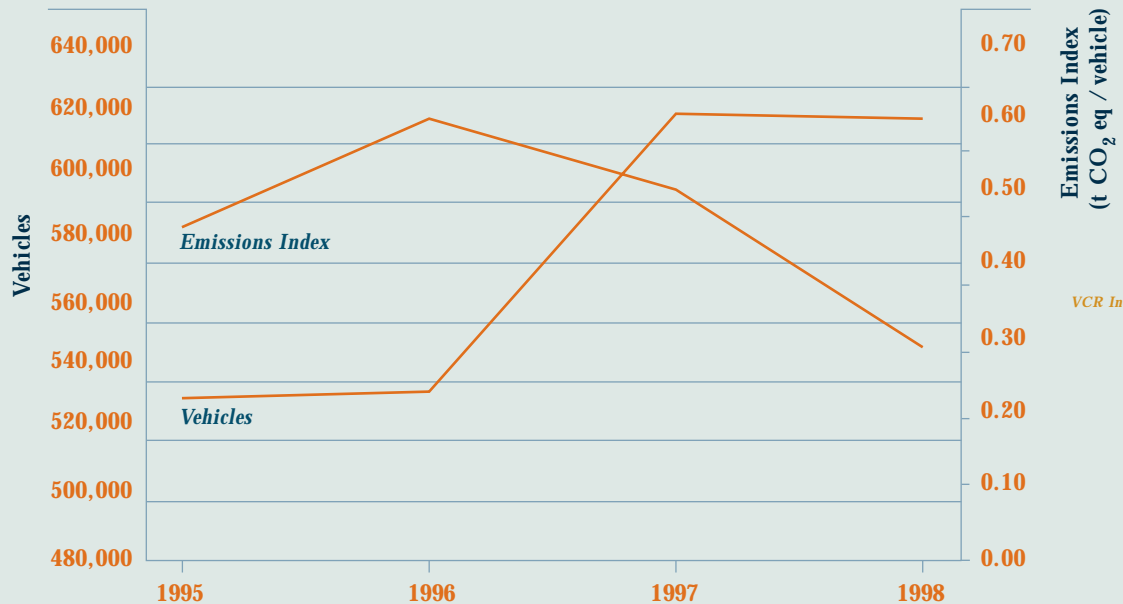
At present, VCR Inc. has registered Action Plans from eleven companies in this sector, three of which have registered Progress Reports. These registrants represent a majority of the sector's total emissions. Since VCR Inc. introduced its Champion-level Reporting System, one of these registrants has earned Gold status, while two others have earned Silver and Bronze respectively.

Auto manufacturers use considerable energy in their manufacturing process, in addition to relatively small quantities of energy for building comfort and vehicle testing. Primary energy inputs for manufacturing are typically fossil fuels (coke, coal, oil and natural gas) and electricity. The fossil fuel consumption results in direct GHG emissions, while electricity consumption results in indirect GHG emissions at the supplying utility. The energy mix varies from manufacturer to manufacturer; however, natural gas is the primary energy source (+55 per cent), followed by electricity (15 to 30 per cent), with the other fossil fuel sources rounding out the mix. Many different methods are being implemented to reduce GHG emissions within the auto manufacturing industry. Most facilities are switching to less carbon intensive fuels for energy intensive processes such as metal casting. Individually, small leaks in HVAC²⁴, steam, process water and compressed air systems may appear relatively insignificant. However, additional efforts are being made to detect and to repair leaks throughout all facilities, resulting in large total energy savings and resulting GHG emission reductions. Energy efficient lighting also plays a major role – saving over 26.5 million kWh per year at General Motors Oshawa Car Assembly Plant alone. By installing energy monitoring systems, energy consumption during non-peak periods is greatly reduced – Ford's Oakville Assembly plant reduced weekend energy consumption by over 15 per cent.

²⁴ Heating, ventilation and air conditioning.

Figure 1-13 illustrates the progress that this sector has made in reducing GHG emissions.

Figure 1-13: Ford of Canada Assembly Plants - GHG Emissions Intensity



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Source: McLean, David A. Ford Motor Company of Canada, Limited: 1999 Action Plan for Manufacturing and Assembly Facilities, October 1999.

“Generation of CO₂ (including off-site generation) has been reduced by 39 per cent.”

General Motors of Canada Limited, October 1999

1.3.2 CEMENT

The cement sector is comprised of Canada’s cement and concrete producers. The Canadian Portland Cement Association (CPCA), whose members account for 100 per cent of Canada’s cement industry, has been actively involved in the National Climate Change Process since 1995. Six cement companies, representing 95 per cent of Canada’s cement and concrete producers, have registered Actions Plans with VCR Inc. (A seventh organization, a U.S.-based company, also registered its Canadian operations.) One organization has submitted a Progress Report that earned Bronze Champion-level Reporter Status.

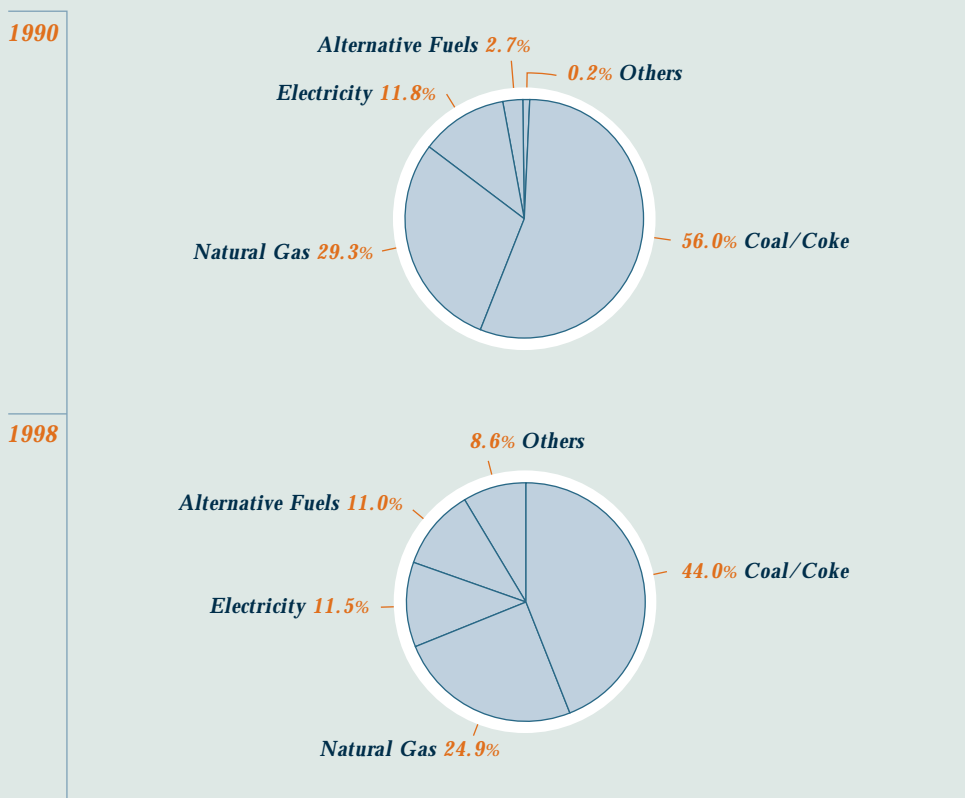
Since the mid-1970s, the implementation of new cement production technology has resulted in an overall 30 per cent reduction in energy consumption per tonne of produced Portland cement. Cement production requires that a mixture of ingredients be exposed to high temperatures (up to 1870 degrees Celcius) in a kiln. The conventional technology – *the wet kiln process* – requires that cement ingredients are ground and mixed as a wet slurry, while excess water is evaporated in the kiln, thereby adding to the kiln fuel consumption. The next generation of technology – *the dry kiln process* –, however, eliminates the need for wet grinding and mixing, and reduces kiln fuel consumption by 25 per cent per unit production. In 1999,

virtually all Canadian cement production employed the dry kiln process. As well, more advanced pre-heater/heat recovery systems are being installed to improve the efficiency of the dry kiln process, whereby the mixed products enter the kiln at a much higher temperature, resulting in the reduction of kiln fuel consumption. Dry kiln systems with pre-heater/heat recovery systems have proven to be 40 per cent more efficient than conventional wet kiln systems, and now account for over six per cent of industry production.

Approximately 60 per cent of the GHG emissions produced by this sector are derived from the natural process of limestone (a cement ingredient) calcination. The remaining portion is a result of the combustion of fossil fuels that are used during the manufacturing process. A variety of fuel sources are employed, but coal and natural gas are the traditional sources.

Recent industry focus on waste-derived energy and waste by-products as additives in the final product has had a significant impact on the consumption of these fossil fuels. Although waste-derived fuels do not result in direct GHG reductions, society as a whole benefits from the safe combustion of potentially hazardous materials and from the reduced consumption of fossil fuels. Figure 1-14 illustrates this fuel-switching trend.

Figure 1-14: Cement Manufacturing Energy Mix (1990 vs. 1998)



Source: Cornelissen, Alicje. Canadian Portland Cement Association, November 1999.

In the case of waste by-product additives, gross GHG emissions have decreased, since fuel consumption is lowered when waste by-products such as blast furnace slag, silica fume or flyash are added.

Since the mid-1970s, improvements in cement production technology have reduced energy consumption per tonne concrete by 30%.

Canadian Portland Cement Association, September 1998

1.3.3 CHEMICALS

The chemical sector is comprised of manufacturers of a broad range of petrochemicals, inorganic chemicals, polymers, and other organic and specialty chemicals. At present, VCR Inc. has registered Action Plans representing 75 companies from this sector, 14 of which have registered Progress Reports. These registrants represent 100 per cent of the sector's total emissions. Since VCR Inc. introduced its Champion-level Reporting System, two of these registrants have earned Gold status, with an additional two earning Silver, and two earning Bronze. The four companies that have attained Gold and Silver reporting level status account for approximately 74 per cent of CO₂ emissions and 82 per cent of GHG emissions from the sector.

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Energy consumption through combustion in the manufacturing process is the key source of GHG emissions in this sector. In addition, manufacturing processes account for 90 per cent of direct CH₄ emissions, while fugitive CH₄ emissions account for the remaining ten per cent. Virtually all N₂O generated by this sector has been a result of vented gases in the production of adipic acid (a feedstock for the production of nylon). Worthy of mention, as well, is the independent initiative undertaken by the sole manufacturer of adipic acid in Canada, Dupont Canada Inc., who has installed facilities to abate its N₂O emissions. These facilities started operating in 1997 and are steadily improving their efficiency, having abated their N₂O by 15.5 per cent in 1997 and by over 50 per cent in 1998, with a goal of reaching 93.9 per cent by 2001.

The Canadian Chemical Producers' Association's (CCPA) 1999 submission to VCR Inc., *Reducing Emissions 7*²⁵, indicates that GHG emissions from the chemical sector in 1998, as compared to 1997, have decreased from 22.0 Mt CO₂ eq to 16.6 Mt CO₂ eq. This total reduction includes a 14 per cent reduction in CH₄ emissions, a 49 per cent reduction in N₂O emissions, and a marginal reduction in CO₂ emissions. As illustrated in Figure 1-15, CCPA member companies have indicated that the sector's net GHG emissions are projected to decline to 45 per cent of 1992 levels by the year 2003. The full *Reducing Emissions 7* report is available at <http://www.ccpa.ca>.

In an effort to reduce GHG emissions from their sector, chemical manufacturers have focused their actions on:

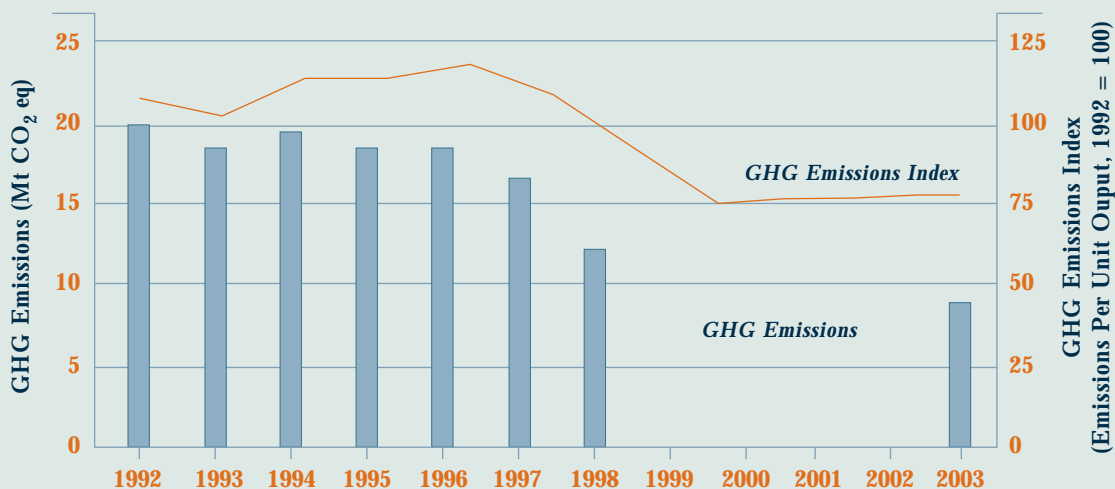
- ◆ pursuing energy-efficiency initiatives;
- ◆ implementing new emissions abatement technologies;
- ◆ reducing methane emissions to the atmosphere through significant process improvements; and
- ◆ implementing fugitive emissions control systems.

As an example of forward thinking and commitment to continuous improvement, a significant portion of the chemical industry has embraced highly efficient co-generation systems for the generation of electricity and steam. In a recent survey of member companies, respondents covering 82 per cent of CO₂ emissions indicated in aggregate that 49 per cent of electricity, and 44 per cent of steam requirements, are currently being met by co-generation. By 2010, the total needs being met by co-generation are expected to increase to 78 per cent and 67 per cent

²⁵ Canadian Chemical Producers Association, *Reducing Emissions 7: 1998 Emissions Inventory and Five Year Projections*, (November 1999).

respectively. Many chemical companies have also committed to the development and implementation of communications programs designed to educate company employees, industry peers and the general public on climate change issues.

Figure 1-15: GHG Emissions from the Chemical Sector



Source: Canadian Chemical Producers' Association. *Reducing Emissions 7: 1998 Emissions Inventory and Five-year Projections*, Figure 5.4 Product Output vs. Global Warming Potential of Emissions from CCPA Member Operations, November 1999, p. 28.

“In terms of global warming potential, [chemical] companies’ greenhouse gas emissions... are projected to decline 26% by 2003 based on 1992 amounts.”

Canadian Chemical Producers’ Association, December 1999

1.3.4 LIME

Canada’s merchant lime sector supplies products that are essential to basic industry, water treatment and the environment. Of the seven companies operating in this sector, four have registered Action Plans with VCR Inc., two of which have registered Progress Reports.

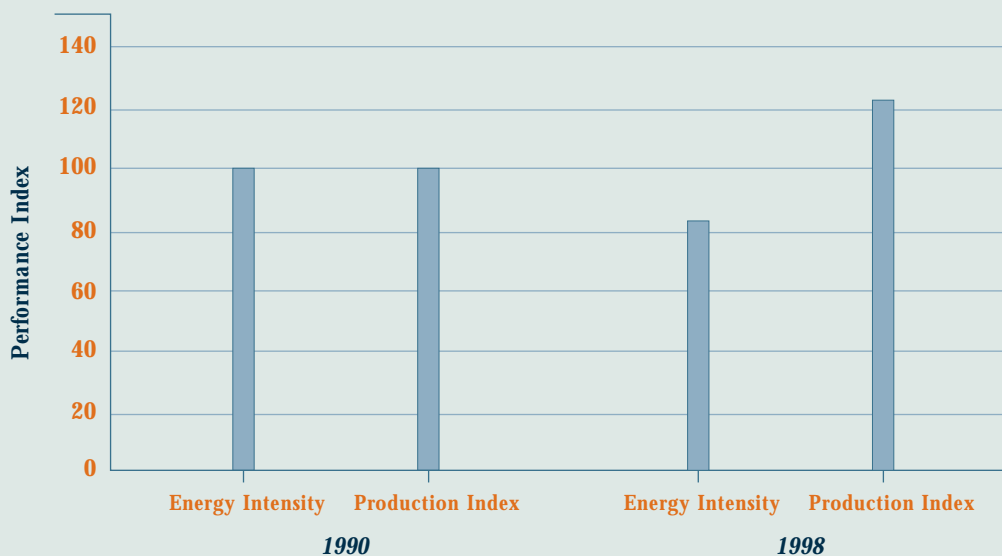
From 1990 to 1998, the sector increased lime production by 23 per cent. The primary GHG emission is CO₂, with approximately 60 per cent of emissions resulting from disassociation of CO₂ in the calcination process and 40 per cent from combustion of fossil fuels. The production of lime requires very high temperatures (in excess of 1200°C) that require combustion fuels as the principle source of energy. Natural gas is the largest energy source with petroleum coke and coal making up most of the balance. GHG emissions resulting from the production of lime are offset to some extent through reabsorption of CO₂ by lime during its life cycle. The National Lime Association estimates that over 25 per cent of lime produced in Canada and the U.S. reabsorbs CO₂ either in process or naturally.

Continuous improvement to reduce energy intensity, and consequent GHG emission intensity, has been the goal of the lime sector for decades (see Figure 1-16).

Since the 1970s, it is estimated that the merchant lime sector has achieved a 29 per cent decrease in energy intensity. Energy efficiency improvements have included the application of pre-heater technology, process automation, and increased mining efficiency. Current efforts are focused on energy intensity reduction through operator training, new refractory technology, high efficiency electric motors, more efficient mobile equipment, and reducing waste. Energy intensity has decreased by 15.5 per cent from 1990 through 1998. Capital stock turnover rates within the industry dictate the ability of lime manufacturers to continue to make significant energy intensity improvements.

The sector's energy intensity target is an improvement of 0.3 to 0.5 per cent per year through to the year 2001.

Figure 1-16: Lime Industry Performance



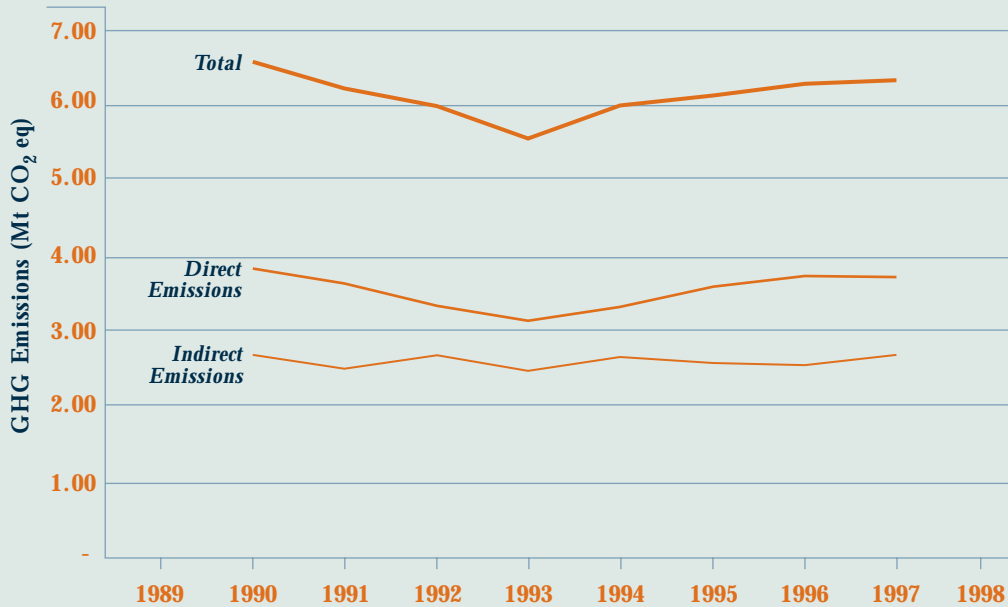
Source: Canadian Industry Program for Energy Conservation, 1997/1998 Annual Report, Natural Resources Canada, 1999, p. 57.

1.3.5 METAL MINING

Metals mined in Canada include copper, gold, iron, lead, nickel, silver, uranium and zinc. There are 22 metal mining companies with Action Plans that are registered with VCR Inc., four of which have earned Champion-level Reporter status. Two companies that produce base and precious metals earned Gold status in 1999, and an additional two earned Silver.

Energy consumption (fossil fuel combustion) is virtually the only source of GHG gas emissions for mining operations. The Mining Association of Canada (MAC) reports that 1997 emissions from this sector (direct and indirect) account for 6.4 Mt CO₂ or 0.9 per cent of Canada's total GHG emissions, which is equivalent to 4.5 per cent less than 1990 emissions (see Figure 1-17). Electricity is the dominant energy source, providing the sector with 44 per cent of its energy needs. Various fossil fuels (primarily middle distillates, heavy fuel oil and coke) account for the remaining 56 per cent.

Figure 1-17: GHG Emissions from Metal Mining



Source: Canadian Industry Energy End-Use Data and Analysis Centre (CIEEDAC), 1999.

Despite anticipated growth in the metal mining industry of one per cent per year from 1998 to 2000, total emissions are projected to remain 1.3 per cent below 1990 levels in the year 2000.

Various emission control strategies are being implemented throughout the industry including energy demand management and monitoring, incorporating “best technology” in new equipment design, mine ventilation optimization, and employee awareness activities. In addition to reducing GHG emissions, these initiatives realize cost savings, which is a significant incentive in an industry where energy costs account for approximately ten to 25 per cent of total operations cost.

“The Golden Giant Mine has and will continue to incorporate policies to reduce energy consumption and greenhouse gas emissions. These policies include the use of high efficiency motors, energy management practices, and employee education programs.”

Battle Mountain Gold, July 1999

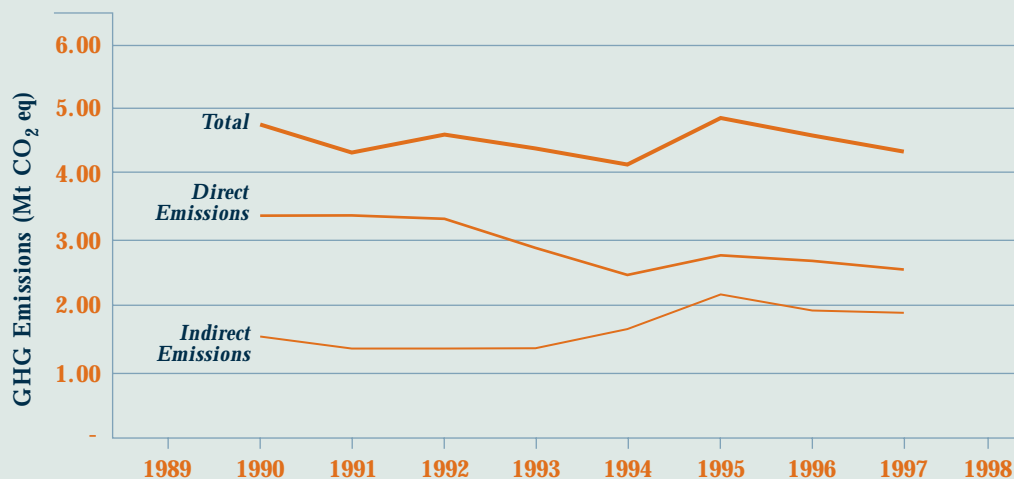
1.3.6 MINERAL PROCESSING

This sector includes the refining and smelting of base metals (not uranium, iron, aluminium, magnesium and precious metals). The group includes twelve companies with Action Plans that are registered with VCR Inc., most of which also mine base or precious metals. These integrated metal processors include two Gold Champion-level Reporters. Three of these organizations have also submitted Progress Reports. VCR Inc. registrants represent the lion’s share of GHG emissions from this sector.

GHG emissions from this sector result primarily from the consumption of fossil fuels for energy. MAC has reported that 1997 GHG emissions account for 4.4 Mt CO₂ or 0.6 per cent of Canada's total emissions, which is equivalent to a reduction of 8.5 per cent below 1990 levels (see Figure 1-18). Electricity was the single largest energy source (48 per cent), but indirect emissions (from electricity generation) accounted for only 44 per cent of the GHG emissions. The majority of the emissions were direct emissions (56 per cent) from fossil fuels, primarily natural gas and coal. It is important to note that direct emissions were down by 25.4 per cent in 1997, when compared to 1990.

Future GHG emissions based on business-as-usual projections will be 5.7 per cent below 1990 levels in 2000, and 4.2 per cent higher in 2010, as GHG emissions increase with projected industry growth (one per cent per year). However, members of the sector are working to reduce GHG emissions and energy costs wherever possible.

Figure 1-18: Mineral Processing GHG Emissions



Source: Canadian Industry Energy End-Use Data and Analysis Centre (CIEEDAC), 1999.

Although magnesium processing is not included in the figures quoted for this industry group, it is important to note that recent commitments have been made to the Québec Ministry of the Environment by the companies involved to reduce the use of SF₆ (a particularly powerful GHG with a global warming potential of 23,900 times that of CO₂) in the magnesium smelting process. This will result in a 1.5 Mt CO₂ eq²⁶ reduction in GHG emissions by 2005.

*Investing in improved control systems results
in reduction of natural gas use in smelting processes.*

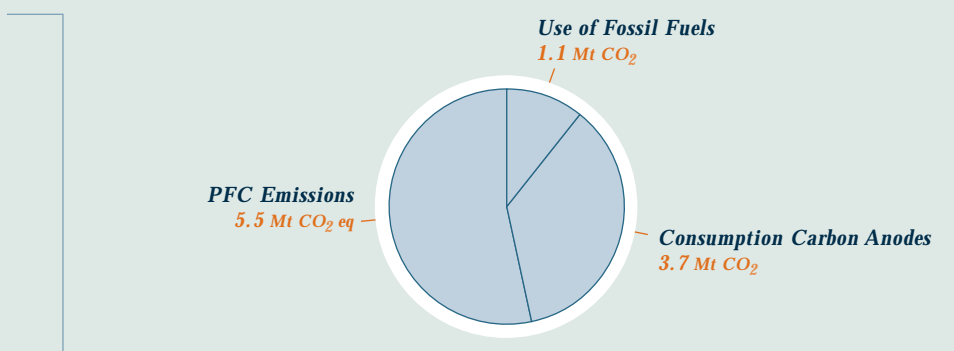
Inco Limited, October 1999

1.3.7 PRIMARY ALUMINIUM

The primary aluminium industry is comprised of eleven smelters that are owned and operated by five companies. Five Action Plans have been registered with VCR Inc., and three have followed-up with Progress Reports.

The Canadian smelters produce 2.3 million tonnes of aluminium per year, and Canada is the world's third largest producer. The Aluminium Association of Canada (AAC) reports that GHG emissions in aluminium production come from three sources. One, which accounted for about 1.1 Mt of CO₂ emissions in 1996,²⁷ is the use of fossil fuels for various process operations. As most Canadian aluminium production is based on hydro-electricity, the fossil-fuel-related GHG component is much smaller than in many other countries, where the electricity required for processing is derived from fossil fuels. The second source is the consumption of the carbon anodes in the electrolysis process, which converts the carbon anode to CO₂; in 1996 this accounted for about 3.7 Mt of CO₂. The balance, 5.5 million tonnes CO₂ eq, is emitted in the form of perfluorocarbons (PFCs)²⁸ (see Figure 1-19). The total tonnage of PFCs emitted is not large, but their global warming potential is 6 500 to 9 200 times that of CO₂ itself. These emissions arise intermittently when electrolytic operating conditions inevitably vary from optimal.

Figure 1-19: Aluminium Industry GHG Emissions Sources (1996)



Source: Van Houtte, Christian. Aluminium Association of Canada, November 1999.

Under a “Business as Usual” (BAU) scenario, the AAC estimates that GHG emissions from aluminium production could rise above 1990 levels by 18 per cent by 2010, and by 30 per cent by 2020. There are three sets of actions that could reduce GHG emissions below the BAU forecast. First, new control and monitoring systems at some operations could reduce PFC emissions at a cost of \$4.5 to \$7.5 million per smelter. These systems could reduce CO₂ eq emissions by 0.8 Mt of CO₂ eq per year by 2010. Second, installing point breaker feeders where appropriate could further reduce PFC emissions by 0.9 Mt per year of CO₂ eq. The cost would be in the order of \$200 million per smelter. Third, the BAU case assumes that older technology at some smelters will be phased out by 2015. If these older facilities were shut down prematurely, as soon as is technically and economically possible, GHG emissions would be reduced by 2010 by 0.8 Mt per year of CO₂ eq. However, the cost associated with this undertaking is estimated at \$1.36 billion.

Assuming that measures were in place to encourage the first two sets of actions, GHG emissions from aluminium production in Canada in 2010 would be about 10.2 Mt per year of CO₂ eq or about two per cent above 1990 levels. Because production by 2010 will be about twice that of 1990, the GHG intensity will have approximately halved in that period.

²⁶ Analysis and Modelling Group, *Canada's Emissions Outlook: An Update, National Climate Change Process*, (December 1999), p. 18. ²⁷ All reported emission figures are based on the average performance of the industry. ²⁸ PFCs are CF₄ and C₂F₆.

Measures that the industry would support to achieve these reductions include *Credit for Early Action* combined with a binding *Covenant*, in which the industry would commit to voluntary improvement in GHG intensity in return for a government commitment not to introduce mandatory measures. A redesigned *Capital Cost Allowance*, provided it did not bring the threat of countervailing actions, would also be supported.

There are two important “indirect” ways in which the aluminium industry can contribute further to achieving GHG reductions. One is through enhanced recycling and the other is through reducing the weight of vehicles. Both have great potential for reducing global GHG emissions.

“We believe that the reduction of energy consumption is achieved through employee awareness and accountability. [Aluminerie Luralco’s] employees are proud to participate in voluntary GHG emissions and energy reduction programs.”

Aluminerie Luralco, October 1998

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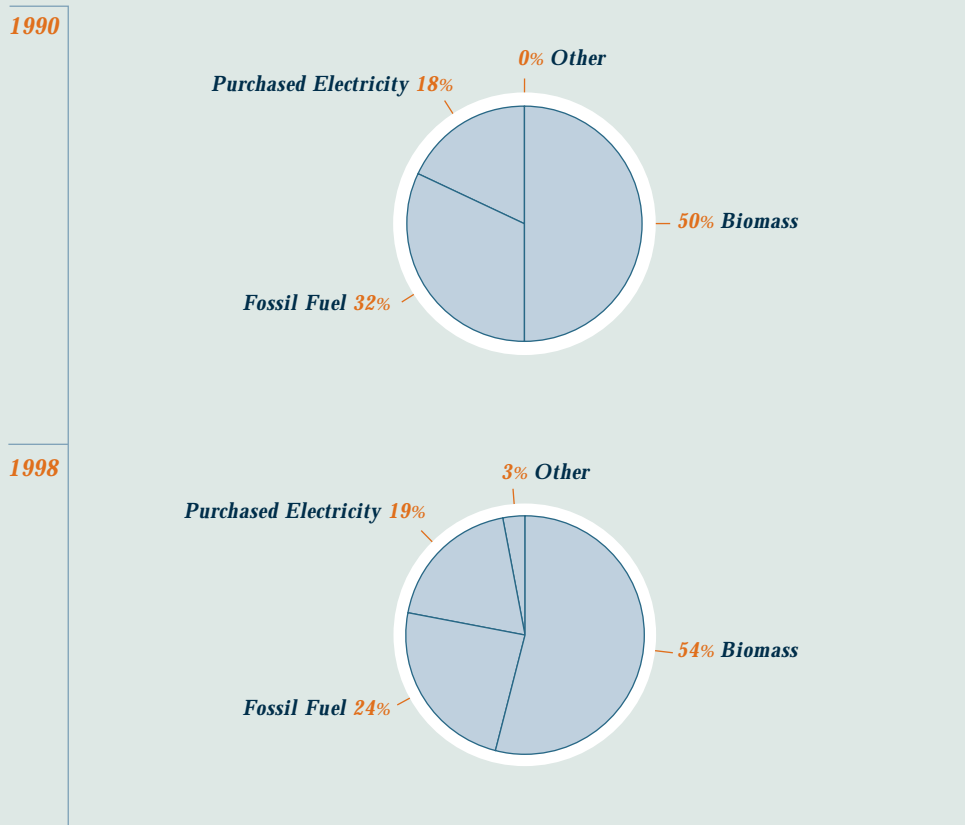
1.3.8 PULP AND PAPER

The pulp and paper sector encompasses the paper and allied industries, which include pulp mills, newsprint mills and producers of paperboard and fine paper products. It does not include the solid wood industries. However, because of the linkages in fibre supply, the two sectors are closely connected as many companies in the paper and allied industries also operate lumber, plywood or panel board manufacturing facilities. At present, VCR Inc. has registered 30 Action Plans from companies in this sector, 19 of which have also registered Progress Reports. These registrants represent 75 per cent of the sector’s total emissions. Since VCR Inc. introduced its Champion-level Reporting System, two of these registrants have earned Gold status, with an additional five earning Silver, and one earning Bronze.

As the pulp and paper industry is an energy intensive industry, it is not surprising that the industry’s dominant source of GHG emissions is associated with its energy consumption. It is estimated that approximately 80 per cent of the industry’s direct emissions result from the combustion of fossil fuels that are used to meet energy needs. The remaining 20 per cent of the industry’s direct emissions are the result of landfills, lime rock consumption and smaller sources.

Biomass represents the main source of energy for the industry, comprising 54 per cent of the total energy mix. The other energy sources are fossil fuel (24 per cent), purchased electricity (19 per cent), and others (three per cent). The pulp and paper industry derives its biomass energy from the combustion of solid wood residue (hog fuel) and spent pulping liquor. Combustion of biomass is considered to be CO₂ neutral, meaning that the emissions released from the combustion are taken up (sequestered) by the replanted, growing forest.²⁹ Consequently, the displacement of fossil fuels with biomass is one of the major ways in which the industry has reduced its GHG impact on the atmosphere (see Figure 1-20).

Figure 1-20: Pulp and Paper, Energy Source Breakdown (1990 vs. 1998)



Sources: Canadian Industry Program for Energy Conservation, 1996/1997 Annual Report, Natural Resources Canada, 1998, p. 37.
 Veilleux, Lucie. Canadian Pulp and Paper Association, November 1999.

The Canadian Pulp and Paper Association (CPPA) reports that its industry’s GHG emissions have continued to decline relative to the 1990 base year. In 1998, direct emissions (from fossil fuel combustion) were 11.2 Mt CO₂ eq, an impressive 17.6 per cent below the 1990 level, while production levels have risen by 19 per cent. The main reasons for the industry’s GHG emission reductions may be attributed to the following:

- substitution of fossil fuel energy with wood residue (biomass) energy;
- substitution of more GHG intensive fossil fuels (e.g. heavy fuel oil and coal) with natural gas (a less GHG intensive fuel); and
- improvements in the energy efficiency of its operations.

“Although [Donohue Inc.’s] total production... increased by 25.4% between 1990 and 1997, total fossil fuel greenhouse gas emissions, expressed as carbon dioxide, decreased by 30.7%...”

Donahue Inc., September 1999

²⁹ The Canadian government estimates emissions from biomass sources. However, it does not include these emissions in the official inventory submitted to the IPCC.

1.3.9 STEEL

Canadian steelmakers continue to emphasize energy efficiency as a major thrust in their productivity, quality and cost reduction efforts in 1998 and 1999. At present, VCR Inc. has registered 15 Action Plans from companies in this sector, seven of which have also registered Progress Reports. These registrants represent over 90 per cent of the sector's total emissions. Since VCR Inc. introduced its Champion-level Reporting System, one of these registrants has earned Bronze status.

Canada's steel sector is one of the country's largest industries, generating sales of over \$11 billion and \$3.6 billion in exports in 1998, producing 15.8 Mt of steel with shipments of 14.1 Mt. Steelmaking in Canada is a technologically advanced, capital-intensive industry requiring constant innovation and investment. GHG emissions are created solely from fossil fuel energy use. The bulk of these emissions arise from the use of coal coke as a chemical feedstock/reducing agent in blast furnace iron-making processes. By-product fuels created in the cokemaking and blast furnace ironmaking processes are recovered for use as in-plant fuels. Between 1990 and 1998, the share of coal-based energy dropped from 57 to 48 per cent, while the use of natural gas increased from 25 to 35 per cent. Electricity use by the industry has remained relatively constant at about 13 per cent, with oil providing the balance. Figure 1-21 illustrates the impact of increasing production on GHG emissions that is mitigated by improvement in the energy intensity of steel production.

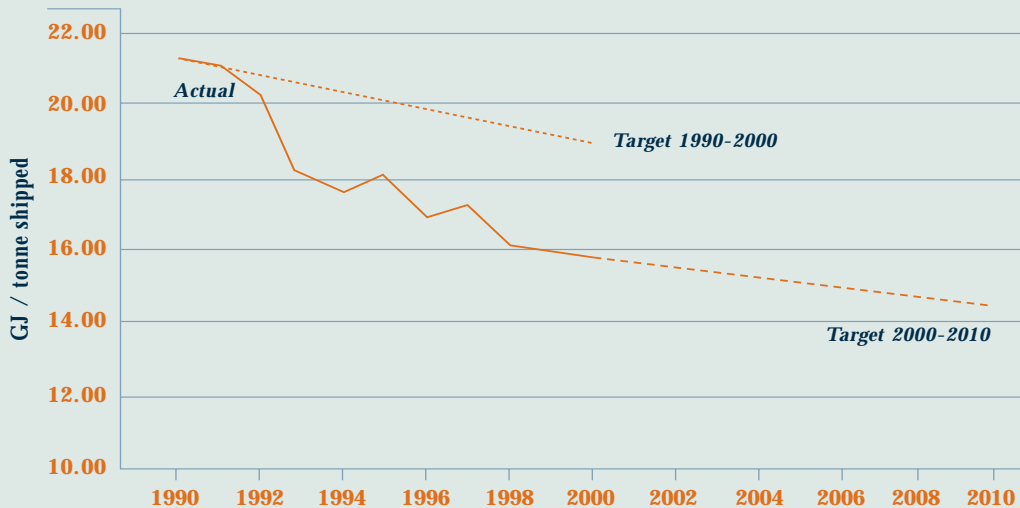
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Specific actions that have been undertaken already, or that will be undertaken in the future, by companies in this sector to reduce GHG emissions include the following:

- ◆ At Gerdau Courtice Steel, recovery of landfill gas, begun in 1998, has offset purchases of natural gas.
- ◆ At Lake Erie Steel, natural gas will continue to offset coke use in blast furnaces. The company plans to upgrade its boilers so as to capture more of the resulting blast furnace gas energy as steam, which will then be used to produce electricity.
- ◆ Stelco's Hilton Works will install a Level II furnace control system to reduce energy consumption by ten per cent on the plate mill furnaces.
- ◆ Ivaco Rolling Mills has recently installed a new natural gas fired reheat furnace equipped with high efficiency burners and recuperators to preheat combustion air.
- ◆ At Stelco McMaster Ltée, the installation of a high impedance transformer and the use of an oxygen lance at the eccentric bottom tapping steelmaking furnace, along with the adoption of electromagnetic stirring in continuous casting, contributed to improved energy efficiency.

At Dofasco, electric motors are now tested in-house, which allows earlier detection of faulty or off-spec performance resulting in electricity savings.

Figure 1-21: Steel Industry Energy Index (1990-2010)



Source: Olynyk, Susan. Canadian Steel Producers Association, December 1999.

“Since 1990, through voluntary action, the [steel] industry has achieved... a 12% reduction in absolute CO₂ emissions despite a growth in shipments of more than 15%.”

CIPEC, December 1999

1.3.10 TEXTILES

The textile manufacturing industry can be divided into three major sectors: 1) the *primary textiles* sector includes producers of manufactured fibres and filament yarns, spun yarns, and woven and knit fabrics; 2) the *textile products* sector includes producers of carpets, narrow fabrics, household textiles, and firms engaged in contract dyeing and finishing; and 3) the third sector consists of *producers of motor vehicle fabric accessories*. At present, 23 companies from this sector have registered Action Plans, eight of which have also registered Progress Reports. Since VCR Inc. introduced its Champion-level Reporting System, one of these registrants has earned Silver status.

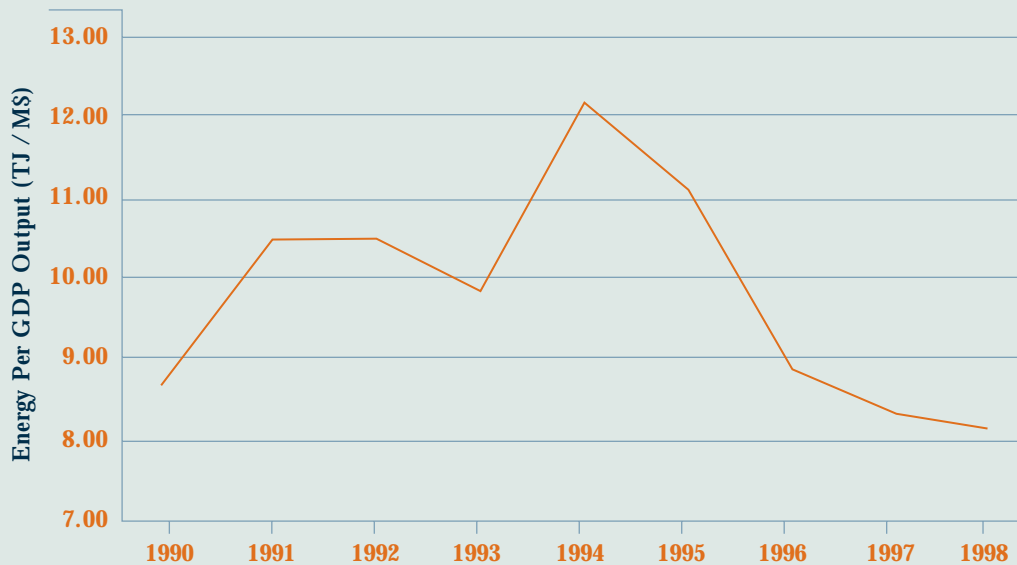
Energy use, in the form of fossil fuel burning, is the primary contributor to GHG emissions resulting from textile manufacturing. In this arena, there has been some shift in the type of energy used since 1990. In that year, natural gas represented 64 per cent of the textile industry energy consumption, with other hydrocarbon fuels accounting for just under eight per cent, and electricity representing 28 per cent. In 1997, natural gas represented 53 per cent of energy use, with other hydrocarbon fuels accounting for five per cent. Electricity’s share has increased to just over 33 per cent.

As part of its ongoing GHG reduction efforts, the Canadian Textiles Institute (CTI) has established a Textile Energy Task Force, with participation open to any textile manufacturers, whether or not they are CTI members. The Task Force has set a textile industry improved energy intensity target of two per cent per year for the period extending from 1995 to 2000. It has also committed the industry to a new energy intensity target of one per cent per year for the period from 2000 to 2010.

In addition, there are many individual textile companies who have reported a variety of capital investments and equipment modernization projects that are contributing to improved energy efficiency. Two companies have installed “solar walls” in their facility to recover energy from the building and from the sun, thereby reducing the use of natural gas and electricity. Other companies have installed energy efficient lighting and motors, heat reclaimer units, air leak monitoring, repair programs and upgraded steam trap monitoring and repair systems.

Figure 1-22 illustrates the energy efficiency gains in the textile industry. Economic output increased by 21.9 per cent between 1990 and 1998, and its total energy consumption increased by only 12.1 per cent over the same period.

Figure 1-22: Textiles Energy Efficiency



Source: Barry, Eric. Canadian Textiles Institute, 1999.

“Within the [textiles] sector, individual companies report a number of capital investments and equipment modernization projects that are contributing to improved energy efficiency.”

CIPEC, December 1999

1.4 Transportation (Commercial)

For the purpose of this report, the commercial transportation sector represents mobile sources of GHG emissions, including air, marine, off road vehicles, trucks, fleet automobiles and rail.

Significant efforts have been made within the domestic airline industry to reduce GHG emissions. However, continued growth in air traffic has resulted in an increase from 10.6 Mt CO₂ eq in 1990 to 13.0 Mt CO₂ eq in 1997³⁰. The domestic marine industry has been able to maintain its GHG emissions at 6.2 Mt CO₂ eq³¹, which is essentially equal to its 1990 levels. Sizable increases in the use of freight trucking and of large scale off-road vehicles for oil sands

³⁰ F. Neitzert, K. Olsen and P. Collas, *Canadian Greenhouse Gas Inventory 1997: Emissions and Removals with Trends*, Environment Canada, (April 1999), p. 73. ³¹ Ibid.

extraction have resulted in a 41 per cent increase in GHG emissions for heavy duty and off-road diesel vehicles from 36.3 Mt CO₂ eq in 1990 to 51.2 Mt CO₂ eq in 1997³². GHG emissions in the rail transportation industry have declined by 10.3 per cent in the period from 1990 to 1997.

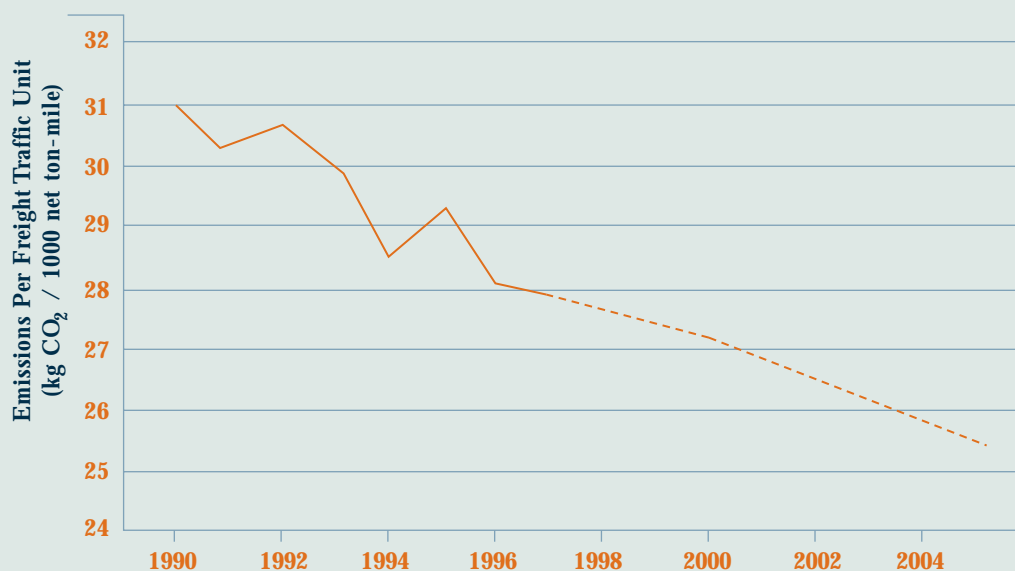
1.4.1 RAILWAYS

The railway sector includes Canada's two transcontinental railways – Canadian National and Canadian Pacific – as well as a number of railways that operate in specific regions of Canada. It includes passenger and freight systems, as well as rapid transit. At present, VCR Inc. has registered Action Plans representing 51 companies from this sector. Given that 1999 is the first year of reporting for the majority of these companies, there is only one who has submitted a Progress Report to date. These registrants represent 100 per cent of the sector's total emissions.

The vast majority of emissions from the railway industry are a result of operating fleets of diesel locomotives (approximately 3 800 in 1997). These locomotives emitted 6.0 Mt of CO₂ eq³³, equal to approximately one per cent of Canada's 1997 total emissions. These emissions amount to 27.956 kg CO₂ per 1000 net ton-mile, equal to 10.3 per cent below 1990 levels (see Figure 1-23). A further seven per cent reduction is expected between 1997 and 2005.

In order to achieve these GHG emission reductions, railway companies are in the process of replacing their fleets with the latest generation of fuel-efficient locomotives. This fleet replacement will likely be completed on, or before, 2005. In addition to more efficient motors, dynamic brakes on these new locomotives will improve efficiency by allowing engineers to control a train's speed more closely, thereby reducing the role of conventional air brakes that are designed for stopping rather than speed control. Both track-mounted rail lubricators and on-board wheel flange lubricators have been installed and have proven to reduce fuel consumption. With improved track systems, rail cars will be more fully loaded, increasing the operational efficiency of the entire railway system. Fuel conservation measures, such as "low-idle" and "smart-start" systems, are also being implemented by the industry.

Figure 1-23: Railway Emissions Intensity



Source: Railway Association of Canada, Locomotive Emissions Monitoring Programme: Reporting Years 1996 and 1997, Environment Canada, May 1999, pp. 14-15.

³² F. Neitzert, K. Olsen and P. Collas, *Canadian Greenhouse Gas Inventory 1997: Emissions and Removals with Trends*, Environment Canada, (April 1999), p. 73. ³³ Ibid.

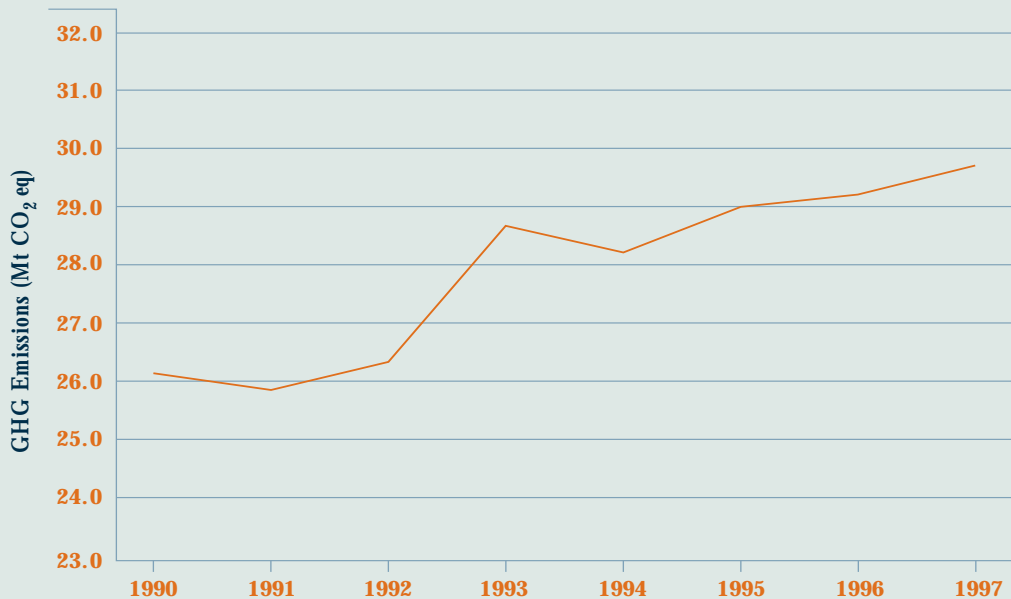
155 locomotives were purchased by CN in 1995 and 1996. These locomotives are 15% more efficient than the equipment they replaced. CN intends to purchase another 155 locomotives before 2001.

CN, Fall 1998

1.5 Institutional and Commercial

This sector includes government facilities at all levels (federal, provincial, territorial and municipal), educational and health facilities, and commercial and retail buildings. Emissions from this sector represent 8.2 per cent of the national inventory and result primarily from burning fuels for space heating and air conditioning. In addition, CH₄ emissions from municipal waste landfills are included in their profile. Figure 1-24 shows the emissions from this sector as a whole.

Figure 1-24: Institutional and Commercial Emissions



Source: F. Neitzert, K. Olsen and P. Collas, *Canadian Greenhouse Gas Inventory 1997: Emissions and Removals with Trends*, December 1999, p. 73.

1.5.1 FEDERAL, PROVINCIAL AND TERRITORIAL GOVERNMENTS

Governments across Canada have been getting their “house in order” with respect to the GHG emissions resulting from the operation of facilities and vehicle fleets within their control.

At present, VCR Inc. has registered Action Plans representing ten governments, six of which have registered Progress Reports. These registrants represent a majority of the sector’s total emissions. Since VCR Inc. introduced its Champion-level Reporting System, one of these registrants has earned Gold status, and a second has earned Silver.

The primary source of GHG emissions for governments lies in the operation of buildings (80 to 90 per cent), while the remainder of the emissions results from operating vehicle fleets (10 to 20 per cent). For buildings, energy is used for space heating and hot-water heating (direct emissions) and, in some regions, from generating the electricity that supplies government buildings (indirect emissions).

The federal government is progressing in its goal to reduce GHG emissions from its own building and fleet operations to a level of 20 per cent below 1990 by the year 2005. Other governments across Canada have set similar targets for themselves and are progressing well.

“The Government of Canada has made progress in reducing its emissions during the past year. For example, the purchase of green power in Alberta by Natural Resources Canada and Environment Canada will reduce greenhouse gas emissions by 11,000 tonnes per year in that province.”

Government of Canada, October 1999

1.5.2 MUNICIPAL GOVERNMENTS

Much like the federal, provincial and territorial governments, GHG emissions generated by municipal operations are derived, in large part, from buildings and fleet vehicles. To date, 74 municipalities have registered Actions Plans with VCR Inc., one of which has followed up with a Progress Report.

In 1998, the Federation of Canadian Municipalities (FCM) teamed up with the International Council for Local Environmental Initiatives (ICLEI) to create *Partners for Climate Protection* (PCP) – a program designed to provide municipalities with increased support in preparing and implementing climate change action plans.

Through an agreement between FCM and VCR Inc., municipalities that are enrolled in the PCP program are automatically registered in the Challenge Registry at VCR Inc. The process begins with a Council resolution that establishes a target of six per cent below 1990 levels for their own facility emissions, and 20 per cent below 1990 levels for all emissions within municipal boundaries.

Municipalities across Canada have implemented a variety of actions to reduce GHG emissions within their own operations including the following:

- ◆ lighting optimization and retrofitting;
- ◆ energy efficiency programs for municipal buildings;
- ◆ fuel switching in fleets of public transportation vehicles;
- ◆ landfill gas recovery; and
- ◆ building community energy systems.

1.5.3 EDUCATION

Colleges

In 1999, there were 900 colleges operating throughout Canada. VCR Inc. has been working closely with the Association of Canadian Community Colleges (ACCC) and with the federal Office of Energy Efficiency (OEE) to encourage colleges to take up the challenge of GHG emission reductions. At present, VCR Inc. has registered Action Plans from 43 colleges, six of which have registered Progress

Reports. Since VCR Inc. introduced its Champion-level Reporting System, four of these registrants have earned Gold status, and an additional three have earned Silver. These registrants represent a small fraction of the sector's total emissions, but this is just the tip of the iceberg – these pioneering institutions are preparing the path for hundreds to follow.

College campuses employ heating, cooling, and lighting systems – the three principal sources of GHG emissions for the sector. Fossil fuels (primarily natural gas or heating oil) provide heating (space heating and hot water supply) and produce direct GHG emissions. Air conditioning systems require significant electrical energy, usually causing indirect GHG emissions as some fossil fuels are consumed by electric utilities to produce electricity. Lighting is another significant electrical energy demand, and therefore a source of indirect GHG emissions. The one special case where indirect emissions are avoided is when college campuses operate co-generation facilities, which produce both heat and electricity. Cogeneration facilities use fossil fuel energy much more efficiently than do conventional heating systems or electrical generation facilities.

“Langara College resolves to voluntarily assist Canadian governments in meeting Canada’s international commitment to stabilize greenhouse gas emissions, by taking economic measures to increase [its] organization’s energy efficiency.”

Langara College, May 1998

School Boards

At present, VCR Inc. has registered Action Plans from 35 school boards, two of which have registered Progress Reports. These registrants represent a fraction of the sector's total emissions. However, the financial and environmental success of these registrants is leading many others to join the climate change challenge. Since VCR Inc. introduced its Champion-level Reporting System, one of these registrants has earned Gold status, and a second has earned Bronze.

School systems typically use fossil fuels for heating buildings and providing hot water. As well, services such as school buses use fossil fuels. These energy uses result in direct GHG emissions over which school boards have direct control. In addition, schools also consume significant electricity, resulting in indirect emissions (in regions where electric utilities use fossil fuels to generate power). As a result of these three primary emissions sources (and associated energy costs), many schools are implementing school and fleet energy management systems.

“Rocky View School Division, as an educational institution, is fully aware of its responsibilities to model appropriate environmental behavior... Rocky View’s objective is to not only teach sound environmental principles, but to fully integrate them into its way of doing business.”

Rocky View School Division No. 41, October 1999

1.5.4 HEALTH SERVICES

Health care plays a vital role in Canadian society. The infrastructure associated with this sector is tremendous. At present, VCR Inc. has registered Action Plans representing 29 organizations from this sector, two of which have registered Progress Reports. These registrants represent a fraction of the sector's total emissions. Since VCR Inc. introduced its Champion-level Reporting System, one of these registrants has earned Gold status.

There are over 170 000 hospital beds and over 250 000 residential care beds in Canada. The sector employs nearly 300 000 health care professionals, in addition to support staff. As Canada's population gets older, the health care sector is expected to increase in capacity, which directly affects GHG emissions.

Health institutions, like other institutions, produce direct GHG emissions through fossil fuel consumption, and indirect GHG emissions through electricity consumption. Fossil fuels are used for space heating and for hot water service, as well as for fleet vehicle fuel. Electricity consumption results in the generation of GHG emissions by electric utilities in many regions of Canada. The majority of the sector's GHG emissions result from facility operations, while a smaller portion results from fleet vehicles.

Some larger health institutions are installing cogeneration facilities to supply both heat and electricity. Cogeneration facilities use considerably less energy than separate heating and electrical generating systems.

The Glenrose Rehabilitation Hospital installed a smaller, more efficient air compressor that saves 97 500 kilowatt hours of electricity annually. "This is equivalent to 97.5 tonnes /year of CO₂ eq. EPCOR, the electrical supplier, has verified the savings and will honor the GHG emissions savings with a certificate."

Glenrose Rehabilitation Hospital, August 1999

1.5.5 COMMERCIAL BUILDINGS

The commercial sector is the largest employer and most broadly based sector in the Canadian economy. It represents a variety of activities including accommodation and food services, engineering, financial and retail facilities. At present, VCR Inc. has registered Progress Reports from 41 companies in this sector, seven of which have submitted Action Plans. These registrants represent a fraction of the sector's total emissions, but their leadership encourages others to take up the climate change challenge. Since VCR Inc. introduced its Champion-level Reporting System, one of these registrants has earned Gold status, with an additional two earning Silver and one earning Bronze.

There are a variety of associations and organizations that represent various elements of the commercial sector. One organization that works closely with the sector to reduce GHG emissions is the OEE. The OEE created the Energy Innovators-Commercial program as a tool to aid various companies in reducing energy costs and GHG emissions through implementing energy efficiency measures. The OEE works closely with VCR Inc. to provide reporting tools to the companies in this sector.

Virtually all of the GHG emissions from the commercial sector are a result of energy consumption. It is difficult to quantify the commercial sector emissions, since the national inventory combines the commercial and institutional sectors (30.7 Mt CO₂ eq in 1997). The primary direct GHG emissions source is fossil fuel combustion for hot water and facility heating. The commercial sector also consumes significant electricity, resulting in GHG emissions from electric utilities.

VCR Inc. registrants come from a wide variety of businesses in the commercial sector:

- ◆ nine accommodation and food services;
- ◆ four finance and insurance organizations;
- ◆ seven professional, scientific and technical services (consulting, engineering, enerservice companies, etc.);
- ◆ five real estate and leasing services;
- ◆ eleven retail services; and
- ◆ five other services (a cold storage company, a management company, a theme park, and a horse-racing facility).

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In addition to reducing GHG emissions from their own activities, the seven professional, scientific and technical service companies have the opportunity to assist other organizations (in a variety of sectors) to reduce GHG emissions. The impact of these reduction activities is significant, not only in terms of GHG emissions reduced, but also in dollars saved due to energy conservation.

Toronto Dominion Centre Leaseholders is implementing a series of measures that will result in a 25% reduction in GHG emissions. The cost savings associated with these projects is over \$2.5 million annually.

Toronto Dominion Centre Leaseholders, June 1999



*A testimony to
the engagement of
Canadian
organizations.*

2 > Challenge and Credit Registries

Two dynamically linked registries are now housed separately within the VCR Inc. Web site. The Challenge Registry is designed to publicly record the Action Plans and Progress Reports that form the basis for planned GHG emission reduction activities by organizations throughout Canada. The Canadian GHG Credit Registry was developed more recently with the purpose of accommodating registration for Canada's Baseline Protection Initiative and for any credit and/or trading systems that emerge in the future.

2.1 Challenge Registry

VCR Inc.'s present Challenge Registry was established in June 1998, replacing the old registry database with a much improved document retrieval system. The new database has been well received by registrants and other interested parties and continues to serve as a testimony to the engagement of Canadian organizations in the pursuit of GHG emission reductions.

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2.1.1 EASE OF INTERFACE

The Challenge Registry has been designed to encourage the use of standardized reporting elements, while limiting duplication for registrants. It forms an integral component of VCR Inc.'s Web site (www.vcr-mvr.ca), allowing users to search for registrants and submissions by registrant name, region, sector and/or report type. In addition, behind the scenes, the ability to browse reports using key words makes the Challenge Registry a useful research tool for VCR Inc.

Interfacing with the Challenge Registry is made simple through VCR Inc.'s flexible reporting system, which allows registrants to report GHG emission reduction activities in whatever format is most convenient for them. This feature encourages registrants to register copies of Action Plans and Progress Reports that are produced for other programs such as FCM's PCP initiative, the OEE's Energy Innovators programs and CIPEC. By the same token, some associations produce annual "roll-up" reports that also contain the necessary elements for individual member registration in the Challenge Registry. This "roll-up" report may then serve as a basic Action Plan for those member companies who supplied this data. For example, the CCPA's annual publication, *Reducing Emissions*, and the Railway Association of Canada's annual submission to Environment Canada, *Air Emissions from Railways*, have both become the base documents for several Action Plans submitted by members of these sectors.

In April 1999, VCR Inc. introduced a new on-line registration system, making the process of registration and registrant profile updating even easier. Templates have been developed that allow registrants to update contact information and to submit their Action Plans or Progress Reports in a standardized format. The process is conducted in a password-protected environment, using state-of-the-art security features.

And finally, one major contribution to the ease of interface between VCR Inc. and its registrants was the publication in June 1999 of the VCR Inc. Registration Guide, which serves to walk registrants through the process of submitting their reports to the Challenge Registry.

2.1.2 RAISING THE BAR

On the recommendation of VCR Inc.'s multi-stakeholder Technical Advisory Committee, the minimum requirements for registration were raised in 1999 in order to further improve the credibility of the Challenge Registry. Only those registrants with a qualifying Action Plan will remain registered as the Year 2000 begins. In order to remain registered, organizations must have demonstrated senior management commitment, commitment to regular reporting, and have reported any kind of base year calculation. While a detailed emissions inventory is encour-

aged for a base year calculation, organizations were allowed to use any calculation that represented a base from which to measure emission reductions.

In mid-May 1999, VCR Inc. notified those registrants who had only submitted a Letter of Intent that they did not meet these criteria. Throughout the balance of the year, they received reporting tools, registration clarification, and technical support from VCR Inc., OEE, and other organizations. While 37 chose not to remain registered, 64 responded by creating an Action Plan that documented their voluntary efforts to reduce GHG emissions. With over 680 Action Plans currently registered within the Challenge Registry, the credibility of all registrants has been enhanced.

2.1.3 GO FOR GOLD!

The VCR Inc. Champion Reporting System was launched in June 1999 and has been enthusiastically embraced by registrants. More than 98 Action Plans have been awarded Champion-level status since that time: 41 Gold, 39 Silver and 18 Bronze.

In striving to encourage continuous improvement, the Champion Reporting System can be applied on an incremental basis, which serves to encourage “fresh” reporting on current GHG emission reductions. For example, an organization might submit a Progress Report in February, which contains its annual emissions inventory. After Environment Week, this same organization might submit a Progress Report Attachment, serving to discuss employee education and outreach efforts. After the annual budget is prepared, it might then submit a description of its future emission reduction activities. Each incremental step will be evaluated on a cumulative basis, providing timely feedback on a given organization’s progress towards Gold Champion-level Reporting status.

2.2 *Credit Registry*

VCR Inc. has recently completed the initial design of its Canadian GHG Credit Registry. It will accommodate emerging Canadian registration needs such as baseline protection, credit for early action, voluntary emissions trading, and offset systems that are currently being studied or proposed.

2.2.1 BASELINE PROTECTION

In April 1998, at their Joint Ministers’ Meeting, the federal, provincial and territorial ministers of energy and environment launched a process to develop a new National Implementation Strategy for GHG emission reduction in Canada. Since that time, well over 450 experts on the climate change issue, including representation from VCR Inc., have provided detailed input and analysis through participation on one or more of various consultation “Issue Tables”.

A significant benefit of this activity has been the opportunity for all parties concerned to understand the nature and dimensions of the GHG emission reductions task and to appreciate the real challenges and opportunities faced by each sector of society in this regard.

On January 12, 2000, the energy and environment ministers officially announced the Climate Change Baseline Protection initiative. In order to participate in this initiative, businesses and institutions have been invited to register their actions with VCR Inc. on a national basis and/or with ÉcoGES^{te} in Québec³⁴. Those who have reached the VCR Inc. Champion level of reporting will likely have already essentially completed the documentation that is required for registering baseline projects. It is VCR Inc.’s intention to make this process as seamless as possible for those who have Action Plans registered in the Challenge Registry. The final rules,

³⁴ National Climate Change Process, *Federal, Provincial and Territorial Governments Announce a Climate Change Baseline Protection Initiative*, Media Advisory, (January 12, 2000).

information requirements and registration process will be instituted shortly after a series of consultative meetings between governments and stakeholders has taken place.

2.2.2 VOLUNTARY EMISSIONS TRADING AND OFFSET SYSTEMS

In the run-up to the development of a new national GHG emission reduction strategy, several proposals have included voluntary emissions trading and investment in off-site reductions as tools for organizations to offset shortfalls in targeted reductions within their own operations.

One such system is being studied by the Greenhouse Gas Emission Reduction Trading (GERT) Pilot. This organization was established to gain experience with GHG emission reduction credit trading. Launched by a multi-stakeholder partnership in June 1998, the Pilot provides an opportunity for interested parties to gain practical experience with this market-based approach to limiting GHG emissions in Canada. VCR Inc. is active on both the Steering and Technical Committees of the GERT Pilot and has agreed to act as the registry for any registered emission reductions approved by the GERT Pilot.

Similar work is underway in the Pilot Emissions Reduction Trading (PERT) Program in Ontario, and VCR inc. is an advisory member of PERT's Working Group and Executive Committee.

*Recognizing
outstanding
achievement.*

3 > Leadership Awards

VCR Inc.'s annual *Leadership Awards* are granted based on the results achieved by registrants, with the intention of recognizing them for their contributions in meeting Canada's commitment to reduce GHG emissions.

All Leadership Award winners from previous years, current award winners, and those receiving Honourable Mention, are invited to VCR Inc.'s annual Council of Champions Meeting and Leadership Awards Ceremony held in February or March of every year. It has become customary for the Ministers of Natural Resources Canada and of Environment Canada to present the awards to the recipients. A broad spectrum of senior industry and government leaders, environmental non-government organizations, academia and other interested parties, including the media, attend the affair. Invitations are mailed out in early January. Those selected for an Award or Honourable Mention are contacted directly in advance of the event.

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VCR Inc.'s Technical Advisory Committee has developed the following selection criteria for the awards and also provides the judging panel for the program:

Minimum Criteria

As *minimum criteria*, award candidates must:

- ✦ be registered with VCR Inc.; and
- ✦ have submitted either an Action Plan or a Progress Report between October 31st of the current year and November 1st of the previous year.

Other considerations include:

- ✦ representation of different sectors in selecting award candidates; and
- ✦ best submission from a new registrant.

Specific Criteria

To select award winners, assessments are based on the following specific criteria:

Depth of commitment to GHG emission reduction as expressed in:

- a) Senior management support, and the development of corporate actions and policies (i.e. Does the organization operate other environmental programs in addition to those described in the VCR Inc. Action Plan? Does the organization have a good history of energy management? Has the organization implemented purchasing policies that promote environmental awareness? Has the organization reported thoroughly?).
- b) Education, training and awareness programs for employees.
- c) Submission of a Progress Report(s), serving to indicate successful results related to the reduction of GHG emissions.
- d) Quality of results reported regularly, achievement of targets, and overall impact on the organization's GHG emissions.
- e) Innovation in addressing GHG emission reductions.

Leadership within the organization's sector as expressed in:

- a) Cooperation and participation with related government (federal, provincial, territorial and municipal) and/or industry programs.
- b) Promotion of the climate change challenge to peers, through trade associations, and/or to the general public.
- c) Assisting peers in planning actions to address GHG emission reductions.
- d) The organization's efforts result in an increased numbers of participants (at all levels of engagement) in VCR Inc. or in a related energy efficiency program related to the climate change challenge.

Throughout the judging process, special emphasis is placed on finding organizations that have demonstrated *commitment, action* and *leadership* within their economic sector. Recognition for *commitment* and *action* is granted to eligible registrants based on their Action Plans and/or Progress Reports. In this case, VCR Inc.'s judging panel members pay close attention to the *Results Achieved* section of the reports under review.

Those recipients who are recognized for *leadership* are drawn from a list of nominated individuals or associations that have been widely active as advocates for the voluntary climate change challenge.

Four broad categories have been established in an effort to capture the efforts of all registrants and of the advocates of the voluntary approach towards the reduction of GHG emissions. The categories are as follows:

- Best New Submission;
- Individual;
- Association; and
- Sectors.

In each of the first three categories, one award winner is announced. In the Sectors category, however, one award, as well as a few Honourable Mention awards, are handed out for each of several sub-categories.

Last year's Leadership Awards Ceremony was held at the Canadian Museum of Civilization in Hull, Québec, in February 1999. Fourteen organizations and individuals received awards for their achievements toward the voluntary reduction of GHG emissions. More than 130 persons attended the event, including Ministers Goodale and Stewart, VCR Inc. Council of Champions and Board members, association heads, and government and industry representatives.



From left to right: Front row - The Honourable Christine Stewart (Environment Canada), Marcy Korchinski (Government of Alberta), Eric Newell (Synchrude Canada Ltd.), Boris Jackman (Petro-Canada), Rudy Riedl (Enbridge Consumers Gas), Bob Page (TransAlta), and Terry Barrows (Encal Energy Limited). Back row - Gary Webster (Canadian Association of Petroleum Producers), Edward Tickles (Southern Alberta Institute of Technology), Al Chmelauskas (MacMillan Bloedel Limited), Art Heeney (Dupont Canada Inc.), Chuck Hantho (Dofasco Inc.), Don Ingram (Husky Oil Operations Limited), The Honourable Ralph Goodale (Natural Resources Canada), Elizabeth Arnold (City of Ottawa), and Bob Flemington (VCR Inc.).

Table 3.1: VCR Inc. Leadership Award Winners (1998)

Best New Submission	Encal Energy Limited - Calgary, Alberta
Individual Leadership Award	The Honourable Anne McLellan, Minister of Justice and Attorney General of Canada
Association Leadership Award	The Canadian Association of Petroleum Producers
Sector Leadership Awards	<i>Educational Institutions</i> Southern Alberta Institute of Technology - Calgary, Alberta
	<i>Governments</i> The Government of Alberta - Edmonton, Alberta
	<i>Municipalities</i> The City of Ottawa - Ottawa, Ontario
	<i>Electric Utilities</i> TransAlta - Calgary, Alberta
	<i>Manufacturing - Chemicals</i> DuPont Canada Inc. - Mississauga, Ontario
	<i>Forestry, Pulp and Paper</i> MacMillan Bloedel Limited - Vancouver, British Columbia
	<i>Manufacturing - Primary Metal</i> Dofasco Inc. - Hamilton, Ontario
	<i>Oil and Gas - Upstream</i> Syncrude Canada Ltd. - Fort McMurray, Alberta
	<i>Oil and Gas - Downstream (2 winners)</i> Petro-Canada - Calgary, Alberta Husky Oil Operations Limited - Calgary, Alberta
	<i>Oil and Gas - Pipelines and Natural Gas Distribution</i> Enbridge Consumers Gas - North York, Ontario



*Expanding breadth,
depth and
momentum.*

4 > Success Indicators

Behind the concept of a voluntary challenge and registry is the understanding that it is not sufficient to reduce GHG emissions behind closed doors. Instead, all sectors of Canadian society must reduce their emissions in a transparent and measurable way in order to exercise the leadership that is required to stimulate voluntary action by those who have not yet become engaged. VCR Inc. was developed with this purpose in mind and is managed in accordance with the principles developed by the New Directions Group³⁵ concerning participation, transparency, performance, flexibility, accountability, verification and continuous improvement. The creation and tracking of Success Indicators constituted an essential element of this approach, and a series of indicators are listed below under the broad headings of Breadth, Depth, and Momentum.

4.1 Breadth

Breadth of engagement is measured in two ways: the first is by the number of sectors and programs that are linked with VCR Inc. Table 4.1 lists the 34 sector associations and programs that were active in 1999, representing a 36 per cent increase over 1998. The second is by tracking the percentage of GHG emissions represented by VCR Inc.'s Challenge Registry registrants.

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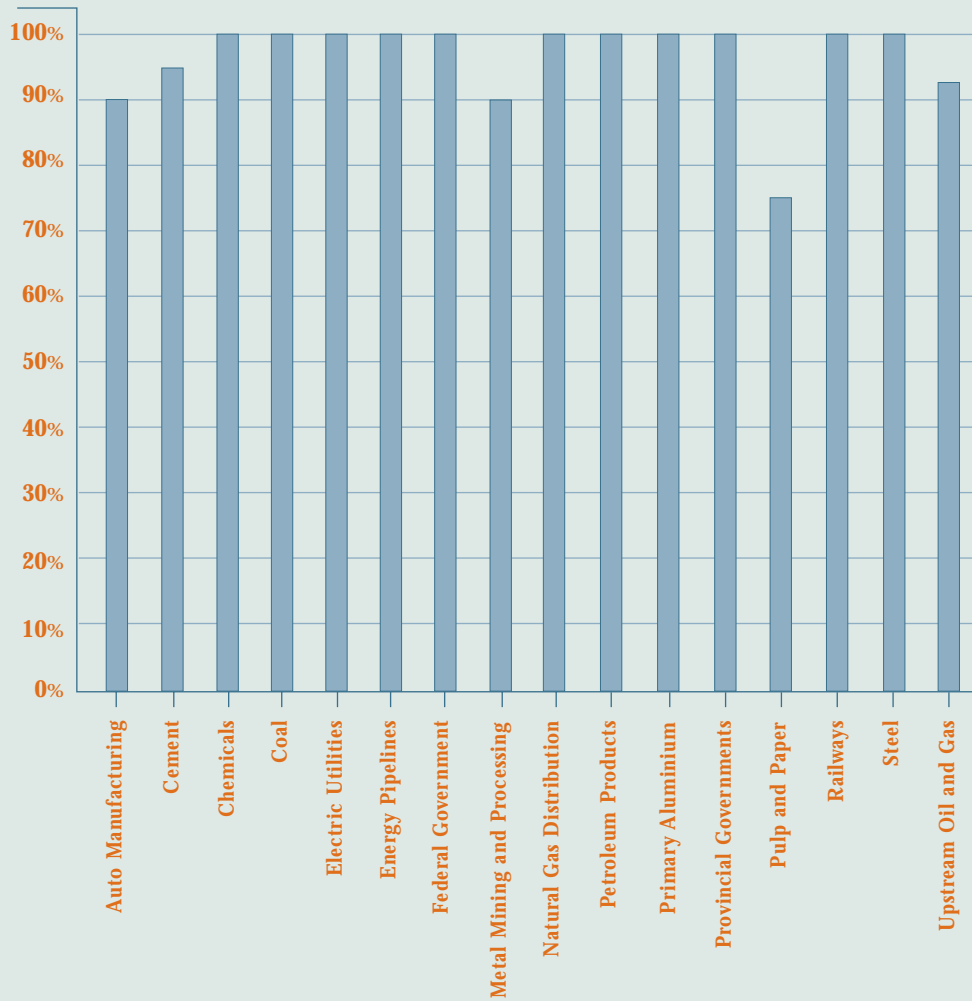
Table 4.1: Linkages and Partnerships

Number of Linkages and Partnerships			
1996	1997	1998	1999
12	21	25	34
<ul style="list-style-type: none"> ❖ Aluminium Association of Canada ❖ Association of Canadian Community Colleges ❖ Automotive Parts Manufacturers' Association ❖ Canadian Association of Oilwell Drilling Contractors ❖ Canadian Association of Petroleum Producers ❖ Canadian Chemical Producers' Association ❖ Canadian Electricity Association ❖ Canadian Energy Pipeline Association ❖ Canadian Fertilizer Institute ❖ Canadian Foundry Association ❖ Canadian Gas Association ❖ Canadian Lime Institute ❖ Canadian Petroleum Products Institute ❖ Canadian Portland Cement Association ❖ Canadian Pulp and Paper Association ❖ Canadian Steel Producers Association ❖ Canadian Textiles Institute ❖ Canadian Vehicle Manufacturers Association ❖ Canadian Industry Program for Energy Conservation 		<ul style="list-style-type: none"> ❖ Coal Association of Canada ❖ ÉcoGESTe ❖ Electro-Federation Canada ❖ Energy Council of Canada (Actions By Canadians – ABC Program) ❖ Federation of Canadian Municipalities' Partners for Climate Protection Program – formerly the 20% Club ❖ Greenhouse Gas Emission Reduction Trading (GERT) Pilot ❖ Mining Association of Canada ❖ National Dairy Council ❖ Ontario Centre for Environmental Technology Advancement ❖ Pilot Emissions Reduction Trading (PERT) Program ❖ Petroleum Services Association of Canada ❖ Railway Association of Canada ❖ Rubber Association of Canada ❖ Technology Early Action Measures (TEAM) – Natural Resources Canada ❖ World Energy Council 	

³⁵ New Directions Group, *Criteria and Principles for the Use of Voluntary or Non-Regulatory Initiatives to Achieve Environmental Policy Objectives*, (November 4, 1997).

By the end of 1999, 980 companies and organizations from all sectors of the economy were registered at VCR Inc., representing a 12 per cent increase over 1998. However, Figure 4-1 illustrates that some sectors have yet to become fully engaged. While 78 per cent of the opportunity for businesses and governments to reduce GHG emissions is represented within the Challenge Registry, filling in the ranks of registered members in each sector would serve to ensure momentum for the long term.

Figure 4-1: Percentage of Sector GHG Emissions Represented at VCR Inc.



4.2 Depth

Depth of engagement is measured in two ways. The first indicator is the increase in number of Action Plans and Progress Reports that have been submitted to VCR Inc.'s Challenge Registry. Figure 4-2 illustrates that the registration of Action Plans has increased by 24 per cent from 547 in 1998 to 681 in 1999, and that subsequent Progress Reports have also increased by 54 per cent from 168 in 1998 to 258 in 1999.

Figure 4-2: Challenge Registry Participation

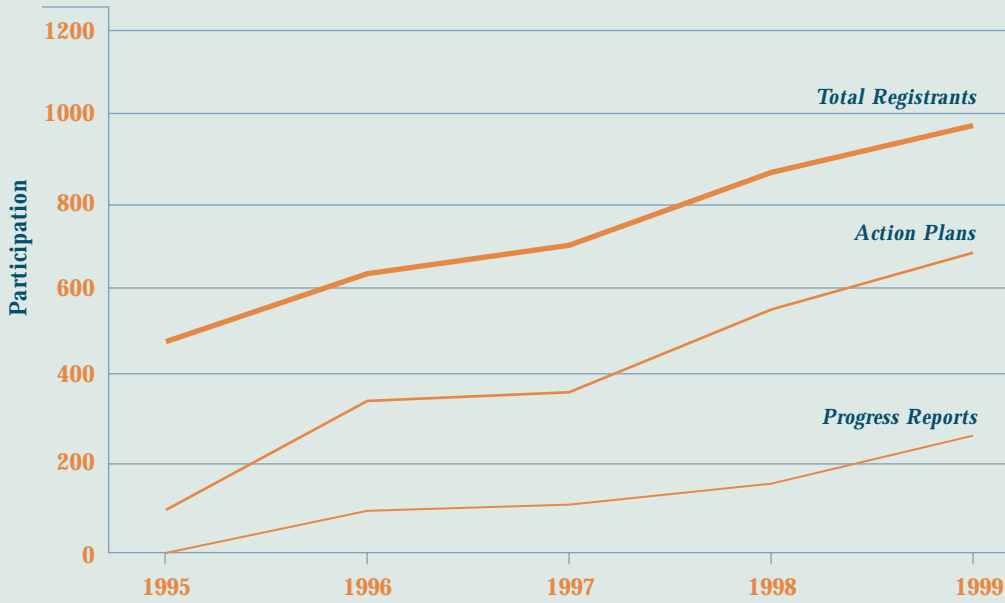
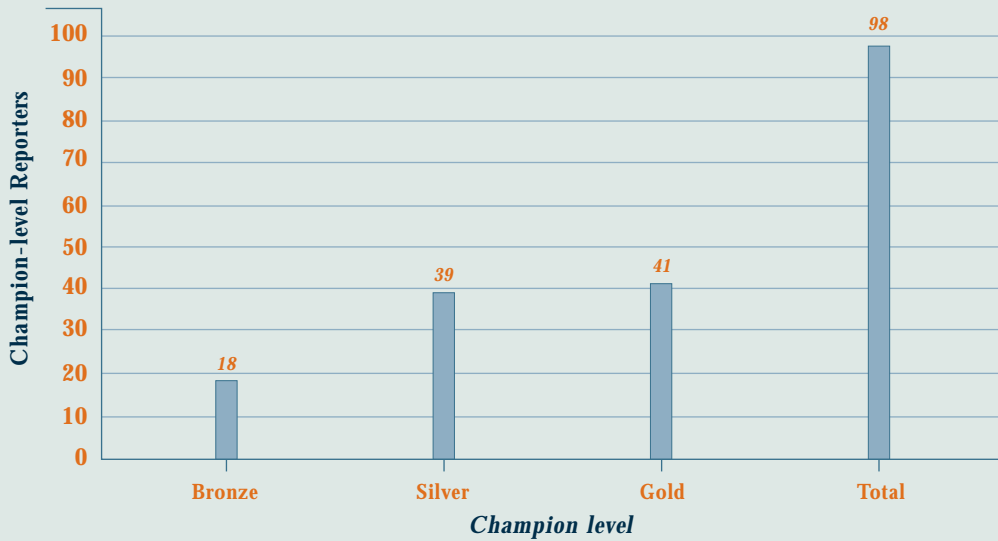


Table 4.2: Total Registrants, Action Plans and Progress Reports (1999)

	Total Registrants	Action Plans	Progress Reports
1995	475	94	4
1996	619	331	88
1997	701	354	112
1998	874	547	168
1999	980	681	258

The second indicator is the number of organizations that have achieved Champion-level Reporting status. An early response from VCR Inc. registrants in the latter half of 1999 indicated an enthusiastic level of support for Champion-level reporting. Figure 4-3 shows that a total of 98 registrants reached Champion status in 1999: 41 Gold, 39 Silver and 18 Bronze.

Figure 4-3: VCR Inc. Champion-level Reporters (1999)

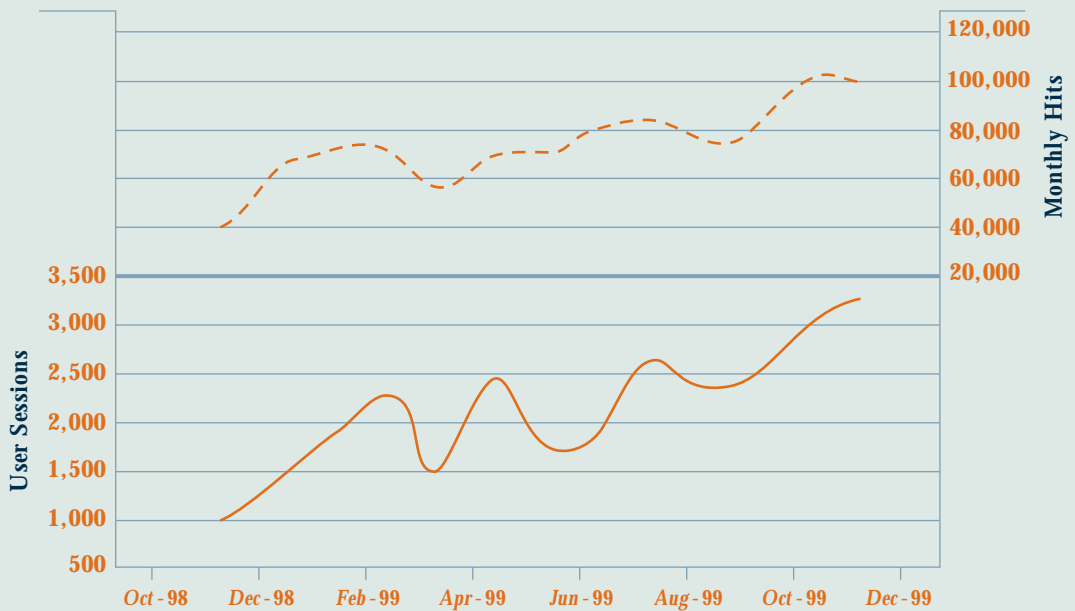


4.3 Momentum

One measure of momentum lies in the significant increase of VCR Inc. registrants who have followed up with a Progress Report after having submitted their original Action Plan.

A second set of momentum indicators is the number of “hits” and “user sessions” on the VCR Inc. Web site. Use of the Web site has continued to grow dramatically, as shown in Figure 4-4, with a typical year over year increase in “hits” of 150 per cent and in “user sessions” of over 200 per cent!

Figure 4-4: Monthly Hits and User Sessions



Quantifying the degree of satisfaction with VCR Inc. and its working relationships provides a third measure of momentum. The VCR Inc. Annual Survey response was analyzed and weighted to create the “Satisfaction Quotients” tabulated in Tables 4.3 and 4.4.

The Satisfaction Quotient increased by over five points for executive level contacts and by eight points for technical level contacts.

Table 4.3: Satisfaction Quotient of Executive Contacts

'To what extent has participation in VCR Inc. met your organization's expectations?'

	1998			1999	
	Multiplier	Percent	Quotient	Percent	Quotient
Greatly	1.5	7.0	10.5	10	15
Satisfactorily	1.0	45.0	45.0	48.8	48.8
Somewhat	0.5	28.0	14.0	20.0	10.0
Not at all	-1.0	6.0	-6.0	5.0	-5.0
Don't know	0.0	14.0	0.0	16.2	0.0
Total	-	-	63.5	-	68.8

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Source: *Compas Inc., VCR Inc. 1999 Stakeholder Survey: Perceptions of Satisfaction and Benefits, December 1999.*

Table 4.4: Satisfaction Quotient of Technical Contacts

'Overall, how satisfied are you with your working relationship with VCR Inc.?'

	1998			1999	
	Multiplier	Percent	Quotient	Percent	Quotient
Very Satisfied	1.5	17.0	25.5	31.0	46.5
Somewhat Satisfied	1.0	49.0	49.0	38.0	38.0
Neither	0.5	23.0	11.5	22.0	11.0
Somewhat Dissatisfied	-0.5	5.0	-2.5	2.0	-1.0
Very Dissatisfied	-1.0	3.0	-2.5	4.0	-4.0
Don't Know	0.0	4.0	0.0	3.0	0.0
Total	-	-	81.5	-	90.5

Source: *Compas Inc., VCR Inc. 1999 Stakeholder Survey: Perceptions of Satisfaction and Benefits, December 1999.*

4.4 Annual Survey Results

When VCR Inc.'s original baseline survey was undertaken last year, it was encouraging to note the participation levels displayed by VCR Inc. stakeholders. A total of 401 completed surveys were returned to VCR Inc. and, taken together, this represented a 31 per cent response rate – exceptional by industry standards.

Undertaken jointly by COMPAS Inc., a Canadian research firm, and The Columbia Communications Group, a Canadian public relations firm, this first survey was conducted to measure stakeholder awareness and satisfaction with VCR Inc. activities, with the intention of serving as a baseline measure to support future comparisons.

Late in 1999, a second stakeholder survey was conducted, which was designed to measure any changes in stakeholder satisfaction. Undertaken by COMPAS Inc. once again, two versions of the survey questionnaire were developed: a short version for senior executive stakeholders, and a longer version for use with the technical contact person in stakeholder organizations. The survey was administered using a combined methodology that included mail, fax, e-mail, and telephone. In total, 390 surveys were completed – equivalent to an overall response rate of 31 per cent, which matched the response rate of the initial baseline survey.

In comparing this second survey to last year's results, it was found that the responses were very positive on the whole. Familiarity with VCR Inc. remained relatively widespread, and there was a general consensus on the importance of VCR Inc.'s work to address climate change. In addition, participation in VCR Inc. was seen to be important and to have met stakeholder expectations. Almost two-thirds of respondents indicated that VCR Inc. assists them with their GHG emission reduction targets, while the promotion of awareness was listed as the top benefit from participation in VCR Inc. On the whole, there was a higher awareness of VCR Inc. activities, and almost two-thirds of respondents indicated that they intend to submit an Action Plan or a Progress Report to VCR Inc. within the next 12 months.

The following is an executive summary of the results:

Familiarity and Perceived Importance

- 84% of technical stakeholders claim to be at least moderately familiar with the activities of VCR Inc. (34% say very familiar). Familiarity is somewhat higher and stronger among executive stakeholders: 89% are at least moderately familiar (43% say very familiar). Familiarity among technical stakeholders is virtually identical to what it was in the baseline survey (85%, while familiarity among executive stakeholders has increased (89% vs. 81%) and is stronger (43% vs. 37% say they are very familiar).
- 88% of technical stakeholders consider VCR Inc.'s work to be important: half consider the work to be moderately important, half consider it to be very important. Executives are slightly less likely to view VCR Inc.'s work as important (85%). This represents a small decrease since the baseline survey among both technical (88% vs. 90%) and executive stakeholders (85% vs. 87%).
- 77% of technical respondents view participation in VCR Inc. as at least moderately important to their organization (31% say very important). Executives are more likely to view participation as important (84%). Support for participation among technical stakeholders is virtually unchanged since the baseline survey (78%), while support among executives has increased (84% vs. 78%).

Perceptions of Satisfaction and Benefits

- Over half (52%) of the technical stakeholders say that their expectations have been met with respect to participation in the activities of VCR Inc. However, satisfaction tends to be moderate (46%) rather than strong (6%). A further 27% think that their expectations have been somewhat met. Executive stakeholders tend to express greater satisfaction: 65% say their expectations have been met (9% say greatly, 56% say satisfactorily), while 18% say they have been somewhat met. Since the baseline survey, the results have not changed noticeably for technical stakeholders, but satisfaction has increased among executives (65% vs. 52%).
- When asked to explain why their expectations had been met, technical stakeholders focused most often on the ability to get good information (31%) and the ability to gauge/monitor progress. They also emphasized promotion of the voluntary approach and co-operation/communication with others (12% each), increased motivation and helping increase energy efficiency (10% each), raising awareness (7%), and the ability to compare with others (6%). Executive stakeholders also focused on VCR Inc. as a source of information (22%) and helping them to gauge/monitor progress (20%), although not to the same extent as technical stakeholders. Executives were more likely to focus on co-operation/communication (22%) and awareness (17%).
- When asked to explain why their expectations had not been met, technical stakeholders indicated that they did not participate much in VCR Inc. (31%) or had just recently joined so that it was too early to say (28%). Some also noted that their efforts were well underway before they joined VCR Inc. or that they had no expectations (17% each). Executive respondents were more

likely to emphasize low levels of participation (42%), but less likely to note that they had just joined (17%). They were also less likely to indicate that their efforts had been underway before they joined VCR Inc. (8%), but more likely to say they had no expectations (25%).

- ✦ 64% of technical stakeholders say that participation in VCR Inc. helps their organization achieve or promote its emission reduction targets. This compares to 80% of executives. Results for technical stakeholders are virtually identical to those in the baseline survey (65%), but are much more positive for executives (80% vs. 69%).
- ✦ In terms of benefits associated with participation in VCR Inc., technical stakeholders focus most often on promoting awareness (19%), access to information (11%), promoting the voluntary approach (10%), and public recognition (8%). Executives emphasize the same benefits but attribute more importance to promoting awareness (25%) and cost reduction (11% vs. 2%). Since the baseline survey, more emphasis is now placed on promoting awareness (19% vs. 9%), while less is placed on access to information (11% vs. 20%), public recognition (8% vs. 12%), and monitoring/gauging progress (3% vs. 13%).
- ✦ Over two-thirds of technical stakeholders claim to be very (30%) or somewhat (38%) satisfied with their working relationship with VCR Inc. Almost one-quarter (21%) are neither satisfied nor dissatisfied, while few (6%) express any degree of dissatisfaction. This question was only asked to technical stakeholders.

Communications Issues

Note that these issues were asked only to technical stakeholders.

- ✦ 81% of stakeholders have received communication from VCR Inc. within the past three months (51% received something in the past month). These results are not much different from those in the baseline survey.
- ✦ During the past year, 86% received information from VCR Inc. through the newsletter, 73% through the annual meeting/awards ceremony, and 51% through the Web site. After this, information comes most often by means of the progress report (48%), the annual report (42%), or personal contact (21%) (multiple responses accepted).
- ✦ In terms of how people would prefer to be kept informed about VCR Inc. activities, 80% express a preference for the newsletter, 64% for the annual meeting/awards ceremony, 53% for the Web site, 46% for the progress report, 24% for the annual report, and 11% for personal contact.
- ✦ 78% feel that the frequency of communications from VCR Inc. is just right. The rest are almost evenly divided between those who think that it is too much (7%) or too little (8%). Since the baseline survey, more stakeholders are satisfied with the frequency of communications (78% vs. 70%).
- ✦ Just over half (52%) receive communications from other organizations about VCR Inc. activities. Organizations that stakeholders have heard from most often include the Canadian Association of Petroleum Producers and the Canadian Industry Program for Energy Conservation (14% each), the Canadian Chemical Producers' Association (12%), and Natural Resources Canada (10%).
- ✦ 66% have visited the VCR Inc. Web site or Registry. The frequency of visits is relatively varied. Just over one third (36%) visit it a few times a year or less. Slightly fewer (30%) visit it at least every 2-3 months. Since the baseline survey, the number of stakeholders who have visited the Web site has increased (66% vs. 58%).

As well,

- ✦ 62% intend to submit an Action Plan/Progress Report to the Registry within the next 12 months. This is down considerably since the baseline survey (72%).
- ✦ 71% are aware of VCR Inc.'s Champion-level reporting system. This is up significantly since the baseline survey (46%).
- ✦ 68% are aware of VCR Inc.'s Leadership Awards program. This also represents an increase since the baseline survey (56%).
- ✦ 46% are aware of VCR Inc.'s role in recording credits for early action and in tracking emission credit trades. This is also up noticeably since the baseline survey (38%).

A landscape photograph with a cloudy sky and a field of tall grass in the foreground. The text is overlaid on the sky.

*Representing over
78 per cent of GHG
reduction
opportunities.*

5 > Management and Organization

5.1 Background

VCR Inc. was established by Natural Resources Canada in 1995 as a key element of Canada's National Action Program on Climate Change. In 1997, it was transformed from a government-incubated program to a private-public partnership. In its new form as a stand-alone, not-for-profit corporation, it currently draws two-thirds of its operating funds from the private sector and the balance from federal and provincial governments across Canada.

VCR Inc.'s purpose is to encourage companies and organizations from all sectors of the economy to accept greater accountability for GHG generation, serving as a catalyst to ensure that Canada's overall climate change objectives are met by both private and public sectors alike through voluntary actions. It is not responsible for the development of Canada's strategy on climate change, nor is it intended to serve as the sole support in the drive to encourage GHG emission reduction activities.

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VCR Inc.'s overriding objective is to **Challenge** both current and prospective registrants from all economic sectors and geographic regions to undertake voluntary actions that will contribute towards the reduction of Canada's GHG emissions.

The **Registry** component of VCR Inc.'s operations serves to record the actions planned and executed by registrants, providing them with the opportunity to exchange information and to share best practices with their peers. It is not intended to provide a comprehensive inventory of Canada's GHG emissions, but rather to serve as a means of demonstrating and recording the individual contributions being made in support of the overall GHG emission reduction initiative.

5.2 Structure

VCR Inc. reports to a **Council of Champions**, comprised of senior representatives from leading industry organizations and government bodies supporting the corporation. The Council currently consists of 35 members. Each Council member serves as the 'champion' of the voluntary challenge in his/her sector or region.

VCR Inc.'s **Board of Directors** is drawn from the Council. Industry representatives are elected on an annual basis at the Council of Champions Meeting, while government representatives are appointed by the federal minister of Natural Resources Canada. The Board receives guidance from the following three committees:

The *Governance Committee* was established to permit review of the issues related to the election and nomination of board members and to assess the performance of the Technical Advisory Committee. It is comprised of a Chair and two other board members.

The *Audit Committee* was created to review the audited year-end financial statements and reports and to meet with the auditors. Much like the Governance Committee, there is a Chair and two board members, and it is their responsibility to satisfy themselves, on behalf of the Board, that VCR Inc.'s financial requirements are met.

A *Technical Advisory Committee* was established to provide, at the request of the Board, recommendations concerning technical issues. It is comprised of representatives from academia, labour, environmental non-government organizations, the aboriginal community, industry and governments.

The VCR Inc. office was created to support the Council of Champions in the development of an engagement strategy to recruit more organizations, more partnerships with associations and more awareness of the voluntary approach by all Canadians. The office is comprised of six staff functions: President, Executive Assistant, Communications, Membership Services, Registry Analysis and Database Management.

5.3 VCR Inc. Registrants

(Champion-level reporters are in bold type)

3M Canada Company

A

A. Clark Roofing and Siding
Abbotsford, City of
ABCO Property Management Inc.
Abitibi-Consolidated Inc.
Acadia University
Accuride Canada Inc.
Agassiz School Division No.13
Agence Métropolitaine de Transport
Agmont
Agrium
Air Canada
Air Products Canada Ltd.
Akzo Nobel Chemicals Ltd.
Albarrie Canada Ltd.
Alberta College of Art & Design
Alberta Energy Company
Alberta Hospital Edmonton
Portage College - Lac La Biche
Alcan Smelters and Chemicals Ltd / Société
d'électrolyse et de chimie Alcan Itée
Alcoa - Aluminerie Lauralco inc.
Algoma Central Railway Inc.
Algoma Steel Inc.
Algonquin College of Applied Arts and Technology
Alliance Pipeline Ltd.
Allied Signal Aerospace Canada
Alta Gas Utilities Inc.
Altana Exploration Company / Roan Resources Ltd.
Aluminerie Alouette inc.
Aluminerie de Bécancour
Aluminum Industry Association
Amber Energy Incorporated
Amoco Canada Petroleum Company Ltd.
Amtrak
Anderson Exploration Ltd.
Andrès Wines Ltd.
Anmore, Village of
Annapolis Valley Regional School Board
Apache Canada Ltd.
Aramark Canada Ltd.
Archean Energy Ltd.
Arnold Railway
ASCOLECTRIC Limited
Ashland Chemicals Canada Ltd.
Associated Freezers Corporation
Association Minière du Québec Inc.
Association Québécoise pour la Maîtrise de l'Énergie
ATCO Electric
ATCO Gas
ATCO Pipelines
Atlantic Health Sciences Corporation
Atlantic Shopping Centres
Atlas Specialty Steels Inc.
Augustana University College
Aur Resources Inc.
Avalon East School Board, The
Avalon Health Care Institutions Board
Avalon West School District

B

Baffin Divisional Board of Education
Banff, City of
Barrday Inc.
Barrick Gold Corporation
Barrie-Collingwood Railway
Barrington Petroleum Ltd.
BASF Canada Ltd.
Battle Mountain Canada Ltd. - Golden Giant Mine
Bayer Inc. - Rubber Division
Baytex Energy Ltd.
BC Gas Utility Ltd.
BC Hydro
BC Rail Ltd.
Beau Canada Exploration Ltd.
Beaulieu Canada Inc.
BelAir Energy Corp.
Berkley Petroleum Corporation
Best Western International, Inc. (Canada)
BetzDesborn Canada Inc.
BHP Diamonds

Bishop's University
Bison Transport
Black & Whites Ink
Black Photo Corporation
Black Gold Regional Schools
Blue Circle Canada Inc.
Boehme Filatex Canada Inc.
Boeing Toronto Ltd.
Boliden Limited
Bombardier Inc.
Boucherville, City of
Boundary Creek Resources Ltd.
Bowater Inc.
Bowater Mersey Paper Company Limited
Brandon University
Brantford, City of
Britex Group
British Columbia Institute of Technology
British Columbia Power Exchange Corp.
Broan-Nutone Canada
Buffalo Trail Regional #28
Bumper Development Corporation Ltd.
Burger King Restaurants of Canada
Burin Peninsula School Board
Burlington Northern (Manitoba) Ltd.
Burlington Northern Santa Fe
Burnaby, City of

C

Cabre Exploration Ltd.
Cadillac Fairview Corporation Limited -
Greater Toronto Area Portfolio
Cadillac Fairview Corporation Limited - Ontario Portfolio
Calahoo Petroleum Ltd.
Calgary Board of Education
Calgary Regional Health Authority (CRHA)
Calgary, City of
Cambior inc.
Cambridge Shopping Centre Ltd.
Cambridge Towel Corporation
Campbell River, City of
Canada Brick Limited
Canada Hair Cloth Company
Canada Inns
Canada Trust
Canadian Airlines International Inc.
Canadian American Railroad Co.
Canadian Association of Oilwell Drilling Contractors
Canadian Association of Petroleum Producers
Canadian Chemical Producers' Association
Canadian Electricity Association
Canadian Energy Pipeline Association
Canadian Forest Oil Ltd.
Canadian Forests Products Ltd. (CANFOR)
Canadian Gas Association
Canadian General - Tower Limited
Canadian Home Builders' Association
Canadian Hunter Exploration Ltd.
Canadian National Railway Co.
Canadian Natural Resources Ltd.
Canadian Occidental Petroleum Ltd.
Canadian Pacific Hotels and Resorts
Canadian Pacific Railway
Canadian Petroleum Products Institute
Canadian Portland Cement Association
Canadian Pulp and Paper Association
Canadian Steel Producers' Association
Canadian Textiles Institute
Canadian Uniform Limited
Canadian Vehicle Manufacturers Association
Canadore College of Applied Arts and Technology
Canmore, Town of
Canlan Investment Corporation
CANOR Energy Ltd.
Capilano College
Cape Breton - Victoria Regional School Board
Cape Breton and Central Nova Scotia Railway
CARA Operations Ltd.
Carleton Manor Inc.
Cartier Railway Company
Cascades Paperboard International Inc.
Casco Inc.
Cavalier Textiles
Cégep André-Laurendeau

Cégep de Chicoutimi
 Cégep de Matane
 Cégep de Saint-Hyacinthe
 Cégep de Saint-Jérôme
 Cégep de Sept-Îles
 Cégep Heritage College
 Cégep Joliette - De Lanaudière
 Cégep Marie-Victorin
 Celanese Canada Inc.
 Centra Gas British Columbia Inc.
 Central Kootenay, City of
 Centre hospitalier de Lameque
 Centre hospitalier de l'Enfant-Jésus RHSJ
 Centre hospitalier de Tracadie
 Centre hospitalier Jonquière
 Centre hospitalier régional de Bathurst
 Champion Feed Services Ltd.
 Chelsea, Municipality of
 Chemical Lime Company of Canada
 Chemin de fer Baie des Chaleurs
 Chemin de fer Charlevoix Inc.
 Chemin de fer de la Matapédia et du golfe
Chevron Canada Resources Limited
 Chignecto-Central Regional School Board
 Children's and Women's Health Centre of British Columbia
 Children's Hospital of Eastern Ontario /
 Hôpital pour enfants de l'est de l'Ontario
 Chinook Group
 Chinook Health Region
 Chinook's Edge School Division #73
 CHIP Hospitality
 Chris's no frills (863850 Ontario Limited)
 Church of St. John and St. Stephen Home Inc., The
 Churchill Falls (Labrador) Corp.
 CIBA Specialty Chemicals
 CIBC Development Corporation
 City of Kingston, Utilities Department
 Clearview School Division #71
 Coal Association of Canada
 Coast Hotels and Resorts
 Coats Bell Division of Coats Canada Inc.
 Coats Patons Canada Inc.
 Cold Lake, City of
 Collège de Bois-de-Boulogne
 Collège de l'Outaouais
 Collège Lionel-Groulx
 Collège Notre-Dame de l'Assomption
 College de Rosemont
 College de Shawinigan
 College of New Caledonia
 College of the Rockies
 Collingwood, Town of
 Collingwood Fabrics Inc.
 Collins & Aikman
 Columbia-Shuswap, City of
 Cominco Ltd.
 Commute Ex Inc.
 Compost Management
 Comstate Resources Ltd.
 Concordia Hospital
Conoco Canada Limited
 Consolidated Fast Frate Inc.
 Consoltex Inc.
 Continental Lime Ltd.
 Cookshire Tex
 Cooper Energy Services
 Coopérative Centre-Ouest
 Coquitlam, City of
 Coquitlam College
 Co-Steel LASCO
 Cotton Ginny Ltd.
 Country Style Food Services Inc.
 Cove Guest Home, The
 Coyle & Greer Awards Canada Ltd.
Crestar Energy Inc.
 Crestbrook Forest Industries Ltd.
 Crossroads Regional Health Authority
 Crown Cork and Seal Canada Inc.
 Crowne Plaza Hotel Winnipeg
 CSX Transportation
 Cuddy Food Products Inc.
 Culinar inc.
 Cullen Gardens and Miniature Village
 CXY Chemicals Canada
 Cytec Canada Inc.

D

DaimlerChrysler
 Dairy Queen Canada Inc.
Daishowa Inc., Division de Québec
 Dalhousie Co-op

Degussa-Hüls Canada Inc.
 Delmar Chemicals Inc.
 Delta, City of
 Delta Hotels and Resorts
 Delta Meadowvale Resort & Conference Centre
 Delta School District
 Denim Swift
 Denninghouse Inc.
 Denro Management Ltd.
 Didsbury, City of
 Difco Performance Fabrics Inc.
 District scolaire nos. 07 et 09
 Districts scolaires 3 et 5
 Diversey Lever Canada
 Dofasco Inc.
 Dominion Energy Canada Ltd.
Domtar Inc.
 Donohue Inc.
Dow Chemical Inc.
 Downeast Plastics Ltd.
 Downie Timber Ltd.
 Dr. V. A. Snow Centre Inc.
 Dundas, City of
 Dundee Realty
DuPont Canada Inc.
 Durham College of Applied Arts & Technology

E

East Central Alberta Catholic Separate
 Schools Regional Division # 16
 Eastern School District
 Eastern Townships School Board
 ECORAIL Inc.
 Edmonton Catholic Schools
 Edmonton, City of (Public Works)
 Eka Chemicals Canada Inc.
 Elementis Pigments
 Elf Atochem Canada Inc.
 Elk Island Catholic Separate School
 Regional District No.41
 Elk Island Public Schools Regional Division No. 14
Enbridge Consumers Gas
Enbridge Pipelines Inc.
Enbridge Pipelines (Saskatchewan) Inc.
Encal Energy Ltd.
 Energy Reduction Audit Services (ERAS)
 Enmax Corporation
 Enron Oil Canada Ltd.
 Ensyn Technologies Inc.
 Envirogard Products Ltd.
 Environmental Resource Centre
EPCOR
 Escalator Handrail Company Inc.
 Essex Terminal Railway Company
 ESSROC Canada Inc.
 Ethyl Canada Inc.
 Euclid-Hitachi Heavy Equipment Ltd.
 Eurocan Pulp and Paper Co.
 Express Pipeline Ltd.

F

F.F. Soucy Inc.
 Fabrene Inc.
Falconbridge Limited
 Famous Players
 Fanshawe College
 Federated Co-operatives Limited
 Federation of Canadian Municipalities
 Ferraz Shawmut Canada Inc.
 Fibrex Insulations Inc.
 Fionn MacCools
 Fisher & Company
 First Real Properties Limited
 Fletcher Challenge Canada Limited
Fletcher Challenge Energy Canada Inc.
 FMC of Canada Limited
 Foothills Pipe Lines Ltd.
Ford Motor Company of Canada, Ltd.
 Fording Coal Limited
 Fort Garry Hotel, The
 Fort James -Marathon Ltd.
 Fort Simpson, Village of
 Fort Vermilion School Division No. 52
 Fort Smith, Town of
 Fortune Energy Inc.
 Founders Energy Ltd.
 Four Seasons Hotel - Toronto
 Foyer St. Joseph de St. Basile Inc.
 Frank's no frills (1283511 Ontario Limited)
 Fredericton Direct Charge Co-op

Fredericton, City of
Freightliner of Canada Ltd.

G

Gander, Town of
Gap Canada
Garden Province Meats
Garland Commercial Ranges Ltd.
Gates Canada Inc.
Gaz Métropolitain
Gazoduc TQM
General Electric Canada Inc.
General Motors of Canada Ltd.
Genesis Exploration Ltd.
Genesport Industries Limited
Geon Canada Inc.
George Brown College of Applied Arts and Technology
Georgian College of Applied Arts and Technology
Gerdau Courtice Steel Inc.
Glendale Yarns Inc.
Glenrose Rehabilitation Hospital Site
Gloucester, City of
GO Transit
Goderich-Exeter Railway Co. Limited
Government of Alberta
Government of British Columbia
Government of Canada
Government of Manitoba
Government of New Brunswick
Government of Newfoundland and Labrador
Government of Northwest Territories
Government of Nova Scotia
Government of Ontario
Government of Prince Edward Island
Government of Saskatchewan
Government of Yukon
Grand & Toy Limited
Grand Erie District School Board
Grant MacEwan Community College
Grasslands Regional Division #6
Graybec Inc.
Great Atlantic & Pacific Company of
Canada Limited (A&P), The
Great Canadian Railtour Company Ltd.
Greater St. Albert Catholic Schools
Greater Vancouver Regional District
Green Things
Greenarm Management Limited
Greif Containers Inc.
Grenfell Regional Health Services
Grey Wolf Exploration Inc.
Groupe MCL Énergie
Groupe-Tech
GSW Water Heating Company
Guelph, City of
Gulf Canada Resources Ltd.

H

H.J. Heinz Company of Canada Ltd.
H.L. Blachford Ltd.
Halifax Regional Municipality
Halifax Regional School Board
Halton Catholic District School Board
Hamilton, City of
Hamilton Health Sciences Corporation
Hamilton-Wentworth Municipality
Havelock Lime (a Division of Goldcorp Inc.)
Health Care Corporation of St. John's
Henkel Canada Ltd.
Hercules Canada Inc.
Hillsborough Resource Limited
Holy Spirit Roman Catholic Separate
Regional Division No. 4
Honeywell Ltd.
Hôpital Général Juif - Sir Mortimer B. Davis
Hôpital Laval
Hôpital Notre-Dame
Hôpital Sainte-Croix
Hospital for Sick Children, The
Hub Meat Packers Ltd. - Sunrise Brand
Hudson Bay Mining and Smelting Co. Ltd.
Hudsons Bay Company
Hudson's Hope, District of
Humber College of Applied Arts and Technology
Humber River Regional Hospital
Hunt Oil Company - Canadian Division
Huntsman Chemical Company of Canada Inc.
Huntsman Corporation Canada Inc.
Husky Injection Molding System Ltd.
Husky Oil Corporation

Hydro Agri Canada
Hydro-Electric Commission of the City of Nepean

I

IBM Canada Ltd.
ICI Canada
Ikea Properties Limited
Imasco Limited
IMC Kallium Canada Ltd.
Imperial Oil Ltd.
Imperial Tobacco Limited
Imperial Home Decor Group
In Fine Company
Ingersoll Lime Ltd.
INCO Ltd.
Inland Cement Limited
Interface Flooring Systems (Canada), Inc.
International Paper Industries Ltd.
Iron Ore Company of Canada
Iroquois Falls, City of
Irving Oil Limited
ITT Sheraton Centre Toronto
IVACO Inc.

J

J.L. de BALL Canada Inc.
James Richardson & Sons, Limited
James Richardson International Ltd.
Janssen-Ortho Inc.
Jempak Canada Inc.
JNE Consulting Ltd.
John's no frills (1290357 Ontario Limited)
Jones Packaging Inc.
Just Elaine's

K

Kamloops, City of
KC Environmental Group Ltd.
Keewatin-Patricia District School Board
Keg Restaurants Ltd.
Kelsey-Hayes Canada Ltd.
Kenneth E. Spencer Memorial Home Inc.
Kenora Board of Education
KFC-Canada, A Division of Pepsi-Cola Canada Ltd.
Kimberly-Clark Nova Scotia Inc.
Kindred Industries
Kingston General Hospital
Kitchener, City of
Koch Oil Company Inc.
Kodak Canada Inc.
Kolter Property Management Limited
Kraft Canada Inc.
Kronos Canada Inc.
Kruger Inc.
Kwantlen University College

L

La commission scolaire catholique de Sherbrooke
La corporation Cadillac Fairview limitée -
Portefeuille de l'Est du Canada
La Corporation d'achat régionale de biens et
services de la Montérégie (Région 16)
La Régie régionale de Montréal-Centre
Labatt Breweries of Canada
Lachine, City of
Lacombe, Town of
Lafarge Canada Inc.
LaGran Canada Inc.
Laidlaw Inc.
Lakeshore School Division No. 23
Lambton College
Landswest School Division No. 123
Langara College
Laval, City of
Le Conseil scolaire de district du Centre-Sud-Ouest
Le Royal Meridien King Edward
LePage
Les Residences Lucien Saindon, Inc.
Les Residences Mgr. Chiasson Inc.
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Lloydminster Public School Division
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Lo-Cost Drug Mart
Lombard Management Company

London, City of
London Health Sciences Centre
Londonderry Mall
Loyalist College
Lubrizol Canada Inc.
LUSCAR Ltd.

M

MacPhee Workshop
Magin Energy
Maksteel Service Centre - Division of
Makagon Industries Ltd.
Malaspina University-College - Nanaimo Campus
Malette Kraft Pulp & Power
Manitoba Hydro
Manoir St-Jean-Baptiste
Maple Leaf Meats
Maple Leaf Pork
Maple Lodge Farms Ltd.
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Maritime Electric
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MDS Nordion Inc.
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Melron Property Enterprises Inc.
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Methanex Corporation
Metroland Printing, Publishing and Distributing
Michelin North America
Mikro-Tek
Mines Wabash (gérées par la Compagnie Minière Cliffs inc.)
Mining Association of Canada
Mississauga, City of
Mobil Canada
Molson Breweries
Moncton, City of
Montell Canada Inc.
Montréal, Ville de
Montréal-Est, Ville de
Moose Jaw Roman Catholic Separate School Division No. 22
Moose Jaw-Thunder Creek District Health Board
Moosehead Breweries Ltd.
Morgan Falls Power Company
Mount Saint Joseph Nursing Home
Mount Saint Vincent University
MTS Communications Inc.
Mullen Trucking
Multi-Énergie Best Inc.
Murphy Oil Company Limited

N

Nacan Products Limited
NALCO CANADA INC.
Nalco/Exxon Energy Chemicals Canada Inc.
Nashwaak Villa Inc.
National Agriculture Environment Committee
National Dairy Council of Canada
National Silicates Limited
NCE Resources Group Inc.
Neste Chemicals Canada Inc.
Nestlé Canada Inc.
New Brunswick Community College - Bathurst Campus
New Brunswick Community College - Campbellton Campus
New Brunswick Community College - Edmunston Campus
New Brunswick Community College - Miramichi
New Brunswick Community College - Moncton
New Brunswick Community College - Saint John
New Brunswick Community College - St. Andrews Campus
New Brunswick East Coast Railway
New Brunswick Power Corporation
New Brunswick Southern Railway Company Limited
New Glasgow, Town of
New Westminster, City of
Newfoundland and Labrador Hydro
Newfoundland Power
Newport Petroleum Corporation
Nexacor Realty Management Inc.
Nexfor Inc.
Noranda Inc.
Norfolk Southern Corporation
Nortel
North Island College
North Star Cement Ltd.
North Vancouver, City of
North Vancouver, District of

North West Company, The
Northern College of Applied Arts and Technology
Northern Gateway Regional Division No.10
Northern Lights College
Northlands Park
Northrock Resources Ltd.
Northstar Energy Corporation
Northwest Catholic District School Board
Northwest Territories Power Corporation
Northwoodcare Incorporated
NOVA Chemicals
Nova Scotia College of Art and Design
Nova Scotia Community College, Annapolis Valley Campus
Nova Scotia Power Inc.
Nova Scotia Textiles, Limited
Novotel Canada Inc.
NRI Industries
Nufarm Agriculture Inc.
Numac Energy

O

O&Y Enterprise
O&Y Enterprise Saskatchewan
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Olds College
OMG Belleville Limited
Ontario College of Art and Design
Ontario Power Generation Inc.
Ontario Northland Transportation Commission
Ontario Southland Railway Inc.
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Orion Bus Industries
Osram Sylvania Ltd.
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Ottawa-Carleton, Municipality of
Ottawa-Carleton District School Board
Ottawa Hospital - Riverside Campus
Outremont, Ville d'
Oxford Automotive
Oxford Properties Group Inc.
Oxychem Durez Canada

P

Pacific Northern Gas Ltd.
Pacifica Papers Company
PanCanadian Petroleum Ltd.
PanCanadian Resources
Paramount Resources Ltd.
Parkland Refining Ltd.
Passamaquoddy Lodge
PCI Chemicals Canada Inc.
Peace Wapiti School Board No. 33
Peel District School Board
Pembina Corporation
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Peoples Park Tower inc.
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Petresan Canada Inc.
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Petroleum Services Association of Canada
Petromet Resources Ltd.
Pétromont Inc.
Petrorep Resources Ltd.
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Pioneer Natural Resources Canada Inc.
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Placer Dome Canada Limited
Poco Petroleum Ltd.
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Polywheels Manufacturing Ltd.
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Port Hope, Town of
Port Moody, City of
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Inc. - Allan Division
Potash Corporation of Saskatchewan
Inc. - Cory Division
Potash Corporation of Saskatchewan
Inc. - Lanigan Division
Potash Corporation of Saskatchewan
Inc. - New Brunswick Division
Potash Corporation of Saskatchewan
Inc. - Patience Lake Division
Potash Corporation of Saskatchewan
Inc. - Rocanville Division
Potashville School Division No. 80
PPG Canada Inc.
Presstran Industries

Prévost Car Inc.
PricewaterhouseCoopers
Prime West Energy Inc.
Procter & Gamble Inc.
PRO-ECO Ltd.
Purcell Energy Ltd.
Pursuit Resources Corp.

Q

QIT - Fer et Titane Inc.
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Quebec Cartier Mining Company
Québec-Gatineau Railway Inc.
Quebec North Shore & Labrador Railway Company
Quebec Southern Railway
Queen Elizabeth Hospital
Queens University
Quispamsis, City of

R

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R. J. Burnside International Limited
Radio Shack
RaiLink - Central Western Railway
RaiLink - Lakeland & Waterways
RaiLink - Mackenzie Northern
RaiLink - Ottawa Valley
RaiLink - Southern Ontario
Railway Association of Canada (RAC)
Ranger Oil Ltd. - Heavy Oil Division
Ranger Oil Ltd.
Raylo Chemicals
Recochem Inc.
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Red River College
Regency Towers
Regent Eco Canada
Regent Resources Ltd.
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Regina Catholic Schools
Regina Health District
Regina School Division No.4 of Saskatchewan
Region 7 Hospital Corporation
Regis Plaza Hotel
Reichhold Chemicals, Inc.
Remai Investment Corporation
Renaissance Energy Ltd.
Renata Resources Inc.
Renfrew County District School Board
Rennie's no frills (897643 Ontario Limited)
Réno-Dépôt inc.
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Rigel Oil and Gas Ltd.
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Rolls Royce Industries of Canada Inc.
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Ross Kennedy Hotels
Ross Ventures Ltd.
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Royal Host Corp.
Royal Inland Hospital
Royal Ottawa Health Care Group
Russel Metals Inc.
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S

S.C. Johnson and Son, Limited
Saanich, District of
Saanich School District No. 63
Sabre Energy Ltd.
Safety-Kleen
Saint John Co-Operative Supply Depot
Saint John, City of
Samson Canada
Sandvik Tamrock
Sask Central School Division #121

Saskatoon (West) School Division No. 42
Saskatoon Catholic School Board
Saskatoon District Health - Administration
Saskatoon, City of
SaskEnergy
SaskPower
Scapa Tapes North America - Renfrew
Scarborough Town Centre
School District #5: Baie Verte, Central, Connaigre
School District 36 Surrey - Board of School Trustees
School District No. 4 (Stephenville - Port aux Basques)
School District No. 23 (Central Okanagan)
School District No. 43 (Coquitlam)
School District No. 46 (Sunshine Coast)
School District No. 57 (Prince George)
School District No. 62 (SOOKE)
School District No. 67 (Okanaga Skaha)
School District of Mystery Lake No. 2355
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Scott's Food Services Inc.
Scugog, Township of
Sears Canada Inc.
Seine River School Division No. 14
Seneca College of Applied Arts and Technology
Serca Foodservice Inc.
Services Immobiliers Métivier Grassi Inc.
Seven Oaks School Division No. 10
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Sheridan College
Sherritt International
Shiningbank Energy Ltd.
Signalta Resources Ltd.
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Simmons Canada Inc.
Simon Fraser University
SIR Corp
Sir Sandford Fleming College
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Sleeman Brewing and Malting Co. Ltd.
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Sobeys Ontario
Sobeys Quebec
Sobeys Retail
Sobeys West
Société Canadienne de Métaux Reynolds limitée
Société de transport de la communauté urbaine de Montréal
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South East Health Care Corporation
South East Health District
South Fraser Health Region
South Westman Regional Health Authority
Southern Alberta Institute of Technology
Southern Kings Health
Southern Railway of British Columbia Ltd.
Southwest Regional School Board
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Spire Energy
Spruce Falls Inc.
St. Anne-Nackawic Pulp Company Ltd.
St. Clair College of Applied Arts & Technology
St. James-Assiniboia School Division No. 2
St. Joseph's Hospital
St. John's, City of
St. Laurent Paperboard Inc. / Cartons
St-Laurent Inc.
St. Lawrence & Atlantic Railroad (Quebec) Inc.
St. Lawrence Cement Co.
St. Lawrence College
St. Lawrence Corporation
St. Marys Paper Ltd.
St. Thomas University
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Standard Products (Canada) Limited
Star Oil & Gas Ltd.
Starcan Corporation
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Stelco Inc.
Stepan Canada Inc.
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Steve & Peggy's no frills (1216772 Ontario Limited)
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Stewart Group
Stora Enso Port Hawkesbury
Strathcona, County of
Sturgeon Community Hospital & HealthCentre
Sudbury, Regional Municipality of
Sulco Chemicals Limited
Summit Resources Limited

Suncor Inc.
Sunoma Energy Corporation
Superior-Greenstone District School Board
Superior North Catholic District School Board
Superior Propane Inc.
Superior Radiant Products Ltd.
Surrey, City of
Swan River, Town of
Sydney Steel Corporation
Syncrude Canada Ltd.

T

T. Eaton Co. Ltd.
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Taylor Munroe Energy Systems Inc.
TCT Logistics
Teck Corporation
Teknion Furniture Systems
Tembec Inc.
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The Pas, City of
Thunder Bay, City of
Tideview Terrace
Tilbury Cement Limited
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Timmins and District Hospital
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Toronto District School Board
Toronto Dominion Centre Leaseholds Limited
Toronto East General and Orthopaedic Hospital, Inc.
Toronto Eaton Centre Leaseholds Limited
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Toronto, City of
Toronto Terminals Railway
Toth Holdings
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Trade Centre Limited
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Trans Mountain Pipe Line Company Ltd.
TransAlta Corporation
TransCanada
Trans-Northern Pipelines Inc
Transportation Association of Canada
Trillium Railway Co. Ltd
Trimac
Trinity Western University
Triumph Energy Corporation
Truscan Property Corporation
Tundra Oil and Gas

U

Ulster Petroleums Ltd.
Ultramar Limited
Unihost Corporation
Unilever Canada Ltd.
Union Carbide Canada Inc.
Union Felt Products Inc.
Union Gas Limited
Union Pacific Resources Inc.
UNIROYAL Chemical Ltd.
United Church Home For Senior Citizens Inc., The
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Université de Moncton
Université du Québec
Université du Québec - École de technologie supérieure
Université du Québec à Chicoutimi
Université du Québec à Hull
Université du Québec à Montréal
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University Health Network
University of Alberta
University of Alberta Hospital site of the
Capital Health Authority
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University of Calgary
University of Guelph
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University of Ottawa
University of Regina
University of Saskatchewan
University of St. Jerome's College
University of Toronto
University of Victoria
University of Waterloo
University of Winnipeg
Unocal Canada Management Limited
Upton Resources Inc.

V

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Vancouver City Savings Credit Union
Vancouver Community College
Vancouver School Board - School District No. 39
Vansco Electronics Ltd.
Velcro Canada Inc.
Venator Group Canada Inc.
Versacold Corporation
VFT Inc.
VIA Rail Canada Inc.
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Victoria General Hospital
Victoria Glen Manor Inc.
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Villa Du Repos Inc.
Villa Providence Shediac Inc.
Vision Quest Windelectric Inc.
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Vitafoam Products Canada Ltd.
VOA Colfab Inc.
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W

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Waterloo-St. Jacobs Railway Co. Ltd
Waterloo Region District School Board
Waukehegan Manor Inc.
Weldwood of Canada Ltd.
Wescast Industries Inc.
West Coast Express
West Edmonton Mall
West Fraser Timber Co. Ltd.
Westaim Corporation, The
Westcoast Energy Inc.
Western Health Care Corporation
Western Québec School Board -
Commission scolaire Western Québec
Westford Health Nursing Care Inc.
Weyburn, City of
Weyerhaeuser Canada Ltd.
Whistler, Resort Municipality of
White Pass & Yukon Route
White Spot Restaurants
Whitehorse, City of
Winchester District Memorial Hospital
Windsor & Hantsport Railway
Winnipeg, City of
Wisconsin Central Ltd.
Wolf Creek School Division No. 72
Woodbridge Foam - Division of Woodbridge Group
Workers' Compensation Board of British Columbia
Wyeth-Ayerst Canada Inc.

Y

Yellowknife, City of
Yellowknife Education District No. 1 of the
Northwest Territories
Yonge Street Hotels Ltd.
York University

Z

Zellers

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(in alphabetical order)

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1999 Board of Directors

(in alphabetical order)

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- ❖ Mr. George Fox, Government of Nova Scotia
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- ❖ M. Robert Tessier, Gaz Métropolitain
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- ❖ Ms. Tayce Ann Wakefield, General Motors of Canada Ltd.

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Ms. Jean C. McCloskey, Government of Canada, Natural Resources Canada
Mr. Michael Sopko, Inco Ltd.
Mr. George Weyerhaeuser Jr., Weyerhaeuser Canada Ltd.
Mr. Charles W. Wilson, Shell Canada Limited

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Mr. Gordon Ulrich, Member
Mr. Peter Harrison, Member
Mr. Bob Flemington, Secretary

Former 1999 Audit Committee Member – Ms. Jean McCloskey

Governance Committee:

Mr. Jim Burpee, Chair
Mr. Paul Kelly, Member
Mr. Boris Jackman, Member
Mr. Bob Flemington, Secretary

Former 1999 Governance Committee Chair – Mr. Charles Wilson

1999 Technical Advisory Committee Members

(in alphabetical order)

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Mr. Robert Hornung, *Pembina Institute for Appropriate
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1999 Funding Partners

- ❖ **Aluminium Association of Canada**
- ❖ **Canadian Association of Petroleum Producers**
- ❖ **Canadian Chemical Producers Association**
- ❖ **Canadian Electricity Association**
- ❖ **Canadian Energy Pipeline Association**
- ❖ **Canadian Imperial Bank of Commerce**
- ❖ **Canadian Fertilizer Institute**
- ❖ **Canadian Gas Association**
- ❖ **Canadian Lime Institute**
- ❖ **Canadian National Railway**
- ❖ **Canadian Pacific Railway**
- ❖ **Canadian Petroleum Products Institute**
- ❖ **Canadian Portland Cement Association**
- ❖ **Canadian Pulp and Paper Association**
- ❖ **Canadian Steel Producers Association**
- ❖ **Canadian Textiles Institute**
- ❖ **Canadian Vehicle Manufacturers' Association**
- ❖ **Coal Association of Canada**
- ❖ **Government of Alberta**
- ❖ **Government of British Columbia – Department of Energy and Mines**
- ❖ **Government of British Columbia – Department of Environment, Lands and Parks**
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- ❖ **Government of Prince Edward Island**
- ❖ **Government of Saskatchewan – Department of Energy and Mines**
- ❖ **Government of Saskatchewan – Department of Environment and Resource Management**
- ❖ **Government of Yukon**
- ❖ **Mining Association of Canada**

List of Acronyms

10 ⁶	<i>1,000,000 (one million)</i>
AAC	<i>Aluminium Association of Canada</i>
ABC	<i>Actions By Canadians</i>
ACCC	<i>Association of Canadian Community Colleges</i>
BAU	<i>business as usual</i>
CAPP	<i>Canadian Association of Petroleum Producers</i>
CCAF	<i>Climate Change Action Fund</i>
CCPA	<i>Canadian Chemical Producers' Association</i>
CEPA	<i>Canadian Energy Pipeline Association</i>
CGA	<i>Canadian Gas Association</i>
CGERI	<i>Canadian Greenhouse Gas Emissions and Removals Inventory</i>
CH ₄	<i>methane</i>
CIPEC	<i>Canadian Industry Program for Energy Conservation</i>
CLI	<i>Canadian Lime Institute</i>
CN	<i>Canadian National Railways or Canadian National Railway Company</i>
CO ₂	<i>carbon dioxide</i>
CO ₂ eq	<i>carbon dioxide equivalent (a standard measure of global warming potential)</i>
CPCA	<i>Canadian Portland Cement Association</i>
CPPA	<i>Canadian Pulp and Paper Association</i>
CPPI	<i>Canadian Petroleum Products Institute</i>
CTI	<i>Canadian Textiles Institute</i>
EEl	<i>Eco-Efficiency Innovation</i>
EII	<i>Energy Intensity Index (or in the context of petroleum products, the Solomon Energy Intensity Index)</i>
ENGO	<i>environmental non-government organization</i>
FCM	<i>Federation of Canadian Municipalities</i>
GDP	<i>Gross Domestic Product</i>
GERT	<i>Greenhouse Gas Emission Reduction Trading Pilot</i>
GHG	<i>greenhouse gas</i>
GJ	<i>gigajoule</i>
H ₂	<i>hydrogen</i>
HFC	<i>hydrofluorocarbon</i>
HVAC	<i>heating, ventilation and air conditioning</i>
ICLEI	<i>International Council for Local Environmental Initiatives</i>
IPCC	<i>Intergovernmental Panel on Climate Change</i>
kt	<i>kilotonnes (1,000 tonnes)</i>
LDAR	<i>leak detection and repair</i>
LPG	<i>liquefied petroleum gas</i>
m ³	<i>cubic metre</i>
m ³ OE	<i>cubic metre oil equivalent</i>
MAC	<i>Mining Association of Canada</i>
Mt	<i>megatonne = 1,000 kilotonnes = 1,000,000 tonnes</i>
MW	<i>megawatt</i>
N ₂ O	<i>nitrous oxide</i>
NGO	<i>non-government organization</i>
NRC _{an}	<i>Natural Resources Canada</i>
O ₂	<i>oxygen</i>
OCETA	<i>Ontario Centre for Environmental Technology Advancement</i>
OEE	<i>Office of Energy Efficiency</i>
PCP	<i>Partners for Climate Protection</i>
PDF	<i>portable document format</i>
PERT	<i>Pilot Emission Reduction Trading Program</i>
PFC	<i>perfluorocarbon</i>
SF ₆	<i>sulphur hexafluoride</i>
SME	<i>small- or medium- sized enterprise</i>
t	<i>tonne = 1,000 kilograms = 1,000,000 grams</i>
TAC	<i>Technical Advisory Committee</i>
TEAM	<i>Technology Early Action Measures</i>
VCR Inc.	<i>Canada's Climate Change Voluntary Challenge and Registry Inc.</i>
VFD	<i>variable frequency drive</i>
WEC	<i>World Energy Council</i>

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