# Cool Business Guide

*Lower Costs,*
*Higher Productivity and*
*Climate Change Solutions*

Duncan Noble

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# About the Pembina Institute

The Pembina Institute is an independent, citizen-based think-tank specializing in the fields of energy-environment, climate change and environmental economics. The Institute engages in environmental education; policy research, analysis and advocacy; community sustainable energy development; and corporate environmental management services to advance environmental protection, resource conservation, and environmentally sound and sustainable resource management. Incorporated in 1985, the Institute's head office is in Drayton Valley, Alberta with additional offices in Ottawa and Calgary, and research associates in Edmonton, Vancouver, Victoria, Saskatoon, and other locations across Canada. The Pembina Institute's mission is to implement holistic and practical solutions for a sustainable world.

The Institute's Climate Change Program works to design, develop, promote and implement actions that protect the climate through improvements in the efficiency of fossil fuel energy production and use, and through a transition to the renewable energy that will power the world's economy in the 21st century.

For more information on the Institute's work, visit our web site at **www.pembina.org** or contact us at:


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# About this Guide

To help managers of small and medium-sized businesses (also called small and medium-sized enterprises, or SMEs) learn how they can respond to and profit from actions to address the climate change challenge, the Pembina Institute is offering a series of presentations and workshops along with this publication. This Guide includes a step-by-step approach to show how your business can plan and implement a response to climate change that will help lower costs, improve productivity and increase competitiveness. The Guide:

- introduces readers to climate change;
- identifies how climate change could affect your business;
- gives examples of how leading businesses are profiting from their response to climate change;
- provides practical worksheets that you can use immediately to plan and implement your response; and
- describes over 50 government and private sector resources and tools to help you learn more, and to obtain expertise, tools, and networking and financial assistance.

The Guide was written mainly for managers and owners of manufacturing SMEs with more than 25 employees or whose annual energy costs exceed $50,000. Smaller businesses will find much of the information valuable, and a simplified approach is suggested for them. Much of the Guide is applicable to non-manufacturing businesses, but there is a bias towards manufacturers, particularly in the examples. Depending on the maturity of their climate change strategy, companies larger than the "official" definition of an SME (i.e., more than 500 employees) will also find much of value in this Guide.

**Units of measurement**: Unless otherwise specified, greenhouse gas emissions are given in tonnes (that is, metric tons, or 1,000 kilograms) of carbon dioxide-equivalent and all financial information is given in Canadian dollars.

Copies of this report can be ordered from the Pembina Institute.


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## About the Author

Duncan Noble joined the Pembina Institute to lead a project facilitating small and medium-sized businesses in Ontario and Alberta to take action on climate change. Duncan has over 15 years of experience in engineering, business and implementation of product sustainability solutions. He is also an associate with Five Winds International, a management consulting firm that helps organizations improve the business, environmental and social performance of their products and services.

Prior to joining the Institute, Duncan spent 10 years in financial and environmental management with Nortel Networks. In his most recent position as Advisor, Sustainability and Design for Environment, he developed the business logic, pilot projects and integration necessary to implement solutions throughout the product life cycle. Among other projects, he led a project to improve manufacturing energy efficiency using energy performance contracting.

Duncan holds an MBA and a B.Sc. in Engineering Physics from Queen's University.

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# 1.0 Executive Summary


Summary

- Climate Change is here to stay; it is firmly established as a critical environmental issue in the minds of the public, on the government policy agenda, and for leading businesses.
- The solutions to climate change are win-win: leading businesses are already responding to climate change in creative and innovative ways that help lower energy and other costs, improve productivity, and generate new sources of revenue.
- Greenhouse gas emissions that lead to climate change will increasingly become a business risk that needs to be managed and will also create substantial business opportunities.
- There are many examples of small and medium-sized businesses in Canada that are taking a win-win approach to improving their energy efficiency, reducing their greenhouse gas emissions and responding to the climate change challenge; four are summarized in this chapter, nine more detailed examples are given in Chapter 3.
- To develop a climate change strategy for your business, you need to understand your specific risks and opportunities, where you want to take your business, and how you propose to get there.
- As you develop and implement your response to climate change, it is important to consider both the management and technical dimensions of your plan, and to anticipate potential obstacles so you can incorporate ways of overcoming them into your plans.


**"Global warming is here to stay as a hot button for policymakers, a wild card for business, and a disturbing prospect for us all." – *Fortune* Magazine**[1]

In the picturesque city of Belleville, Ontario (population 47,000), the 90 employees at Interface Canada are setting new standards for reducing greenhouse gas emissions and creating impressive business value. A leading producer of commercial flooring, Interface uses environmental challenges—including climate change—as company-wide drivers for lower costs, higher productivity and improved employee loyalty. The results are remarkable.

Energy consumed per unit of product was reduced 70 percent from 1993 to 1999. Greenhouse gas emissions are down by more than 8,000 tonnes. Since 1994, Interface's QUEST program (Quality Using Employee Suggestions and Teamwork) has saved the Belleville plant $3-million in energy, water and waste costs. As a result of increased productivity and competitiveness, exports to the U.S. have grown from 15 percent to 60 percent of production over the last four years.[2] According to Rahumathulla Marikkar, Interface's Director of Technology and Environment, "When our employees see the risks of climate change, they get very creative designing solutions that reduce our emissions and help our bottom line by lowering costs and improving productivity."

Business leaders at the 2000 World Economic Forum in Davos, Switzerland voted global climate change as the most pressing issue confronting the world's business community. The good news is that the solutions to climate change are win-win-win. They reduce air pollution and greenhouse gas emissions, protect public health, save money, create high quality jobs, build communities and create a stronger economy. To achieve these benefits, all sectors of Canadian society—individual citizens, businesses, communities and governments—must adapt and change to face the challenge of climate change.

[1] *Fortune*, December 8, 1997.
[2] Andrew Nikiforuk, "Pure Profit," *Canadian Business*, April 3, 2000, p. 71.

The purpose of this Guide is to raise the awareness of managers of small and medium-sized businesses about why climate change is such an important business issue, and to facilitate the implementation of profitable "win-win-win" solutions that deliver business value (see Box). This summary chapter explains why climate change is an important business issue and presents the associated risks and opportunities. It also provides examples of successful responses to climate change, and describes how to start planning and implementing a response for your company.

**Responding to Climate Change: Key Business Benefits**

1. Reduced Costs and Higher Productivity – Improved Energy and Material Efficiencies
2. New Revenues – New Climate Friendly Technologies, Products and Services
3. Enhanced Brand Image
4. Improved Employee Morale and Loyalty
5. Reduced Liability and Risk

Economics has emerged as the key driver for companies that are taking action on climate change.[3] There are many examples of how businesses have responded to climate change and, at the same time, reduced energy and other costs and increased their productivity and competitiveness.

- The trade journal *Energy User News* looked at 1,000 energy efficiency upgrades involving one or more of the following components: lighting, motors, drives, heating and cooling, and building control systems. The results showed an average reduction in energy use of 39 percent, with an average return on investment of 32 percent—a 3.1-year simple payback.[4]
- The U.S. Department of Energy, Industrial Assessment Center audited more than 4,000 small to medium-sized manufacturing facilities between 1990 and 1997. These audits identified average annual cost savings of between $18,000 and $98,000 per facility across 20 industrial sectors, with average simple paybacks between 13 and 28 months.[5]
- The Eco-Efficiency Innovation program conducted facility audits at 45 small and medium-sized manufacturing plants in Ontario in 1999 and 2000. The audits identified many cost saving opportunities; 90 percent of the participating manufacturers implemented energy- and water-saving projects with average annual energy savings of 10 to 15 percent, simple paybacks ranging from one to three years, and average annual greenhouse gas emission reductions of 1,250 tonnes.[6]

Chapter 3 of this Guide gives nine detailed examples of Canadian companies that have reduced costs, increased their productivity and competitiveness or developed new revenue sources by responding to climate change.

To manage the business risk of climate change and to take advantage of the opportunities, climate change considerations need to be integrated into key business decisions and processes. This Guide highlights many practical examples, tools, approaches and resources to help businesses plan and implement their response.

[3] Stephanie Gehlen South, *Corporate Leadership on Climate Change* (Arlington, MA: Cutter Information Corp., 2000).
[4] Joseph J. Romm, *Cool Companies: How the Best Businesses Boost Profits and Productivity by Cutting Greenhouse Gas Emissions* (Washington, DC: Island Press, 1999); p. 47.
[5] Climate Wise, *Wise Rules for Industrial Efficiency: A Tool Kit for Estimating Energy Savings and Greenhouse Gas Emission Reductions* (United States Environmental Protection Agency, 1998); p. 32. Available at http://greenbiz.com/toolbox/tools_third.cfm?LinkAdvID=4795.
[6] Corinne McLean, "Digging deep for efficiencies and energy savings," *Plant*, February 12, 2001, page unknown (http://www.plant.ca). For more information about the Eco-Efficiency Innovation program, see its profile in Chapter 6.

## The Climate Change Challenge

Climate change is one of the most serious issues facing Canada and the rest of the world. Human activity, particularly the combustion of fossil fuels, is increasing the atmospheric concentrations of greenhouse gases. Scientific evidence indicates that these gases are enhancing the natural greenhouse effect that makes our planet habitable. As concentrations of greenhouse gases increase in the atmosphere, the earth retains more heat from the sun. Although sometimes referred to as "global warming," a more accurate term for this process is "climate change," reflecting the fact that changes in temperature will also affect other climate variables such as precipitation, ocean currents and wind patterns. More information on the science and impacts of climate change can be found in Chapter 2.

Whenever a business makes a decision, many internal and external factors need to be considered. Whether the decision is about new products, new technologies, new facilities or something else, it is important to consider the impact of the decision on costs, productivity and competitiveness. Will there be a shortage of skilled staff if you expand to a new location? How will interest rates affect your decision to upgrade your facilities and take on debt? Will your proposed new product meet your customers' needs? Many factors can have an impact on costs and profitability. One of them is climate change.

## Managing the Business Risks Associated with Climate Change

Climate change is likely to have significant consequences on businesses with assets and operations directly affected by the weather, such as insurance, real estate, agriculture, forest products, fisheries and tourism. Just as important, however, government policy and market responses to the threat of climate change will also have an impact on your business.

As governments take action to meet international environmental commitments,[7] the use of regulatory and fiscal policies to reduce greenhouse gas emissions will result in increased costs for products and services that cause such emissions. The two most popular fiscal measures being considered internationally to reduce greenhouse gas emissions are a carbon tax and emissions trading.[8] Several European countries including Germany, Norway, Sweden, Finland, the United Kingdom, Denmark and France have already adjusted energy taxation to reflect the greenhouse gas, or "carbon" content of energy sources. While the Canadian government is currently committed to not using a carbon tax, it is actively exploring emissions trading options.

These policies will reduce the value of some assets (e.g., inefficient truck fleets and buildings) and increase the value of others (e.g., energy efficient technologies and products, and replacements or substitutions for carbon-intensive energy sources). They will make greenhouse gas emissions a more substantial cost of doing business and will create opportunities for technologies, products and services that reduce these emissions.

The ultimate cost of greenhouse gas emissions is uncertain and difficult to predict, but the range of prices predicted by various analysts strongly suggests there will be a significant

[7] In 1997, by signing the Kyoto Protocol, Canada agreed to reduce its greenhouse gas emissions from 1990 levels by six percent by 2008-2012. However, actual emissions continue to rise. The latest results show that emissions were up 13 percent and are expected to be up 27 percent by 2010. To change this "business as usual" projection to the agreed target reduction of six percent requires a reduction of 26 percent, or about 200 megatonnes of greenhouse gas emissions. This 26 percent is referred to as Canada's "Kyoto gap."

[8] Emissions trading is discussed in section 3.1 and in the Glossary at the end of this Guide.

impact on energy costs in Canada. Depending on how Canada seeks to meet its Kyoto commitment, estimates of greenhouse gas emission permit prices range between $25 and $80 per tonne of carbon dioxide-equivalent ($CO_2$-e).[9]

The table below shows the impact of a range of greenhouse gas emission permit prices on typical energy costs in Ontario and Alberta. For example, at $40 per tonne of carbon dioxide equivalent ($CO_2$-e), electricity costs in Alberta would increase by four cents per kilowatt-hour, and gasoline prices would jump 10 cents per litre.

**Impact of Greenhouse Gas Permit Prices on Energy Prices[10]**

| Energy Source | $20/tonne $CO_2$-e | $40/tonne $CO_2$-e | $60/tonne $CO_2$-e |
|---|---|---|---|
| Alberta Electricity | +2 cents/kWh | +4 cents/kWh | +6 cents/kWh |
| Ontario Electricity | +0.5 cents/kWh | +1 cents/kWh | +1.5 cents/kWh |
| Natural Gas | +4 cents/$m^3$ | +8 cents/$m^3$ | +11 cents/$m^3$ |
| Gasoline | +5 cents/litre | +10 cents/litre | +15 cents/litre |

These cost increases will have a direct impact on the bottom line and could potentially pose a risk to productivity and competitiveness. **But this risk can be managed**. It is in your interest to take immediate action to reduce your greenhouse gas liability by taking steps to improve energy efficiency and increase the use of low-carbon energy sources.

Even if your business does not use much in the way of fossil fuel-based energy, you may still be at risk. What about your suppliers? Are they heavily dependent on fossil fuels? How do they compare with industry averages and with industry leaders? Manufacturers should be aware of how climate change could affect their major suppliers. Your procurement policies and supply chain management policies need to consider the greenhouse gas intensity of your suppliers as a risk factor. If you don't, you might get surprised by the impact of rising costs for greenhouse gas emissions on their cost structure and hence their prices for you.

Climate change also poses a risk to the demand for your products and services. Whether your business sells to other businesses or to the final consumer, your customers will increasingly prefer more efficient and climate-friendly products. As the general awareness of the environmental, economic and social harm caused by climate change increases, you can expect this consumer preference to move beyond simple cost factors and to become stronger. For a good example of how consumer environmental preferences influence business, consider how the entire Canadian forest products industry has changed in response to customer and public concerns about its practices.

The business risks of climate change are discussed in more detail in Chapter 3.

[9] Work by the Analysis and Modelling Group of Canada's National Climate Change Process in 2000 suggests that greenhouse gas emissions permit prices in 2010 will be in the range of $40 to $80 per tonne of carbon dioxide if Canada seeks to meet its target entirely through domestic actions. U.S. Department of Energy work indicates that, if countries were allowed to make maximum use of the Kyoto Protocol's flexibility mechanisms, emissions permit prices would be $25 per tonne of carbon dioxide.

[10] Greenhouse gas emission factors (fuels and Alberta electricity) from Voluntary Challenge and Registry (VCR) Inc., *Registration Guide 1999*, available at www.vcr-mvr.ca; Ontario electricity emissions factor update from Paul Werbiski, Ontario Power Generation, personal communication July 4, 2000 (paul.werbiski@ontariopowergeneration.com). Alberta electricity would be affected more than Ontario electricity because it is generated using a higher proportion of fossil fuel.

## Seizing Opportunities Associated with Climate Change

Climate change will create new opportunities for Canadian business. These opportunities fall into one of two general categories: internal efficiency opportunities and new revenue opportunities. Internal efficiency includes:

- improved **energy efficiency** through new technologies or conservation measures;
- improved **materials efficiencies** that reduce waste or eliminate non-energy greenhouse gases (e.g., coolants, products of industrial processes); and
- improved **carbon efficiency** resulting from a change to less greenhouse gas intensive fossil fuels (e.g., switching from coal to oil, or from oil to natural gas) or replacing fossil fuels with "green power" renewable energy like small hydro, some forms of biomass, wind or solar energy.

New revenue opportunities associated with responding to climate change include:

- building brand image (e.g., Climate Neutral Network);
- developing new technologies, products and services that enable your customers to be less greenhouse gas intensive (e.g., energy efficient solutions such as high efficiency lighting and motors); and
- generating offsets or emission reduction credits for sale if your cost of reducing emissions is lower than average.[11]

Many large businesses inside and outside Canada are starting to understand the coming changes associated with climate change and are responding by investing hundreds of millions of dollars to manage the risks and, more importantly, to seize the new opportunities. Businesses like Suncor, TransAlta, Alcan, DuPont, Shell, BP and many others are taking climate change seriously and are finding innovative ways of responding to it profitably. Even the venerable *Harvard Business Review* recently carried a feature called "What Every Executive Needs to Know About Global Warming."[12] These businesses are not responding to hair-raising alarm bells from environmentalists. Their objective is to deliver value to their owners.

Canada's small and medium-sized businesses are also responding to climate change. Their programs and investments are not as high profile as those of Suncor, TransAlta and other large companies but they are making a difference—reducing greenhouse gas emissions and doing it profitably. In the search for lower costs, higher productivity and competitiveness they have discovered that responding to climate change drives both internal efficiencies and new revenue opportunities. Nine detailed success stories are given in Chapter 3. Highlights from five of these examples are summarized below.

### *Energy Efficient Towel Production at St. Lawrence Corp.*

St. Lawrence Corp., based in Iroquois, Ontario, is the largest manufacturer of terry towels in Canada. In the early 1990s, an energy audit identified several no-cost or low-cost opportunities with less than a two-year payback. St. Lawrence has implemented many of these measures, including installing a new, higher efficiency heat reclaimer unit, and optimizing compressed air and steam systems. Annual energy cost savings reached $370,000 per year in 1999 versus a 1990 "business as usual" projection. Although production has increased 11 percent from 1990 to 1999, absolute greenhouse gas emissions are down 13 percent, or 1,227 tonnes.

[11] "Offsets" and "Emission Reduction Credits" are defined in the Glossary.

[12] Kimberly O'Neill Packard and Forest Reinhardt, "What Every Executive Needs to Know About Global Warming," *Harvard Business Review*, July-August 2000, pp. 129-135.

### *Material Efficiency Savings at Interface*

The Interface Canada carpet factory in Belleville, Ontario has gone well beyond conventional energy efficiency measures to also change their product design and manufacturing processes. These changes have eliminated one energy intensive process (carpet printing) and have lowered the carpet finishing process temperature by over 100F° (56°C), improving yield, quality, performance and cost. With higher yields, reduced waste and improved material efficiency, more than 8,000 tonnes of greenhouse gas emissions have been eliminated.

### *Improving Carbon Efficiency and Saving Money at Kuntz*

Kuntz Electroplating, based in Kitchener, Ontario, specializes in electroplating for the automotive industry. Kuntz began implementing environmental initiatives in the 1970s in an effort to reduce costs. Initially, the focus was on reducing raw material use. More recently, Kuntz installed a natural gas-fired cogeneration system to produce their own electricity and 60 to 65 percent of their process heat and space-heating requirements for newly expanded facilities.

The increased efficiency of the cogeneration system produces economic and environmental benefits. Total energy costs were down 20 percent in the first year after start up. After the system installation costs are paid back in five years, ongoing savings will provide annual energy cost reductions for at least another 20 years. Greenhouse gases and other pollutants are down significantly: nitrogen oxides by 9,000 kilograms per year, sulphur dioxide by 120,000 kilograms per year, and carbon dioxide by 20,000 tonnes per year.

### *Growing Green Revenue – Vision Quest's Barons of Wind*

In 2000, Calgary-based Vision Quest Windelectric produced ten million kilowatt hours of electricity for its customers, and displaced 10,000 tonnes of greenhouse gas emissions. In 2001, the company plans to quadruple that amount. Vision Quest is building wind energy capacity in Alberta by installing wind turbines and delivering green power and emission reduction credits to users in partnership with corporations like Suncor and ENMAX, as well as directly to some residential customers.

The climate change benefit of wind energy is that no fossil fuels are burned to produce the electricity. And it is now very close to being an economically viable replacement for the most environmentally damaging forms of electricity production. While wind could not supply all of Canada's electricity needs, it could potentially supply 30 percent or more of all the power used from coast to coast.[13]

**The Green Power Opportunity**

"Green Power" is electricity produced from low impact renewable sources like wind, solar and small hydro. Driven by growing demand for clean power, deregulation in electricity markets, improved technologies and declining costs, the market for green power is expanding rapidly. Estimates for the ultimate size of this market in Canada are in the $1-billion range.* This growing market represents a huge business opportunity for producers and distributors of green power, and also represents one of many actions energy consumers can take to reduce their GHG emissions.

* A. Pape-Salmon, Pembina Institute, pers. comm. February 28, 2001

### *Building Brand Image – Climate Neutral Network*

In response to a growing opportunity to develop and take advantage of consumer preference for climate-friendly products and build their own brand images, an alliance of businesses has formed the Climate Neutral Network. Their mission is to develop and

[13] This is not because of lack of wind resource, but is due to technical limitations in supplying a centralized electrical grid from a variable generating source such as wind.

promote products with no net impact on the climate. As of the summer of 2000, the Network boasted over 20 members, including well-known companies such as BP, Interface, Nike, Sunoco and The Body Shop. By joining together, these companies have pooled resources and are sharing technical assistance, networking, design principles and reviews, the Climate Neutral Network trademark, and market development. They expect to derive real business benefits from their membership in the Network, including product differentiation, links with communities via offset projects, building trust and goodwill with stakeholders, reduced risk, and low-cost emission offsets. Climate Neutral Network contact details are given in Chapter 6.

These, and examples for other companies, are profiled in more detail in Chapter 3 of this Guide. Other resources with more success stories are described in Chapter 6.

## Planning Your Company's Response to Climate Change

You could decide that your business needs to respond to climate change for several reasons, including:

- You want to reduce costs, increase revenues and improve productivity.
- You believe that the price or cost of doing business will increase because governments will inevitably restrict greenhouse gas emissions, thus increasing the cost of products and services that are greenhouse gas-intensive.
- You want to improve your brand image by making it "climate friendly."
- You care about the world you are leaving for future generations.

If you are convinced that your company needs to take action on climate change and start integrating climate change considerations into your business, where should you start? Every business is different and has a unique combination of internal and external drivers, resources and other factors that will shape its response. Planning your response to climate change, however, should not differ dramatically from your approach to other business opportunities and challenges.

Where to begin? You need to set goals, determine priorities, and then develop and implement a plan.

What should you consider when planning a response? You need to understand the nature and size of the risks and opportunities that are unique to your business, allocate the appropriate resources and manage these resources to gain maximum value. Chapter 5 of this Guide contains worksheets to help you answer three basic questions:

1. Where are you now? What are your specific risks and opportunities and what is the current status of your response to climate change?
2. Where do you want to go? What climate change strategy is appropriate to the unique circumstances of your company?
3. How are you going to get there? What high leverage actions can you take now to move you closer to where you want to be?

As you implement these actions it is likely that circumstances will change, so you need to monitor your progress against your original plan, verify your key assumptions and be prepared to revise the plan to take changes into account.

## Consider the Management and Technical Dimensions

The best plans to address climate change share certain key elements with good business plans in general. First, it is important to recognize that any business plan requiring changes from current practices needs to consider both the technical dimension (i.e., **What** to do) and the management, or human, dimension (i.e., **How** to do it). Often, there is too much focus on the technical details and not enough on human behaviour and the management of change. Peter Senge calls this "the innovator's dilemma":

> *The fundamental flaw in most innovators' strategies is that they focus on their innovation – on what they are trying to do – rather than on understanding how the larger culture, structures, and norms will react to their efforts.*[14]

To address the management dimension of a plan to respond to climate change, the first step, in common with any successful business initiative, is obtaining upper management commitment. Without this commitment, any new initiative is bound to fail because it will never be able to compete successfully with other priorities for resources and management attention.

Many of the most successful implementation efforts include a designated or self-selected champion who focuses on developing a powerful team, overcoming internal and external barriers, and ensuring that new ways of doing things become well established. The champion needs to be a person with credibility in the organization, the right combination of skills and experience, and an attitude to get the job done whatever it takes.

It is also important to put in place tools to engage and motivate employees. These serve two purposes. First, they tap into the natural creativity and capacity, present in all employees, for finding new ways of doing things. Second, if employees are not made aware of and do not become enthusiastic about changes required to respond to climate change, the likelihood of changes taking hold and becoming permanent is greatly reduced.

**Taking Waste to the Mat**

One of the greatest obstacles to change is how most companies are organized, says Rahumathulla Marikkar, a chemical engineer and environmental champion with Interface Canada in Belleville. "Operations want to get the product out the door, while health and safety act like policemen. And that's a major obstacle," he says.* As Director of Technology *and* Environment at the Belleville plant, Marikkar doesn't have to deal with that obstacle. His leadership has been instrumental in reducing greenhouse gas emissions by more than 8,000 tonnes, virtually eliminating wastewater, reducing energy consumption per unit produced by 70 percent and saving the Belleville plant $3-million in energy, water and waste costs. In 1999, Marikkar was recognized by Canada's VCR Inc. for his role in helping Interface become a leader in industry and in the community through sustainability and impressive reduction of energy use.

* A. Nikiforuk, "Pure Profit," Canadian Business, April 3, 2000; p. 71.

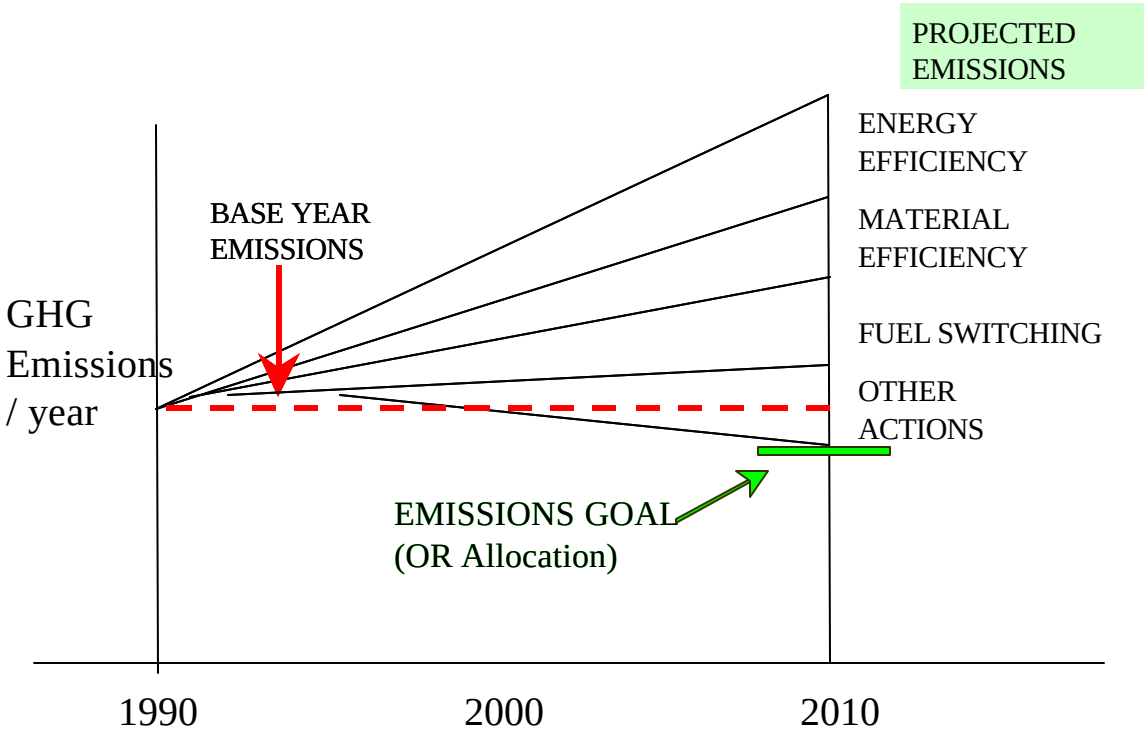
As a plan is implemented, it is important to ensure that management systems and incentives support new behaviour consistent with the required changes. In many cases, internal financial signals may need to be changed. This might include changing how management and employee bonuses are calculated, setting up a revolving investment fund that takes savings from one efficiency upgrade and reinvests it in further upgrades, putting a cost on greenhouse gas emissions for internal investment analysis to test the robustness of projects against future risk, or taking an overall company target on emissions and allocating it to different divisions, sites or product lines. Without changing internal financial signals or other management systems and incentives, it is difficult to send and continuously reinforce a clear message to every employee that your company is serious about responding to climate change.

These management tools and examples of their use are discussed in more detail in Chapter 4.

[14] Peter Senge et al., *The Dance of Change: The Challenges of Sustaining Momentum in Learning Organizations* (New York: Currency/Doubleday, 1999).

The technical dimension of a plan to manage greenhouse gas emissions needs to include a baseline assessment of current emissions, a target for future emissions,[15] projections of future emissions based on business as usual, and the projected impact of planned emission reduction activities. These planned emission reductions could include internal energy efficiency improvements, material efficiency improvements, fuel switching or other activities. The figure below illustrates a plan showing four categories of emission reductions that will be used to reach a target.

**Figure 1-1: Example of a Greenhouse Gas (GHG) Emission Reduction Plan**




## Overcoming Potential Obstacles or Barriers

As you develop, implement and continuously improve your company's plan to manage greenhouse gas emissions and take advantage of new revenue opportunities, it is important to keep in mind potential obstacles or barriers you are likely to encounter so that you can incorporate ways of overcoming them into your plans. These may include lack of awareness about climate change, lack of expertise about how to exploit internal efficiencies or new revenue opportunities, lack of money required to make proposed changes, and lack of time or competing priorities for management attention.

[15] This target could be a voluntary target set to drive action, or it could, in the future, be a regulated limit set by governments.

The information in this Guide, along with associated presentations and workshops,[16] will help you begin to overcome these potential obstacles and to plan and implement a profitable response to climate change for your company. These materials, including tools and resources described in Chapter 6, feature examples of how some companies have responded to climate change along with worksheets for planning your own response. Many of the resources from governments, industry associations and the private sector are available immediately through the Internet. Each resource and tool has been classified and described to help you quickly find what you need to start planning and implementing your response to climate change. You will find help in the areas of Awareness and Education, Expertise and Consulting, Financial Assistance and Incentives, Management and/or Technical Tools, Networking with Solution Providers, Success Stories, and Turnkey Solutions.

Now that you have seen why climate change is an important business issue and how it could affect your company, we invite you to explore the rest of this Guide to learn how to plan and implement your response.

- Chapter 2 describes the science and impacts of climate change, and how the international community and Canada are responding.
- Chapter 3 describes the business risks and opportunities associated with climate change, and gives nine examples of small and medium-sized companies that have profited from their response to climate change.
- Chapter 4 describes seven important elements of climate change strategy that can help you plan and implement a successful response to climate change for your company.
- Chapter 5 describes a five-step process to identify a few high leverage actions you can start to implement immediately to manage your specific risks and seize your unique opportunities.
- Finally, Chapter 6 describes over 50 resources and tools to help identify and implement your response to climate change, and to overcome potential obstacles and barriers.

The bottom line is that climate change is not going away and the substantial resources and innovative capacity of business are starting to be used to create profitable win-win solutions to this major challenge. Whether our response will be enough to match the considerable challenge will depend on all of us.

[16] To help managers of small and medium-sized businesses learn how they can respond to and profit from actions to address the climate change challenge, the Pembina Institute began offering presentations in September 2000. More detailed workshops using this Guide will be offered between March and June 2001. For more information, see the response form at the end of this Guide.

# 2.0 Climate Change: The Problem and the Response


Summary

- The science of climate change is becoming increasingly well understood.
- The evidence linking human activities—mainly the use of fossil fuels—to global warming and climate change is overwhelming.
- Scientific modelling of a range of projected greenhouse gas emissions indicates that average temperatures will rise by 1.4 to 5.8°C during the next century. In comparison, average temperatures were only 4 to 6°C lower than today during the last ice age.
- The impacts of climate change in Canada could well be dramatic, including increased deaths due to heat waves, more severe flooding in some places, more severe droughts in others, major changes to forests, widespread permafrost melting, and extinction of polar bears and other species.
- The international community is responding to the challenge of climate change through a global framework that includes the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol.
- Canada, the United States and other industrialized countries are taking climate change seriously and are accelerating their spending and programs; however, the gap between actual greenhouse gas emissions and targets continues to widen.


## 2.1 Climate Change Science and Impacts

The Earth's natural climate is constantly changing, but the 20th century experienced a global warming trend unprecedented in the past 1,000 years. Most climate experts agree that this warming has been driven in large part by emissions of greenhouse gases from human activities. They project that if these emissions continue their current upward trend, the Earth will undergo further dramatic warming during the 21st century. If this warming is allowed to occur, it is expected to change the global environment in profound ways, with major consequences for people, economies and natural ecosystems as we know them now.

### Who Is Making These Predictions?

Hundreds of scientific papers on climate change are published every year in technical journals. The job of sifting through the research findings to determine where firm conclusions can be reached is called "science assessment." The Intergovernmental Panel on Climate Change (IPCC) is the leading science assessment body in this area, providing technical advice to governments that are parties to the United Nations Framework Convention on Climate Change. The IPCC brings together hundreds of the world's leading experts to produce Assessment Reports, published approximately every five years. Most of the information in this chapter is drawn from the IPCC's Second Assessment Report (1996), updated on key points by newly-published summaries of its Third Assessment Report (2001), and from federal government science assessment publications produced by scientists close to the IPCC process.

**The Significance of Climate Change**

The global average temperature during the last ice age, when Canada was covered by an ice-sheet several kilometres thick, was only 4-6°C lower than it is now. Plant and animal species typically shift northwards by about 150 km for every 1°C rise in temperature. These facts show just how sensitive the environment is to apparently small temperature changes.

Some people remain skeptical of the IPCC's findings, but very few of these skeptics are genuine experts who publish on climate change in peer-reviewed scientific journals. Some

parts of the media continue to publish selective material, giving the impression that significant doubt remains about the human role in climate change and its likely future impacts. This is not representative of mainstream scientific opinion.

### Current Warming

- During the 20th century, the average temperature increased by 0.4-0.8°C globally, and by about 1°C in Canada. This change is greater than any other 100-year change recorded in the past 600 years, and probably in the last 1,000.
- By the 1990s, the ice covering the Arctic Ocean had become about 40 percent thinner than it was 20 to 40 years earlier.
- In Canada, there has been a significant reduction in late winter-early spring snow depths over much of the country since 1950, parts of the boreal forest are showing signs of climatic stress, and prairie grasslands are moving northwards.

### The Cause of Current Warming

- High levels of emissions from human activities have caused the amounts of long-lived greenhouse gases in the atmosphere to increase markedly since the beginning of the industrial era—by 31 percent in the case of carbon dioxide ($CO_2$), the most important of these gases.
- Carbon dioxide comes mainly from the burning of fossil fuels such as oil, gasoline, natural gas and coal, but also from deforestation. Other important greenhouse gases include methane ($CH_4$)[17] and nitrous oxide ($N_2O$).[18] (See Table 1.)

[17] The main sources of methane are fossil fuel production; livestock flatulence, belching and manure; and the rotting of landfilled organic materials, such as kitchen scraps and garden waste.

[18] The main sources of nitrous oxide are vehicle emissions, synthetic and natural nitrogen fertilizers used on agricultural soils, and production of adipic acid. Adipic acid is used mainly in the production of nylon. When adipic acid is being produced, large quantities of $N_2O$ are also produced and are usually vented to the atmosphere. With the 1997 installation of emission-abatement technology at the sole production plant in Canada (the DuPont facility at Maitland, Ontario), $N_2O$ emissions have declined sharply.

**Table 1: Sources of Greenhouse Gases in Canada (1998)**

| Source | Contribution | | Change since 1990 |
|---|---|---|---|
| | Fossil Fuel | Other (non energy) | |
| Fuel use in fossil fuel production and distribution | 8.6 % | | +18 % |
| Fuel use in other industry | 9.5% | | +2 % |
| Public electricity and heat generation | 18.0 % | | +31 % |
| Gasoline use in road vehicles | 12.7 % | | +12 % |
| Diesel use in road vehicles) | 5.4 % | | +46 % |
| Miscellaneous industrial processes | | 7.4 % | –3 % |
| Fossil fuel production and distribution (other than burning) | 7.6 % | | +38 % |
| Fuel use in residential buildings | 6.3 % | | –7 % |
| Agricultural soils | | 6.0 % | –4 % |
| Fuel use in commercial/ institutional buildings | 3.9 % | | +5 % |
| Livestock | | 4.1 % | +13 % |
| Fuel use in air, rail and water transportation | 3.5 % | | +6 % |
| Landfills | | 3.1 % | +15 % |
| Fuel use in off-road vehicles | 2.8 % | | +20 % |
| Other | | 1.0 % | |
| Subtotal Fossil Fuels | 78.3% | | |

### Future Projections – Global

To stabilize the amounts of greenhouse gases in the atmosphere at double pre-industrial levels—and therefore stabilize the human contribution to climate change—global emissions must fall by more than 50 percent from current levels. Under "business as usual" scenarios in which emissions continue to increase:

- The global average temperature will rise by a further 1.4 to 5.8°C by 2100, and the speed of the rise will very likely be greater than any seen during the past 10,000 years.
- This projected global warming will be accompanied by a rise in global average sea level of 9 to 88 cm by 2100.
- Extreme rainfall events are very likely to become more frequent over many areas.

### Future Projections – Canada

Under "business as usual" scenarios of rising greenhouse gas emissions:

- Canada's average **temperature** could increase by 5 to 10°C during the 21st century.
- Dramatic increases are projected in the number of **deaths due to heat waves** in Toronto and Montreal.
- **Sea-level rise** could have major impacts in the Maritimes and British Columbia.
- More intense rainstorms are likely to lead to more severe **river flooding**, particularly on the Atlantic coast and the Great Lakes-St. Lawrence basin.
- Major changes to the levels and flow rates of Canada's **rivers and lakes** are projected; for example, the outflow of the St. Lawrence River could be reduced by 20 percent.

- The Prairies and the southernmost regions of Ontario are expected to suffer from **more severe droughts.** Part of the southern Prairies is projected to become semi-desert.
- Canada's **forests** are likely to undergo major changes. Canada's boreal forest is expected to be reduced extensively in size. Forest fires will likely become more frequent.
- Widespread **permafrost melting** could lead to the collapse of buildings, electric utility lines and tailings dams, along with the rupture of pipelines.
- Decades of conservation efforts in Canada's **National Parks** will potentially be undermined.
- Canada's polar bears will be at risk of **extinction**.
- A mix of positive and negative impacts are projected for Canada's **agricultural production**, with the positive effect of higher temperatures (which could improve the rate of crop growth) balanced by the negative effect of drier soils.
- Like agriculture, **fisheries** are expected to experience mixed impacts.
- Winter **heating costs** will be reduced.

## 2.2 What Is Being Done About Climate Change?

### 2.2.1 The International Response

The United Nations Framework Convention on Climate Change provides a global framework for international action to address this important issue. The Convention was adopted in May 1992, just prior to the Earth Summit in Rio de Janeiro, and entered into force in March 1994. Today, over 180 countries are parties to the Convention. Its "ultimate objective... is to achieve... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-caused] interference with the climate system." As a first step, the Convention committed industrialized country signatories to the non-legally binding "aim" of returning their greenhouse gas emissions to 1990 levels by 2000. Most industrialized countries, including Canada, will fail to meet this goal.

Parties to the Convention have also agreed "to take precautionary measures to anticipate, prevent or minimize the causes of climate change" (precautionary principle) and that "developed country Parties should take the lead in combating climate change."

In 1995, recognizing that the emissions stabilization goal was inadequate, countries began negotiating a stronger legal instrument, eventually adopted in December 1997 in Kyoto, Japan. The Kyoto Protocol commits industrialized countries to legally-binding targets to limit their greenhouse gas emissions, adding up to a total reduction of at least five percent from 1990 levels on average during the five-year period 2008-2012. Canada's target is a six-percent reduction. The U.S. agreed to a seven-percent reduction, the European Union to an eight-percent reduction (shared among member states according to an internal agreement), and Japan to a six-percent reduction.

The Protocol does not specify key details of how the Kyoto flexibility mechanisms and sinks provisions will be implemented. Governments tried and failed to resolve these and other key outstanding issues at the sixth Conference of the Parties (COP 6) to the Convention (November 13-24, 2000, The Hague). Fortunately, however, negotiations are continuing with a resumption of COP 6 in Bonn, from July 16-27, 2001.

Most industrialized countries are awaiting the outcome of these negotiations before ratifying the Protocol. For the Protocol to enter into legal force, 55 countries must ratify it, including countries accounting for 55 percent of industrialized-country carbon dioxide emissions in 1990. To date, only 22 countries have ratified the Protocol, none of them industrialized.[19] Many countries have expressed an intention to ratify the Kyoto Protocol in time for the tenth anniversary of the Rio Earth Summit in 2002.

### 2.2.2 How are the Americans responding?

U.S. policy on climate change is of particular interest in Canada because of the high degree of integration between the U.S. and Canadian economies. U.S. climate policy is also of special importance because the U.S. emits almost half the developed world's greenhouse gas emissions and nearly a quarter of global emissions. This gives the U.S. a large say in whether the Kyoto Protocol will enter into force (see above for the rules for entry into force), although it is possible for the Protocol to enter into force without being ratified by the U.S.

The U.S. has been relatively active in addressing climate change domestically, arguably more so than Canada. Significant domestic U.S. actions include:

- President Clinton's **2001 budget proposal** (February 2000): spending of US$4.3-billion covering research on and deployment of clean energy technology, climate change science, and an initiative to reduce vehicle emissions; and tax incentives worth US$4-billion over five years for energy-efficient homes and vehicles and for clean energy.
- Approved **funding for budget year 2000**: US$3.3-billion in spending, and over US$1-billion in tax incentives.
- Administration **pledge to implement domestic emissions trading** as the key measure to achieve emissions reductions, pending ratification of the Kyoto Protocol.
- **Official goals** to triple biomass energy in the U.S. by 2010, supply five percent of U.S. electricity through wind power by 2020, and reduce emissions from federal operations by 30 percent from the 1990 level by 2010.
- Action by **state governments**, including: US$540-million trust fund for renewable energy in California; New Jersey commitment to reduce emissions by 3.5 percent below the 1990 level by 2005; restrictions on greenhouse gas emissions from new power plants in Oregon.
- **Legislative activity**: More than 20 bills related to climate change were in committee in Congress in March 2000.

Despite these actions, the most recent U.S. government analysis still projects the country's carbon dioxide emissions to be 28 to 38 percent higher in 2010 than in 1990. If the U.S. is to meet its Kyoto Protocol target, it will have to implement significant additional measures and/or make massive use of the Protocol's flexibility mechanisms and sinks provisions.

Although some strong voices from the U.S. business community have tried to discredit the science of climate change and have opposed the Kyoto Protocol, a number of leading U.S. companies are now taking a different approach. Members of the Business Environmental Leadership Council of the Pew Center on Global Climate Change, including Alcoa, Boeing, BP, DuPont, Enron, Lockheed Martin, Maytag, Shell, Toyota, United Technologies, Weyerhaeuser and Whirlpool:

[19] France has also adopted a law committing it to ratification.

> *…accept the views of most scientists that enough is known about the science and environmental impacts of climate change for us to take actions to address its consequences. Businesses can and should take concrete steps now in the U.S. and abroad to assess opportunities for emission reductions, establish and meet emission reduction objectives, and invest in new, more efficient products, practices and technologies.*
>
> *The Kyoto agreement represents a first step in the international process, but more must be done both to implement the market-based mechanisms that were adopted in principle in Kyoto and to more fully involve the rest of the world in the solution.*[20]

### 2.2.3 How is Canada responding?

New spending announcements in recent federal budgets (Table 2) show that the government of Canada has been attaching increasing importance to climate change and now regards it as the biggest environmental issue facing the country:

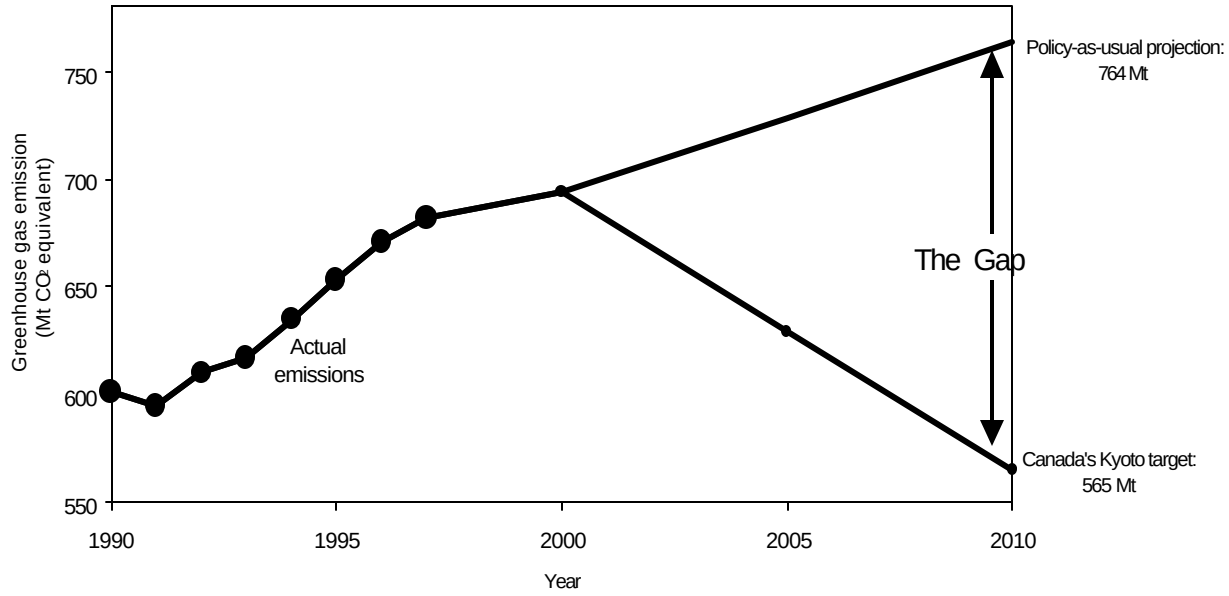
**Table 2: Climate Change Spending in Federal Budgets**

| Budget | Climate Change Spending | Details |
|---|---|---|
| Prior to 1997 budget | "over $100-million" annually | |
| 1997 budget | new spending: $20-million per year for three years | Energy efficiency and renewable energy for commercial buildings |
| 1998 budget | new spending: $50-million per year for three years | Climate Change Action Fund: education, technology, science, National Climate Change Process (analysis and consultations) |
| 1999 budget | | Tax incentive for reduced flaring; funds for municipal energy savings |
| 2000 budget | new spending: $625-million over four years | Renewal of Climate Change Action Fund and energy efficiency and renewable energy programs; extra money for municipalities, technology development, technology transfer, science and federal green energy procurement |
| October 2000 budget update | new spending: $500-million over five years | Action Plan 2000 on Climate Change (see below for details) |

Figure 1 highlights the "Kyoto gap" that has opened up between Canada's continuing trend towards higher greenhouse gas emissions, and our emissions reduction target under the Kyoto Protocol, again showing just how important the climate change issue has become. Up to now, Canada has relied to a large degree on voluntary action by greenhouse gas emitters under Canada's Climate Change Voluntary Challenge and Registry Inc. (VCR Inc.). But the existence of the Kyoto gap shows that this has not been enough, and that governments will need to introduce stronger, mandatory measures in which financial incentives and other economic instruments will play a large part. The current conventional wisdom in the federal government, echoed by Environment Minister David Anderson, is that a domestic emissions trading system will be needed to meet the Kyoto target. It seems increasingly likely that greenhouse gas emissions will acquire a significant cost and liability in Canada within the next few years.

[20] Source: http://www.pewclimate.org/belc/statement.html

**Figure 2-1: Canada's Kyoto Gap**




*Source: Environment Canada and Natural Resources Canada*

In October 2000, all federal, provincial and territorial governments with the exception of Ontario adopted *Canada's National Implementation Strategy on Climate Change*, along with a *First National Climate Change Business Plan* containing specific measures. The federal government estimates that its *Action Plan 2000 on Climate Change* will reduce Canada's emissions by about 65 megatonnes per year by 2008-2012—approximately one-third of the Kyoto gap. It includes new initiatives in the areas of vehicle fuel efficiency; renewable energy and other technology development; energy efficiency in industry, buildings and government operations; and urban transit. The precise nature of many of these measures remains to be clarified.

As in the U.S., there is a wide range of views in the Canadian business community on climate change and the Kyoto Protocol. However, several major Canadian corporations have become positively engaged on this issue and are acting now to reduce their future liability for greenhouse gas emissions. In October 2000, Alcan, Ontario Power Generation and Suncor Energy announced their participation in a new "Partnership for Climate Action" along with BP, Shell International, DuPont and Pechiney. "The primary purpose of the Partnership is to champion market-based mechanisms as a means of achieving early and credible action on reducing greenhouse gas emissions that is efficient and cost-effective."[21] The companies' combined voluntary targets for emission reductions total 80 megatonnes by 2010, compared with combined 1990 emissions of 360 megatonnes.

[21] Partnership for Climate Action news release, October 17, 2000.

## 2.3 For More Information

| Description | Location |
|---|---|
| ***Climate change science and impacts*** | |
| Pembina Institute web site on the science and impacts of climate change | http://www.climatechangesolutions.com/english/science/ |
| Intergovernmental Panel on Climate Change (IPCC) reports | http://www.ipcc.ch/pub/reports.htm |
| Environment Canada's *Canada Country Study* on climate change impacts (summary) | http://www.ec.gc.ca/climate/ccs/policysummary_e.htm |
| Canada's greenhouse gas emissions inventory | http://www.ec.gc.ca/pdb/ghg/English/EHome.html |
| ***The international response*** | |
| Web site of the secretariat of the United Nations Framework Convention on Climate Change and of the Kyoto Protocol | http://www.unfccc.de/ |
| Daily reports on past and current international climate change negotiations | http://www.iisd.ca/climate/ |
| *Actions Undertaken to Address Climate Change* – Environment Canada compilation of government action in various countries | Environment Canada: (819) 994-1659 |
| ***How is Canada responding?*** | |
| Main federal government climate change web site | http://www.climatechange.gc.ca/english/html/ |
| National Climate Change Secretariat | http://www.nccp.ca/html/ |
| Issue Table "options reports" | http://www.nccp.ca/html/table.htm |
| Federal *Action Plan 2000 on Climate Change* | http://www.nccp.ca/html/media/GofCdaPlan-en.pdf |
| *First National Climate Change Business Plan* | http://www.nccp.ca/html/media/FNBP-eng.PDF |
| ***The response of businesses*** | |
| Voluntary Challenge and Registry Inc. – business submissions on greenhouse gas emissions and emissions-reducing activities | http://www.vcr-mvr.ca/home_e.cfm |
| Pew Center on Global Climate Change | http://www.pewclimate.org/ |
| Partnership for Climate Action | http://www.environmentaldefense.org/pubs/NewsReleases/2000/Oct/g_greenhouse.html |
| Success stories, tools and resources for reducing industrial greenhouse gas emissions | http://www.climatechangesolutions.com/english/industry/ |

# 3.0 The Business Relevance of Climate Change


## Summary

- Climate change will affect businesses in three main ways:
  - Changes to the climate will directly affect the productivity of sectors such as forests, fisheries and agriculture, and will also affect the value of insurance, real estate and tourism assets.
  - Government policies and measures will influence the market to favour less greenhouse gas-intensive businesses, products and services.
  - Customer and public pressure will favour less greenhouse gas-intensive businesses, products and services.
- Potential business risks that need to be managed include: increased energy prices, increases in other production costs, government regulations limiting greenhouse gas emissions and changes in customer and public preferences.
- Internal efficiency opportunities associated with climate change include improving energy efficiency, materials efficiency and greenhouse gas ("carbon") efficiency.
- New revenue opportunities associated with climate change include building brand image; new, less greenhouse gas-intensive products and services; and generating emission reduction credits for sale.

**Success Stories**

- Canadian small and medium-sized businesses are managing the risks and seizing the opportunities associated with climate change.
- St. Lawrence Corp., a terry towel manufacturer, used an energy audit in 1993 to identify several low-cost or no-cost energy efficiency opportunities that saved $370,000 per year in 1999 compared with a 1990 "business as usual" projection.
- Kindred Industries, a manufacturer of sinks, has been implementing energy efficiency initiatives since the early 1980s and now enjoys energy savings of more than $70,000 per year, reduced emissions of greenhouse gases and other pollutants, and increased employee comfort.
- The construction of Mountain Equipment Co-op's new retail store in Ottawa used an integrated systems approach that created the first retail store to comply with Canada's C-2000 "Green Building" Standard. The store has many innovative features—it consumes less than half the energy of an equivalent conventional building—and employees and customers love it.
- Kuntz Electroplating installed a natural gas fired cogeneration system to produce their own electricity, process heat and space-heating requirements. Total energy costs were down 20 percent in the first year and greenhouse gas emissions are down 20,000 tonnes.
- Interface Flooring Systems has gone well beyond conventional energy efficiency measures to change their product design and manufacturing processes, with impressive results. Since 1994, savings have reached $3-million in reduced energy, water and waste costs, and greenhouse gas emissions are down by more than 8,000 tonnes.
- Vision Quest Windelectric is growing rapidly, thanks to a growing demand for "green power" and a recent $5-million investment by TransAlta. Vision Quest is building wind-energy capacity in Alberta by installing wind turbines and delivering green power and emission reduction credits to their growing customer base.
- Dantec Corporation developed a new, fully automatic computer control system for grain drying that results in energy savings and yield improvement for their customers, plus a new profitable product for Dantec.
- Fuel Maker is meeting the market need for refuelling systems to service the rapidly growing fleet of vehicles powered by affordable, clean burning natural gas and is positioning itself for a future hydrogen based economy.
- Westport Innovations is a rapidly growing business that is commercializing the enabling technologies to allow diesel engines to produce less pollution and meet stringent new U.S. emission regulations.

Economics has emerged as the key driver for companies that are taking action on climate change.[22] There are many examples of how businesses have responded to climate change and, at the same time, reduced costs and increased their productivity and competitiveness.

- The trade journal *Energy User News* looked at 1,000 energy efficiency upgrades involving one or more of the following components: lighting, motors, drives, heating and cooling, and building control systems. The results showed an average reduction in energy use of 39 percent, with an average return on investment of 32 percent—a 3.1-year simple payback.[23]
- The U.S. Department of Energy, Industrial Assessment Center audited over 4,000 small to medium-sized manufacturing facilities between 1990 and 1997. These audits identified average annual cost savings between $18,000 and $98,000 per facility across 20 industrial sectors, with average simple paybacks between 13 and 28 months.[24]
- The Eco-Efficiency Innovation program conducted facility audits at 45 small and medium-sized manufacturing plants in Ontario in 1999 and 2000. The audits identified many cost saving opportunities; 90 percent of the participating manufacturers implemented energy- and water-saving projects with average annual energy savings of 10 to 15 percent, simple payback ranging from one to three years, and average annual greenhouse gas emission reductions of 1,250 tonnes.[25]
- This chapter gives nine detailed examples of Canadian companies that have reduced costs, increased their productivity and competitiveness or developed new revenue sources by responding to climate change.

## Managing Risk and Taking Advantage of Opportunities

Your business is constantly striving to minimize costs and increase productivity in an effort to expand market share and maximize profit. Every decision made by your business, whether it relates to your products, the production processes and technologies you use, or to the facilities you construct, must be considered in this context. A number of factors can have an impact on costs, competitiveness and profitability. One of them is climate change.

For some companies, changes to our climate will have a direct impact on the bottom line. Increased drought, for example, will reduce productivity and increase costs for farmers. A more unpredictable climate with more frequent and severe weather events will increase uncertainty and costs for insurance companies. The forest industry will see productivity decline as a new climate regime increases the number of forest fires and pest infestations.

A changing climate may not have a large direct effect on many small and medium-sized businesses in Canada. However, government policy to reduce greenhouse gas emissions along with public concern about climate change are likely to have a significant impact for many businesses. Your company's decision makers must recognize and manage the real and

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[22] Stephanie Gehlen South, *Corporate Leadership on Climate Change* (Arlington, MA: Cutter Information Corp., 2000).

[23] Joseph J. Romm, *Cool Companies: How the Best Businesses Boost Profits and Productivity by Cutting Greenhouse Gas Emissions* (Washington, DC: Island Press, 1999) p. 47.

[24] Climate Wise, *Wise Rules for Industrial Efficiency: A Tool Kit for Estimating Energy Savings and Greenhouse Gas Emission Reductions* (United States Environmental Protection Agency, 1998) p. 32. Available at http://greenbiz.com/toolbox/tools_third.cfm?LinkAdvID=4795.

[25] Corinne McLean, "Digging deep for efficiencies and energy savings," *Plant*, February 12, 2001, page unknown (http://www.plant.ca). For more information about the Eco-Efficiency Innovation program, see its profile in Chapter 6.

significant business risk that greenhouse gas emissions will represent a substantial financial and public liability in the near future. At the same time, you need to consider and take advantage of the new business opportunities opening up in a world seeking to reduce greenhouse gas emissions.

Your company should integrate climate change considerations into its business decisions. Failure to do so will lead to poorly informed decisions that are likely to have a negative impact on costs, competitiveness and profitability.

## 3.1 The Business Risks Associated with Climate Change

If Canada ratifies the Kyoto Protocol, it will have to reduce its greenhouse gas emissions by 26 percent from projected "business as usual" levels in the year 2010. This represents a significant challenge for Canada's federal and provincial governments. With millions of sources of greenhouse gas emissions in Canada, traditional regulatory tools are unlikely to do the job. As a result, a broad consensus now exists that Canada will only be able to meet commitments like those envisioned under the Kyoto Protocol if governments put in place a major economic instrument that adjusts market signals in the economy to make activities that produce greenhouse gas emissions relatively more expensive and less attractive than activities that do not. In other words, the market must put a price on greenhouse gas emissions.

Governments have two main options for doing this: a tax on greenhouse gas emissions or a greenhouse gas emissions trading system. Taxes on greenhouse gas emissions (that is, a carbon tax), are already in place or committed to in a number of European countries, including Germany, the United Kingdom, France, Italy, the Netherlands, Sweden, Norway, Denmark and Finland. Under such a tax, energy sources that produce more greenhouse gas emissions (e.g., coal) become relatively more expensive than energy sources that produce fewer greenhouse gas emissions (e.g., natural gas). At this time, however, it appears very unlikely that Canada will implement a carbon tax.

Canada is much more likely to choose the second option—a greenhouse gas emissions trading system. Greenhouse gas emission trading systems are now being designed and assessed by federal and provincial governments who hope to decide in 2002 whether or not to use such a system. International greenhouse gas emissions trading is included in the Kyoto Protocol's flexibility mechanisms. A domestic greenhouse gas emission trading system is already in place in Denmark, and the United Kingdom plans to have a pilot system in place in 2001. The United States has made a public commitment to implement such a system and many other countries, including Australia, are now considering system design options.

Under a standard emissions trading system, government passes a regulation requiring greenhouse gas emitters (e.g., business) to hold permits for any emissions they produce. Governments create the permits and allocate them among emitters, but limit the number of permits available to ensure that Canada's overall emission targets are met. Any emitter that wants to produce more greenhouse gas emissions than it has permits for must purchase additional permits in the open market from other emitters who have surplus permits to sell. As a result, activities that produce greenhouse gas emissions become relatively more expensive than activities that do not because a permit must be purchased to allow the activity to proceed. The fact that the permits have value as an item to be sold or traded gives parties an incentive to reduce their emissions.

No matter what economic instrument is ultimately chosen by Canada, the end result will be the same. The price of greenhouse gas emissions-intensive activities, products and services

will increase relative to alternatives that are less greenhouse gas-intensive. Progressive companies are taking steps now to assess and manage their climate change risks and opportunities in an effort to contain costs and maintain competitiveness.

The first step in understanding the potential risks posed by climate change policy is to quantify your company's own potential greenhouse gas emissions liability. As the adage goes, "You cannot manage what you cannot measure." What quantity of greenhouse gas emissions does your company produce? Section 4.2 of this Guide describes basic steps to monitor and measure your greenhouse gas emissions. At this time, more than 100 Canadian businesses are already voluntarily reporting their greenhouse gas emissions to the public under Canada's Climate Change Voluntary Challenge and Registry (VCR) Program.[26] The VCR program is described in Chapter 6.

## Business Risk # 1 – Increased Energy Costs

Almost 80 percent of Canada's greenhouse gas emissions are associated with the production and combustion of fossil fuels such as coal, oil, gasoline and natural gas. Greenhouse gas emissions from energy use account for an even larger proportion of total emissions from "small and medium-sized enterprises" (SMEs) with fewer than 500 employees in Canada. It has been estimated that electricity and natural gas use in Canadian manufacturing SMEs resulted in more than 40 million tonnes of greenhouse gas emissions in 1996, about six percent of Canada's total greenhouse gas emissions in that year.[27]

Small and medium-sized manufacturers spent $5.9-billion on energy in 1996, accounting for 63 percent of energy expenditures by all manufacturing establishments in Canada.[28] Energy costs are between two and four percent of total production costs for typical manufacturing SMEs in Canada.[29] This is a small but not insignificant cost. Indeed, many SMEs have become increasingly aware of the impact of energy costs on their businesses in recent months. For example, the recent deregulation of the electricity industry in Alberta has coincided with substantial electricity price increases in that province. At the same time, natural gas prices have more than doubled over the last year, as demand has grown faster than supply.

Whether these price increases are temporary or permanent, there should be no doubt that implementing an emissions trading system or other economic instrument to put a price on greenhouse gas emissions in Canada will further increase energy prices in the years ahead. While the future cost of greenhouse gas emissions is uncertain and difficult to forecast, the range of prices predicted by various analysts implies a significant impact on energy costs in Canada. Depending on how Canada chooses to meets its Kyoto commitment; estimates of greenhouse gas emission permit prices range from $25 to $80 per tonne of carbon dioxide-equivalent.[30]

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[26] The VCR reports participation by more than 700 organizations. However, by June 30, 2000, only 115 private sector and/or industrial entities had made submissions to the VCR stating their 1998 emissions. Source: Matthew Bramley, *Greenhouse Gas Emissions from Industrial Companies in Canada: 1998* (Ottawa: The Pembina Institute, 2000). p. 1.

[27] Peck & Associates, *Manufacturing Small to Medium-Sized Enterprises and Climate Change: A Review of Status, Barriers and Opportunities* (Toronto: 1998). Chapter 3. Available at http://www.nccp.ca/html/tables/industry.htm

[28] Peck & Associates, 1998. p. 4, from Statistics Canada, 1996 Annual Survey of Manufacturers.

[29] Peck & Associates, 1998.

[30] Work by the Analysis and Modelling Group of Canada's National Climate Change Process in 2000 suggests that greenhouse gas emissions permit prices in 2010 will be in the range of $40 to $80 per tonne of $CO_2$ if Canada seeks to meet its target entirely through domestic actions. U.S. Department of

Table 3 shows the impact of a range of greenhouse gas emission permit prices on typical energy costs in Ontario and Alberta. For example, at $40 per tonne of carbon dioxide-equivalent, electricity costs in Alberta would increase by four cents per kilowatt-hour, and gasoline prices would jump 10 cents per litre.

## Table 3: Impact of Greenhouse Gas Permit Prices on Energy Prices[31]

| Energy Source | $20/tonne $CO_2$-e | $40/tonne $CO_2$-e | $60/tonne $CO_2$-e |
|---|---|---|---|
| Alberta Electricity | +2 cents/kWh | +4 cents/kWh | +6 cents/kWh |
| Ontario Electricity | +0.5 cents/kWh | +1 cents/kWh | +1.5 cents/kWh |
| Natural Gas | +4 cents/$m^3$ | +8 cents/$m^3$ | +11 cents/$m^3$ |
| Gasoline | +5 cents/litre | +10 cents/litre | +15 cents/litre |

Your company should assess the implications of such energy price increases on your production costs and competitiveness. For many small and medium-sized enterprises, the implications will be significant. Accordingly, your company should be taking steps now to manage the risk of higher energy costs by decreasing your vulnerability to future increases in the price of energy produced from fossil fuels.

**Managing the Risk and Transforming Risk into Opportunity**

- Section 3.2 of this Guide describes how some companies are responding to the risk posed by higher energy prices by taking advantage of the many cost-effective opportunities to implement energy conservation and energy efficiency initiatives; the result has been reduced costs and improved competitiveness. For example, St. Lawrence Corp. has implemented many no-cost or low-cost energy saving opportunities with less than a two-year payback. By 1999, the company's energy costs were $370,000 per year below its 1990 "business as usual" projection.
- Section 4.4 describes how some companies are managing the risk of increased energy prices by incorporating assumptions about those prices directly into business decisions around new investments. For example, to test the robustness of projects against future risk, Shell now requires an assessment of all new investments under scenarios where the future price of greenhouse gas emission permits is assumed to be $5, $20 and $40 per tonne of carbon.*
- Section 4.5 describes how some companies are seeking to reduce their vulnerability to increased energy prices by creating incentives for employees to find and implement measures that reduce energy consumption. For example, Edmonton-based utility EPCOR has a program to financially reward employees for environmental protection measures, including greenhouse gas emissions management. An employee bonus is calculated annually, based on environmental performance, financial performance, safety performance, and customer satisfaction. Total bonuses each year amount to as much as ten percent of salary.
- Section 3.2 also describes how some companies are responding to the future risk of a price on greenhouse gas emissions by taking advantage of the growing opportunity to switch from more carbon-intensive energy sources to less carbon-intensive "green power." For example, Interface Flooring Systems currently purchases 25 percent of its electricity supply from certified green power (solar, wind and small run-of-river hydro with no dams). The company's goal is to have all of its electricity supplied from certified green power by 2002.

* Robert Kleinburg (robert.a.kleinburg@si.shell.com), Shell International, "The cost of carbon – a critical issue for business," Presentation at COP-5, Bonn, Nov. 1, 1999. To convert emissions of carbon to emissions of carbon dioxide, multiply by 3.667 (=44/12).

Energy work indicates that, if countries were allowed to make maximum use of the Kyoto Protocol's flexibility mechanisms, emissions permit prices would be $25 per tonne of $CO_2$.

[31] Greenhouse gas emission factors (fuels and Alberta electricity) from Voluntary Challenge and Registry (VCR) Inc., *Registration Guide 1999*, available at www.vcr-mvr.ca; Ontario electricity emissions factor update from Paul Werbiski, Ontario Power Generation, personal communication July 4, 2000 (paul.werbiski@ontariopowergeneration.com). Alberta electricity would be affected more than Ontario electricity because it is generated using a higher proportion of fossil fuel.

## Business Risk # 2 – Increases in Other Production Costs

While the use of a major economic instrument to reduce greenhouse gas emissions will have an impact on your own company, you will also need to understand and manage the risks for your suppliers and distributors due to higher energy costs.

For example, does your business require inputs that are manufactured through an energy-intensive process? If the answer is "yes," you can expect your input costs to increase significantly as your suppliers pass their cost increases on to you. At the same time, your distribution costs will also increase. If your goods are moved by truck, a potential 10 to 15 cent-per-litre increase in the price of fuel would be reflected in your transportation costs. Some small and medium-sized enterprises may already be facing such cost increases with the rise in gasoline prices during the last year.

Once again, it is possible to manage this risk in ways that will open up new opportunities for your company to become more profitable.

**Managing the Risk and Transforming Risk into Opportunity**

- Section 3.2 of this Guide describes how some companies are responding to the risk that their input costs will increase by redesigning their internal production process to use fewer material inputs. For example, Interface Canada has eliminated one energy intensive process (carpet printing) and lowered the carpet finishing process temperature by over 100°F (56°C), improving yield, quality, performance and cost. With higher yields, reduced waste and improved material efficiency, over 8,000 tonnes of greenhouse gas emissions have been eliminated.
- Some companies are using life-cycle value assessment tools to examine the entire life cycle of their product or service (including raw materials production, manufacturing, distribution, use and disposal) to identify and implement opportunities to reduce both costs and the overall impact on the environment.*
- Section 4.7 describes how some companies are managing the risk of increased input and distribution costs by adjusting their procurement practices to favour less carbon-intensive goods and services. For example, in 1998 Petro-Canada's President and CEO wrote to all of their large suppliers urging them to take action on climate change and specifically to participate in the VCR, Canada's voluntary climate change reporting registry. Petro-Canada now considers VCR participation as a factor in evaluating potential suppliers.

* For more information about life-cycle value assessment, see the Glossary or http://www.pembina.org/ces/lcva.htm

## Business Risk # 3 – Regulatory Requirements to Limit Greenhouse Gas Emissions

Under most greenhouse gas emission trading systems, large emitters of greenhouse gases will have to acquire permits to cover their emissions. It is unclear to what extent small and medium-sized enterprises will face such requirements. The sheer number of SMEs in Canada means that it is administratively impossible to include all of them in a domestic emissions trading system. Participation requirements could be influenced by the size of the firm (e.g., any firm with more than a specific number of employees would be required to participate) or the amount of greenhouse gases emitted (e.g., any firm producing 1,000 tonnes of greenhouse gas emissions annually would be required to participate).

It is probable that only some large, energy-intensive SMEs will be required to participate in an emissions trading system. Nonetheless, other SMEs are likely to be held publicly accountable for their greenhouse gas emissions. For example, the Ontario government recently indicated that it would require all major industrial, institutional and commercial operations in the province to begin reporting their greenhouse gas emissions to the

government in 2001.[32] In addition, small and medium-sized enterprises that produce or contribute to the production of energy using products may find new regulated energy efficiency or carbon efficiency standards established for those products in the future.

What can you do to manage the risk that your company will face regulatory requirements in the future to limit greenhouse gas emissions from either its operations or its products? All of the actions mentioned earlier to mitigate the impact of increased energy and production costs will also enhance your ability to meet any future regulatory requirements. Additional tools and opportunities are also available.

**Managing the Risk and Transforming Risk into Opportunity**

- Section 4.2 of this Guide describes how a number of companies are managing the risk that they will face regulated limits on greenhouse gas emissions by voluntarily measuring and reporting their greenhouse gas emissions and setting voluntary targets to limit emissions. For example, St. Lawrence Corp. has submitted progress reports to the VCR since 1997 and established a voluntary target of two percent improvement in energy consumption for the years 1996 through 2000—that is, a target of ten percent reduction by the year 2000. The VCR is described in Chapter 6.
- Section 3.2 describes how some companies have identified and are aggressively pursuing a new business opportunity that will be created by an emissions trading system: the development and sale of greenhouse gas emission reduction credits that can help companies meet regulated requirements to limit greenhouse gas emissions. For example, Vision Quest Windelectric is building wind energy capacity in Alberta by installing wind turbines and delivering green power and emission reduction credits to users in partnership with corporations like Suncor and ENMAX, as well as directly to some residential customers.

## Business Risk # 4 – Changes in Customer and Public Preferences

The use of a major economic instrument to address climate change may place regulatory requirements to limit greenhouse gas emissions on your customers and will certainly increase their costs for carbon-intensive goods and services. Consequently, your customers are also going to be looking for ways to reduce their greenhouse gas emission liability, which is likely to lead them to pursue more aggressive supply chain management initiatives.

Customers are already demanding that suppliers meet certain environmental requirements as part of existing supply chain management initiatives; these include:

- providing environmental data on products;
- certification of management practices (ISO 14001) and products (e.g., forest products) on environmental grounds by independent third parties;
- prohibiting the use of certain substances and materials;
- take-back obligations when the product is no longer useful; and
- performance requirements with respect to energy use, recyclability and other factors.

It is not difficult to see a time in the future where customers demand evidence of a climate change management plan and the accomplishment of specific objectives with respect to greenhouse gas emissions management.

[32] This requirement was scheduled to take effect January 1, 2001. It has been delayed, with no new start date announced. For more information, see the Ontario Ministry of the Environment's web site at http://www.ene.gov.on.ca

In addition, the ability of companies to obtain a "public licence to operate" is increasingly tied to environmental performance. This may be especially important for SMEs that are major employers in smaller communities. If your company is perceived to be a poor performer on climate change and that limits your public licence to operate, it could affect your standing in the community, your ability to gain approvals for new facilities and your ability to attract and retain employees and investors.

Taking action on climate change will help ensure that your company can maintain and increase its customer base while continuing to have a public licence to operate.

**Managing the Risk and Transforming Risk into Opportunity**

- Section 3.2 describes how some companies are taking advantage of changing customer preferences to develop business opportunities around new products and services that are less greenhouse gas-intensive and more climate friendly. For example, Vancouver-based Westport Innovations is collaborating with leading diesel engine manufacturers for heavy duty vehicles to commercialize the technologies that will allow diesel engines to operate on a mixture of natural gas and diesel fuel. Westport's technology maintains the high efficiency and performance of diesel engines while dramatically reducing local air pollutants and greenhouse gases.
- Some companies are having their climate change performance verified by independent third parties. Their goal is to enhance their brand image and increase market share by demonstrating to customers and other stakeholders that they are serious about climate change. For example, Shaklee Corporation became the first certified "Climate Neutral Enterprise" in 2000. This certification by the Climate Neutral Network (see Chapter 6 for details) verifies that Shaklee has reduced and offset its greenhouse gas emissions to achieve a net zero impact on the climate. As a Climate Neutral Certified company, Shaklee agreed to fund several emissions reduction projects, ranging from upgrading existing oil steam boilers at schools in the Portland, Oregon school district to providing solar generated electricity to rural populations in Sri Lanka and India. In addition, in 1999 Shaklee finished construction of a new building for its world headquarters in Pleasanton, California that showcases energy efficient and sustainable-resource technologies.*
- Some companies are demonstrating their commitment to address climate change by supporting initiatives to reduce greenhouse gas emissions in the communities where they are based. For example, sixteen large energy companies are supporting the Action By Canadians (ABC) on climate change program. This program raises awareness and builds commitment for individual action[I] through interactive training workshops in the workplace. Over 4,000 Canadians have attended the ABC workshops. The ABC program is described in Chapter 6.

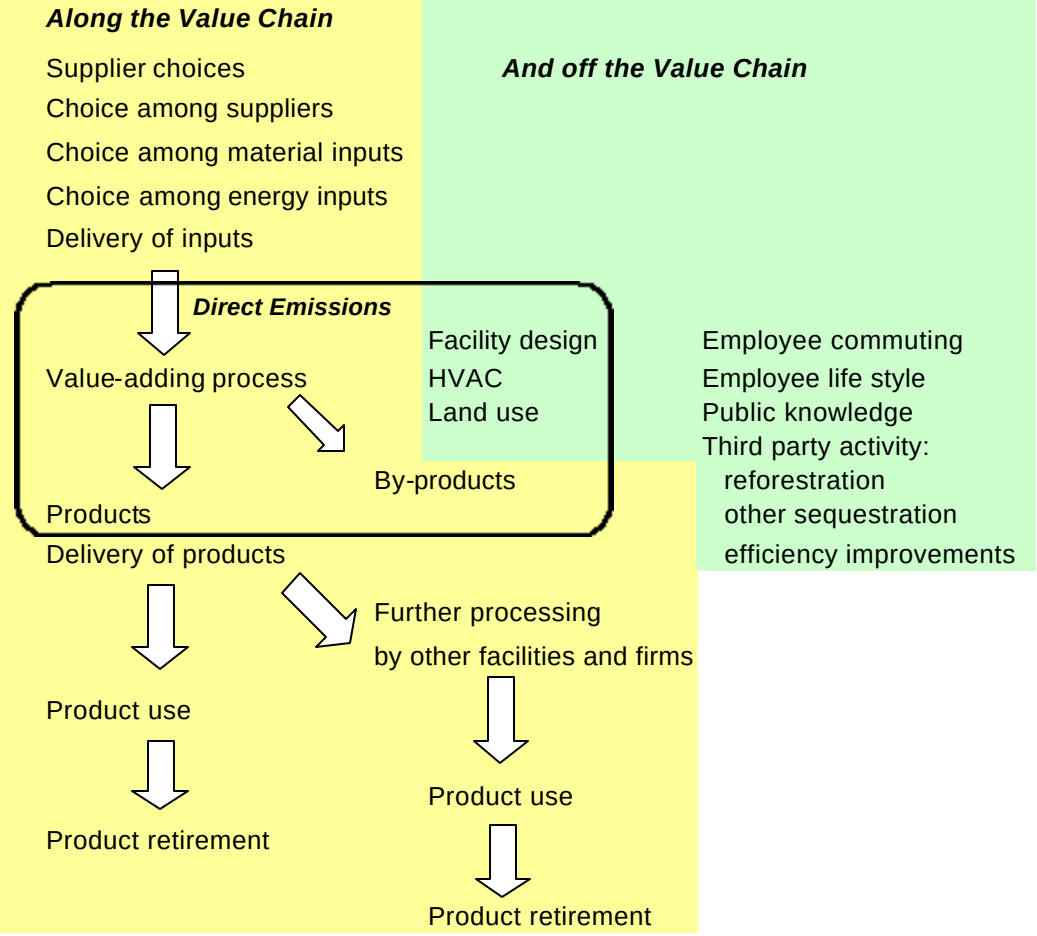
* Shaklee Corporation, "Business Environmental Award Goes to Shaklee," November 13, 2000. Available at http://www2.shaklee.com/company/release.cfm?id=1

[I] Individual actions include things like turning off lights, lowering night-time thermostat settings, proper car maintenance, etc.

## 3.2 Business Opportunities Associated with Climate Change

Figure 2 shows many of the areas where actions by companies can influence greenhouse gas emissions. It serves as a good reminder of the breadth of actions available to reduce greenhouse gas emissions within companies and through upstream suppliers or with downstream customers.

**Figure 3-1: Business Influence over Direct and Indirect Greenhouse Gas Emissions**




*Source: Global Environmental Management Initiative,* www.businessandclimate.org

Climate change will create new opportunities for Canadian business. These opportunities fall into one of two general categories: internal efficiency opportunities and new revenue opportunities. Internal efficiency includes:

- improved **energy efficiency** through new technologies or conservation measures;
- improved **materials efficiencies** that reduce waste or eliminate non-energy greenhouse gases (e.g., coolants, products of industrial processes); and
- improved **carbon efficiency** resulting from a change to less greenhouse gas-intensive fossil fuels (e.g., switching from coal to oil, or from oil to natural gas) or replacing fossil fuels with "green power"—that is, renewable energy like small hydro, some forms of biomass, wind or solar energy.

New revenue opportunities associated with responding to climate change include:

- building brand image (e.g., Climate Neutral Network),
- developing new technologies, products and services that enable customers to become less greenhouse gas-intensive (e.g., energy efficient solutions such as high efficiency lighting and motors); and
- generating offsets or emission reduction credits for sale if your cost of reducing emissions is lower than average.[33]

Both internal efficiency opportunities and new revenue opportunities can be implemented on various scales. For example, incremental improvements include energy conservation measures such as shutting off lights in unoccupied spaces or better maintenance of steam distribution systems. More substantial improvements often require significant redesign of facilities, products or processes to improve their energy, material or carbon efficiency. Finally, the growing demand for reduced greenhouse gas emissions is creating entirely new market segments for climate-friendly products and services.

Many large businesses inside and outside Canada are starting to understand the coming changes associated with climate change and are responding by investing hundreds of millions of dollars to manage the risks and, more importantly, to seize the new opportunities. Businesses like Suncor, TransAlta, Alcan, DuPont, Shell, BP and many others are taking climate change seriously and are finding innovative ways of responding to it profitably. Even the venerable *Harvard Business Review* recently carried a feature called "What Every Executive Needs to Know About Global Warming."[34] These businesses are not responding to hair-raising alarm bells from environmentalists. Their objective is to deliver value to their owners.

Small and medium-sized Canadian businesses are also responding to climate change. Their programs and investments are not as high profile as those of the large companies but they are making a difference—reducing greenhouse gas emissions and doing it profitably. In the search for lower costs, higher productivity and competitiveness they have discovered that their response to climate change drives both internal efficiencies and new revenue opportunities. The types of internal efficiencies and new revenue opportunities illustrated by nine success story examples are summarized in Table 4. These success stories are discussed in more detail below.

**Table 4: Summary of Success Stories**

| Company | Internal Efficiencies | | | New Revenue | | |
|---|---|---|---|---|---|---|
| | Energy Efficiency | Materials Efficiency | Carbon Efficiency | New Products | Brand Image | Emission Offsets |
| St. Lawrence | √ | | | | | |
| Kindred | √ | | | | | |
| MEC | √ | √ | | | √ | |
| Kuntz | | | √ | | √ | |
| Interface | √ | √ | √ | | √ | |
| Vision Quest | | | | √ | √ | √ |
| Dantec | | | | √ | | |
| FuelMaker | | | | √ | | |
| Westport | | | | √ | | |

[33] "Offsets" and "Emission Reduction Credits" are defined in the Glossary.
[34] Kimberly O'Neill Packard and Forest Reinhardt, "What Every Executive Needs to Know About Global Warming," *Harvard Business Review*, July-August 2000, pp 129-135.

## St. Lawrence Corp.

√ Example of energy efficiency opportunity

- Largest manufacturer of terry towels in Canada (~70,000 kg of terry towels per week)
- 286,000 square foot manufacturing plant in Iroquois, Ontario
- Employs approximately 300 people
- Annual sales of approximately $30-million
- Previously known as C.S. Brooks Corporation, Caldwell a Division of Dominion Textile, Caldwell Linen Mills

### Drivers for Change

- In the early 1990s, St. Lawrence Corp. found that the design and technology of its outdated facilities were eating up energy costs, but lacked the internal expertise to identify appropriate actions.
- In 1993, the Ontario Ministry of Environment and Energy (OMEE) prepared an energy audit of the facility, identifying several areas to save energy and costs.
- In 1995 St. Lawrence Corp. became an Industrial Energy Innovator. Management committed to a two percent improvement in energy consumption for the years 1996 to 2000—an overall target of 10 percent reduction by the year 2000.

### Actions

- 1993 Energy Audit
- Changed back-up fuel from Bunker C oil to light oil to eliminate need for winter steam to keep the back up fuel liquid
- Improved power factor to over 90 percent with capacitors
- Installed new heat reclaimer unit with higher efficiency in dye and bleach processing area
- Reclaim heat from air compressor cooling water and use to heat process make-up water
- Monthly checks for leakage performed on all air outlets and steam traps
- Occupancy sensors installed in canteens

### Results

- Energy cost savings of $370,000 per year in 1999 compared with 1990 "business as usual" projection
- Energy consumed and greenhouse gas (GHG) emissions per unit production down 26 percent in 2000 (first seven months) from 1990 base year
- GHG emissions down 2,275 tonnes in 1999 from 1990 "business as usual" projection
- Absolute GHG emissions down 1,227 tonnes (13 percent) in 1999 versus 1990, even with an 11 percent increase in production
- Many of the energy efficiency measures adopted were no-cost or low-cost, with less than two-year payback.

### Key Success Factors

- According to Walter Bailey, VP Manufacturing, the 1993 Energy Audit by Ontario MOEE (carried out by Ottawa based engineering consultants) is considered their "bible for energy efficiency."

### Sources and Additional Information

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- St. Lawrence Corp.'s VCR Progress Report, 2000. Available from VCR Inc. web site www.vcr-mvr.ca/home_e.cfm
- Romeo Lefebvre (St. Lawrence Corp.), Presentation to Canada's Energy Efficiency Conference, October 2000, Ottawa
- Walter Bailey, Vice President, Manufacturing
  St. Lawrence Corp.
  24 Bath Road
  Iroquois, Ontario K0E 1K0
  tel: (613) 652-4816 fax: (613) 652-4518

## Kindred Industries

√ Example of energy efficiency opportunity

- Manufacturer of stainless steel and colour composite sinks
- 106,000 square foot production facility in Midland, Ontario
- Employs over 100 people; annual sales between $25- and $100-million
- International markets include: North America, Europe, South and Central America, Asia/Pacific
- A division of Emco Ltd of London, Ontario
- Kindred achieved ISO 9001 quality management system certification in 1994 and, in response to growing customer interest (especially overseas) in environmental performance, achieved ISO 14001 environmental management system certification in 1999.

### Drivers for Change

- In response to high energy costs in the early 1980s, Kindred implemented energy efficiency and conservation programs to reduce operating costs and remain competitive.
- ISO 14001 certification has helped Kindred measure and monitor its environmental performance, focus on continuous improvement, and help retain overseas markets that require this certification.

### Actions

- In 1989, a study was done on the 30-year old heating, ventilation and air conditioning (HVAC) equipment; numerous recommendations were generated.
- The first cost cutting effort was to re-insulate its cement block facility and enclose it in steel siding.
- Improvements taken from the HVAC study have resulted in the phasing out of the older heating equipment, and replacing it with new gas powered equipment.
- All plant heating was changed over to radiant tube heating.
- The hot water heating system in the offices was converted to roof top gas heat/cool units.
- Make-up air units have been replaced with roof top gas units.
- The fire tube boiler was replaced with direct gas fired units at appropriate locations within the manufacturing operation.

Several electrical energy efficiency initiatives were also implemented:

- New energy efficient motors were installed to operate the presses that form the sinks; "Replacement motors or new equipment are all specified to have energy efficient motors," states Rick Gould, Property Manager for Kindred. "This is an ongoing continuous improvement program."
- Power factor correction capacitors were recently installed to reduce energy costs.
- Fluorescent tube lighting at the plant is being converted to metal halide lighting; as of fall 2000, lighting in the main production area of 12,000 $ft^2$ of Kindred's 106,000 $ft^2$ plant has been replaced.
- Most of the initiatives implemented at Kindred meet a three- to five-year payback criterion.

### Results

- Energy consumption to manufacture stainless steel sinks dropped by 37 percent.
- Energy savings amount to about $70,000 per year in natural gas costs alone, and are likely higher with rapidly rising natural gas costs.
- From the reduced energy input required for the production of the bowls alone, roughly 530 tonnes of GHG emissions per year have been eliminated.
- Overall, emissions have been reduced by a significantly greater amount considering the electricity consumption reduction and other energy conservation initiatives that were implemented.
- When the building insulation was completed, better windows installed, and the heating and ventilating system improved, employees enjoyed a much more comfortable work environment.

### Key Success Factors

- Middle management initiated the recommendations, upper management supported them, and the employees have openly supported implementation of the recommended initiatives.
- Engineering sales representatives were essential in identifying some key areas for energy conservation improvement.

### Sources and Additional Information

- "Kindred Industries Sink Energy Costs," *Plant*, date unknown.
- Mr. Rick Gould, Property Building Manager
  1000 Kindred Road
  Midland, Ontario L4R 4K9
  tel: (705) 526-5427, extension 250 e-mail: rick.gould@kindred-sinkware.com
  web: www.kindred-sinkware.com

## Mountain Equipment Co-op – Ottawa Retail Store

√ Example of energy efficiency, materials efficiency, brand image opportunities

- Products and services for self-propelled wilderness oriented recreational activities, such as hiking and mountaineering
- Five locations across Canada (Vancouver, Calgary, Edmonton, Toronto, Ottawa)
- Revenues of $139-million in 1999
- Roughly 1.4 million members; employs over 1,000 people across Canada
- 90-100 employees at Ottawa store
- A not-for-profit member owned and directed retail consumer co-operative

### Drivers for Change

- Vision statement "... to establish MEC ... throughout Canada … as a leader in environmental and social responsibility …."
- MEC's employees strongly associate with the environmental goals in this vision.
- The opportunity to reduce operating costs is real.
- Implementing such initiatives establishes MEC as a leader with its target customers, who identify strongly with the goal of environmental protection.
- The Ottawa store is the most recent product of the MEC vision, incorporating the greatest number of environmentally related initiatives, and is a natural evolution of efforts to "green" the construction of MEC's Vancouver, Calgary and Edmonton buildings.

### Actions

- First retail store in Canada to comply with Canada's C-2000 "Green Building" Standard
- 75 percent by weight of the original 40-year old building being renovated was retained on site.
- Timber reclaimed from the St. Lawrence River was used in new construction.
- 80 percent of the building materials were obtained from within a 500-km radius (reducing upstream environmental impacts from transportation).
- More than 55 percent of the materials by weight in the new building came from recycled sources (steel beams, insulation from cellulose, rockwool from recycled material, wood from other buildings being dismantled, bricks from the old building were cleaned and reused).
- Design complies with strict indoor environment guidelines on air quality, room-by-room ventilation, noise, humidity control and occupant comfort.
- Natural daylight is maximized by using a roof monitor and skylights.
- Argon gas-filled double pane windows reduce heat loss and summer solar gain.
- $CO_2$ sensor adjusts fresh air based on occupancy level of the store.
- Rockwool insulation is in the walls and roof to increase thermal efficiency of the building envelope.
- One wall of the building is built from 100 straw bales covered by 1 cm of stucco as a demonstration of this low impact technology using biomass to replace more greenhouse gas-intensive conventional materials.

### Results

- The Ottawa store is expected to consume less than half the energy of a typically built retail store of the same size.

- A 10-percent premium was paid compared to traditional construction; this premium will be recovered over the next ten to twelve years from reduced electrical and heating costs. Increasing energy costs have the potential to shorten this payback period.
- Media coverage of the environmental features of the Ottawa store alone has contributed significantly to the brand name association of MEC with its vision of social and environmental responsibility.
- Employees are happier to work in this environment.
- Though too early to quantify for MEC, studies indicate that consumers spend more per square foot of floor space in naturally lit, green retail buildings.[35]
- The careful selection of materials and energy efficient design produced an up front (i.e., before operating the building) savings of over 617 tonnes of $CO_2$ emissions, 2.5 tonnes of sulphur dioxide ($SO_2$) and 1 tonne of nitrogen oxides ($NO_x$).
- Annual emissions from operating the Ottawa store, compared to typical construction, are reduced by 71.6 tonnes of $CO_2$, 1 tonne of $SO_2$ and 0.1 tonnes of $NO_x$

### Key Success Factors

- Earlier successful experience with environmental features of new buildings in Vancouver, Calgary and Edmonton built experience and confidence within MEC.
- An integrated systems approach was used from the early design stage onwards; owner, architect, engineering consultants, store managers and contractors had to agree on this approach to be a part of the team.
- The Board supports the green building program through its operating policy.
- MEC Board members and employees have an environmental mindset.
- Being a non-profit organization removes some pressure that other publicly or privately held organizations might feel from shareholders or investors.
- MEC's thinking is that it will be successful because of its environmental commitment and initiatives – not in spite of them.
- It was a very low risk exercise using proven products and techniques; everything done in Ottawa had already been successfully done somewhere else.

### Sources and Additional Information

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- Mountain Equipment Co-op web site. 2000. http://www.mec.ca/coop/communit/about/history.htm
- Corin Flood, tel: (250) 837-7120; e-mail: cflood@mec.ca
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  web: http://www.mec.ca/

[35] See, for example: Joseph J. Romm, *Lean and Clean Management: How to Boost Profits and Productivity by Reducing Pollution* (New York: Kodansha, 1994); pp. 99-100.

## Kuntz Electroplating

√ Example of carbon efficiency, brand image opportunities

- Specializes in electroplating for the automotive industry
- Dramatic growth from 350 employees in mid-1990s to approximately 725 as of fall 2000
- 300,000 square foot production facility in Kitchener, Ontario
- Annual sales between $100- and $200-million
- Markets in Japan, Mexico, Western Europe, and North America
- In November of 1996, Kuntz became QS 9000 and ISO 9002 certified.

### Drivers for Change

Kuntz began implementing environmental initiatives in the 1970s to reduce costs. Their initial focus was on the reduction of raw material use. They have since continued with the implementation of environmental initiatives for a variety of reasons:

- a desire to lead the sector to maintain a competitive advantage;
- to reap the benefits from managing quality issues;
- a desire to exert more control over risks by exercising due diligence in areas of environmental concern; and
- wanting to make a community commitment.

### Actions

Kuntz has undertaken a number of cost saving, eco-efficiency initiatives that have saved hundreds of thousands of dollars and helped the company become the success it is. Three such initiatives are:

- Waste management: Kuntz ships an average of 32 tonnes per week of dried nickel-bearing material to Inco's smelting operations in Manitoba instead of sending it to a landfill.
- New technology application: A cogeneration facility was installed at the plant to generate electricity and heat for the operating needs of Kuntz. It has since been expanded to provide up to 60-65 percent of the process heat and space heating requirements of their newly expanded facilities.
- System Certification: Kuntz was certified to the ISO 14001 Environment Management Standard (EMS) in June 1998.

### Results

Kuntz has experienced many benefits as a result of ISO 14001 and various eco-efficiency projects, including: substantial cost savings, improved public perception, improved brand image from several environmental achievement awards and operations that are more efficient.

- In 1996, over 1,600 tonnes of nickel-bearing waste was diverted from landfill, saving $256,000 per year.
- Having a certified ISO 14000 operation is becoming a standard in the automotive industry. Adopting it early helped Kuntz make the transition to those requirements. Following the guidelines has improved the company's relationship with community, government and the public. This is important to Kuntz because most of the people working in the plant also live in the community.
- The cogeneration project produced financial savings of roughly 20 percent in the first year.
- The cogeneration unit converts approximately 30 percent of its total energy input into electricity. Another 50 percent of available heat is converted to hot water and steam

that can be used immediately for space heating, domestic hot water, process needs and absorption chilling.
- Substantial emissions reductions have been realized with the implementation of the cogeneration system: nitrogen oxides are down by 9,000 kg/year, sulphur dioxide emissions by 120,000 kg/year, and carbon dioxide emissions by 20,000 tonnes/year.

### Key Success Factors

- Initiatives are investigated fully before implementation. The change must not affect production or quality, and there must be a reasonable payback period.
- Kuntz is an active participant in related industry associations such as the Automotive Parts Association and the Metal Refinishers Association. These associations offer company representatives opportunities to network and collectively address common concerns such as improving environmental performance.
- Strong commitment by top management to environmental initiatives has ensured their success over the past few decades.
- Kuntz employees are non-unionized and are involved in a rigorous profit-sharing program. Morale of employees at Kuntz is excellent and the overall company culture is dedicated to continual improvement of their operations.

### Sources and Additional Information


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- Five Winds International, *The Role of Eco-Efficiency: Global Challenges and Opportunities in the 21st Century, Part 2: Industry Case Studies*, May 2000, pp. 113-115.
- Mrs. Brigitte Roth.
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  web: www.kuntz.com

## Interface Flooring Systems (Canada)

√ Example of energy efficiency, materials efficiency, carbon efficiency and brand image opportunities

- Manufacturing plant in Belleville, Ontario
- Leading producer of commercial carpeting and floor coverings
- Approximately 90 employees
- According to *Canadian Business*, "… has become such an outstanding leader in non-polluting technologies, environmentally friendly carpets and high sales, that a steady parade of government officials, academics and corporate executives pass through its doors every week."[36]

### Drivers for Change

- Started to focus on environmental issues in early to mid-1990s
- After receiving multiple requests from customers, CEO Ray Anderson launched company initiatives to improve environmental performance.
- Interface quickly realized that environmental improvements such as eliminating waste lead to lower costs and higher productivity.
- Now committed to becoming the world's first "sustainable company"

### Actions

- Many energy efficiency and conservation improvements were made, including using smaller electric motors, high efficiency lighting, waste heat recovery, better compressed air management and preventative maintenance to ensure peak operating efficiency.
- Material efficiencies achieved through higher yields
- Product design changes and process improvements have eliminated one energy intensive process (carpet printing).
- Lower carpet mass and lower temperature fusing adhesive allowed lowering of the finishing process temperature by over 100°F (56°C), improving yield, quality, performance and cost.
- Currently 25 percent of electricity supply is from certified green power (solar, wind and small run-of-river hydro with no dams); the target is 100 percent of electrical supply from certified green power by 2002.
- There is significant investment in employee training and awareness, including "Count-Me-In!" workshops to raise awareness about opportunities for personal action by employees to reduce greenhouse gas emissions.
- Employee bonuses are linked to environmental improvement through eco-points related to progress in key areas such as the reduction of greenhouse gases, the use of sustainable energy and the elimination or reduction of non-renewable materials.[37]
- Employees are encouraged to participate in a home energy audit; Interface pays for upgrades such as insulation and water-saving showerheads.

[36] A. Nikiforuk, "Pure Profit," *Canadian Business*, April 3, 2000; p 71.
[37] Lorinda R. Rowledge, Russell S. Barton and Kevin Brady, *Mapping the Journey: Case Studies in Strategy and Action toward Sustainable Development* (Sheffield, UK: Greenleaf, 1999), p. 127.

### Results

- Energy consumption per unit of product reduced 70 percent from 1993 to 1999
- Savings of $3-million from 1994 to 1999 in reduced energy, water and waste costs
- GHG emissions reduced by over 8,000 tonnes
- Increased productivity and competitiveness have led to growth in U.S. exports from 15 percent to 60 percent of production over the last four years, reflecting an increased ability to compete against other Interface plants for U.S. business.
- Belleville plant regularly wins Interface's internal "Eco Sense" award for the best efficiency improvement of 29 Interface facilities worldwide.
- After Interface eliminated a printing process that produced 550,000 litres of wastewater every month, the local utility sent out a technician to repair the factory's water meter, assuming it had broken.

### Key Success Factors

- Substantial ongoing commitment from senior management, up to and including CEO Ray Anderson
- Employee awareness and involvement through QUEST (Quality Using Employee Suggestions and Teamwork) program
- Employee training encourages risk taking and honest, open discussion
- Measurement and Monitoring: establishing baselines, setting improvement targets, progress reported and evaluated monthly

### Sources and Additional Information

- Interface's Action Plan/Progress report to CIPEC, 1998. Available from VCR Inc. web site www.vcr-mvr.ca/home_e.cfm
- Lorinda R. Rowledge, Russell S. Barton and Kevin Brady, *Mapping the Journey: Case Studies in Strategy and Action toward Sustainable Development* (Sheffield, UK: Greenleaf, 1999), pp. 123-128.
- Andrew Nikiforuk, "Pure Profit," *Canadian Business*, April 3, 2000, pp 70-76.
- Ray Anderson, *Mid Course Correction – Towards a Sustainable Enterprise: The Interface Model* (Atlanta: The Peregrinzilla Press, 1998).
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## Vision Quest Windelectric

- √ Example of new product, brand image and emission offset opportunities
- Calgary, Alberta-based developer of wind powered electrical generation projects
- Installs wind turbines and produces certified green power for business customers, electricity wholesalers (e.g., ENMAX), and residential customers
- 13 MW capacity installed as of November 2000 (enough to serve the needs of over 6,000 homes)

### Drivers for Change

- Vision Quest was founded based on market demand for clean, reliable renewable electricity with certified emissions reductions.
- Wind energy is the fastest growing source of energy in the world, driven by electricity industry deregulation, rapidly declining costs, increasingly reliable technology and growing concerns over harmful emissions and other environmental impacts from competing sources.
- Wind generated electricity is rapidly becoming cost competitive with most other sources, and is not subject to the price fluctuations of natural gas or the polluting emissions of coal.

### Milestones

- April 2000 agreement with ENMAX, an Alberta electric distribution and transmission utility company, to supply 30,000 megawatt hours (MWh) per year of wind-generated electricity—enough to meet the needs of 5,600 homes
- Earlier 1997 contract with ENMAX led to first registered emission reduction under the Greenhouse Gas Emissions Reduction Trading Pilot (GERT), a pilot emissions trading scheme involving the Canadian federal government, a number of provinces, industry, labour and environmental groups[38]
- 1998 contract with Suncor one of the first indications of the oil patch's willingness to purchase emissions reductions
- In 2000, TransAlta invested $5-million in Vision Quest in exchange for a minority interest and board representation; the company's three founders will remain majority shareholders.

### Results

- Produced 10 million kilowatt hours (kWh) in 2000, displacing 10,000 tonnes of GHG emissions; planning to quadruple this production in 2001
- Castle River Windfarm (Pincher Creek, Alberta) brought online November 2000; sixteen turbines each at a cost of about $1-million; capacity of 10.5 MW, annual production of 35 million kWh, 35,000 tonnes of GHG emissions offsets

### Sources and Additional Information

- Jason Edworthy, Executive Director
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  web: www.greenenergy.com

[38] For more information, see the description of GERT in Chapter 6, or www.gert.org

## Dantec Corporation

√ Example of new product opportunity

- Specializes in online product quality and total process optimization through real time advanced control systems
- Employs approximately 30 people in Waterloo, Ontario.
- Annual sales of $5- to $25-million
- Customers around the world in Asia, North and South America, and Western Europe
- Dantec has implemented over 1,000 solutions for customers in the field. This particular story focuses on development of one of those solutions called the "Dryer Master."

### Drivers for Product Development

- Farmers in the community that Dantec was servicing identified a need for a proper grain drying system.

### Actions

- Research assistance was obtained from the University of Waterloo, Department of Chemical Engineering.
- Research grants were obtained from the Ontario Ministry of Energy and Environment and from Energy Mines and Resources Canada (now part of Natural Resources Canada)
- Farmers in the community permitted the use of their crops for field-testing of the control system.
- The development of the product was 100 percent market driven and adapted to the equipment in the marketplace.
- A new algorithm was developed exclusively for this product.

### Results

Customers using the Dryer Master control system are finding that:

- Energy use is 18 percent less than conventional drying systems.
- Yield weight of the grain (corn) is improved by 1.2 percent
- There is a 54-percent reduction in over-drying (reduction in wasted energy).
- There is a reduction in under-drying (unmarketable product).
- The price of the Dryer Master installed is $15,000 to $20,000.
- Considering the operational improvement overall, the estimated payback period is three years. (This payback term can be shorter or longer depending on crop size and energy costs used in the analysis).
- Greenhouse gases and other pollutants from fuel combustion are less than with conventional dryer operations.

For Dantec:

- The development of this unit has contributed to the expansion of the product and service line Dantec has to offer its customers.
- The product is contributing to a better bottom line for the company.
- Dryer Master is still under constant development. It evolves as knowledge about the drying process increases and as new drying technology enters the marketplace. Today, the drying process can be modified by modem from remote locations to accommodate operating abnormalities.

### Key Success Factors

- The owner of Dantec at the time the product work began was committed to putting together a grain drying solution for the farmers in the community.
- The successful development effort was the direct result of retaining the committed co-operation from a number of parties (Dantec, the farmers, University of Waterloo), and the funding institutions (Ontario Ministry of Energy and Environment, and Energy, Mines and Resources Canada).
- Energy prices were high at the time the first prototypes were put into the market. This helped offset the higher initial costs of the first product line.
- Persistence was needed to maintain the momentum in the development of this product. It took a number of years to get to market.

### Sources and Additional Information

- CADDET Energy Efficiency Result 106, "Computer control system for continuous and semi-continuous grain dryers," March 1992.
- Mr. Jan Soutendam
  Dantec Corporation
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  Waterloo, Ontario N2L 6A7
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  web: www.dantec.com

## FuelMaker Inc.

√ Example of new product opportunity

- Specializes in manufacturing, distributing, and servicing vehicle refuelling appliances (VRAs) and supporting systems for vehicles powered by natural gas
- Owned by Magna International, Canadian General Capital, senior management of the company and American Honda, who recently bought a 20-percent stake in the company
- Based in Toronto, Ontario, with export sales to Asia, Europe, North and South America
- Employs about 40 employees; annual revenues of around $10-million

### Drivers for Development

- FuelMaker believes that, like the biological and information technology developments of today there will be a boom in the alternative fuel market in the near future. FuelMaker intends to be the supplier for this oncoming burgeoning market, whether it is natural gas or hydrogen.

### Actions

- A manufacturing and service outlet was established in Canada upon having determined that the strongest market for the VRA was in North America.
- Several investment partners were established.
- The VRA was officially certified as an appliance.
- Various versions of a VRA have been developed to accommodate different refuelling demand requirements.
- Markets have now been established around the world.

### Results

- The VRA being offered to the market is safe and simple to operate, can operate completely unattended, and is fully guaranteed.
- VRAs are now serving medium-sized fleets of commercial vehicles as well as in-plant vehicles such as forklifts, ice cleaners and other specialty vehicles.
- Over 7,000 refuelling systems have been sold to date.
- Exhaust emissions from natural gas vehicles are much lower than those from gasoline-powered vehicles. Smog producing emissions including carbon monoxide and nitrogen oxides are reduced by over 80 percent, and greenhouse gases such as carbon dioxide are reduced by 20 to 30 percent.
- Natural gas costs an average of 15 to 40 percent less than gasoline or diesel and also is a clean burning fuel, reducing vehicle operating expenses.
- Vehicle conversion costs to natural gas vary with the vehicle type. Factory ordered natural gas vehicles incur roughly a $5,000 premium. Government grants are available to offset these costs. For more information, see http://www.ngvcanada.org/ or http://alt-fuels.nrcan.gc.ca/e/natural.htm
- The VRA can be leased or purchased. Installation costs and lease arrangements vary with the installation configuration proposed.
- A VRA can be leased for $90/month in Ontario.
- A purchase arrangement could reduce natural gas costs to roughly 24 cents/litre gasoline equivalent.[39]
- Natural gas is the safest fuel available today. In studies, natural gas has been proved to be as safe as or safer than gasoline. Natural gas dissipates quickly into the air, it cannot spill, and is less combustible than other products. It is non-corrosive, non-toxic and consequently poses no health risk from exposure to lungs and skin. It cannot contaminate soil or water. Delivery to fuelling sites is via underground pipeline, eliminating the hazard of tanker trucks and the potential for fuel spills.

### Key Success Factors

- FuelMaker has a dedicated team and experienced management focussed on the development and refinement of the VRA.
- The strength of the management team, market opportunity and product has made them successful in raising money from investors and government agencies.
- Acquiring appliance certification greatly simplified the installation requirement process, and at the same time simplified the permitting process and reduced installation costs (compared to being classified as a compressor installation).
- FuelMaker has been very flexible in its approach to marketing and research.

### Sources and Additional Information

- Greg Keenan, "FuelMaker to offer at-home gas station," *Globe and Mail*, October 25, 2000, p. B1.
- Mr. John Lyon, President (technical information)
  Mr. Rick Morris (general information)
  tel: 1-800-227-6241
  FuelMaker Corporation
  70 Worcester Road, Toronto, Ontario M9W 5X2
  tel: (416) 674-3034 fax: (416) 674-3042
  e-mail: Info@fuelmake.mhs.compuserve.com
  web: http://www.fuelmaker.com/

[39] Based on natural gas costs in early 2000.

## Westport Innovations

√ Example of new product opportunity

- Developing technologies to enable diesel engines to operate on a mixture of natural gas and diesel fuel in collaboration with leading diesel engine manufacturers for heavy duty vehicles
- Objective is to retain the high performance and fuel efficiency of the diesel engine while significantly reducing emissions of oxides of nitrogen ($NO_x$), particulate matter (PM) and carbon dioxide ($CO_2$).
- Westport was incorporated in 1995 and is based in Vancouver, British Columbia.
- Revenue from operations rose from $248,480 in fiscal 1999 to $316,736 in fiscal 2000, which consisted primarily of contract revenue from bus trials in California and from a program with the United States Department of Energy.
- As of fall 2000, 112 employees worked for Westport.

### Drivers for Development

- The $300-billion diesel industry will soon be regulated to reduce emissions for their heavy-duty vehicle installations.[40] Westport is committed to meeting this sector's future demand for emissions reductions equipment in a way that will ultimately reduce operating costs.
- Westport was born from research originating at the University of British Columbia. The University decided to commercialize the technology to capitalize on the licensing opportunity.

### Actions

- To date, $25-million has been spent on research.
- Westport has formed alliances with various engine-manufacturing interests.
- It is anticipated that its truck fuel system project will be the first program to generate significant operating revenue beginning in the fiscal year 2002.

### Results

- Tests over the last three years have met expectations in performance, including:
  - Diesel-like performance
  - Lower operating costs than that of the straight diesel-fuelled engines.
- Exhaust emissions reductions depend on the fuel mixture used. However one example from trial tests, with a fuel mix duplicating diesel performance standards, produced 70 percent less PM, 37 percent less $NO_x$ and 17 percent less $CO_2$ than the identical engine using diesel fuel alone.
- Westport technology consists of three main proprietary fuel system components: fuel injectors, a natural gas fuel pump and electronic controls.
- The cost for a Westport installation has not been established but comparative dual fuel systems from other distributors cost US$20,000 to US$30,000, compared with a base truck price of US$100,000 to US$130,000

[40] U.S. EPA web site: http://www.epa.gov/oms/regs/hd-hwy/2000frm/f00026.htm

### Key Success Factors

- Ability to raise money in the equity markets since inception: Westport has raised approximately $57-million in equity from a number of private and public offerings.
- Ability to attract excellent people to the team starting with Professor Phil Hill from the University of British Columbia, original developer of the enabling technology.
- Co-operation from global engine manufacturers such as Cummins and Ford.
- Westport believes it is a good example of a thriving business that has been created from an environmental opportunity.
- The new U.S. standards for 2004 and later model years require diesel trucks to be more than 40 percent cleaner than today's models. A second phase of emissions reduction regulations (forecast to take effect in 2006-2007) will require cleaner diesel fuels and even cleaner engines, and will reduce air pollution from trucks and buses by another 90 percent.[41]

### Sources and Additional Information

- "New Hope for Diesels," *Calgary Herald*, March 13, 1999, from *Encompass Magazine*, April/May 1999. Volume 3, No. 4, http://www.encompass.org/3-4/dighop34.htm
- Alan Bayless, Manager, Media and Investor Relations
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[41] US EPA web site: http://www.epa.gov/oms/regs/hd-hwy/2000frm/f00026.htm

# 4.0 Elements of a Climate Change Strategy

Your company's climate change strategy must ensure that greenhouse gas emissions are considered in daily operating practices and procedures and, more significantly, in decisions on investments in new product development, new projects or facilities. To be effective and credible, a climate change strategy should include at least the following elements:

1. Commitment from Management
2. Emissions Measurement and Monitoring
3. An Emissions Improvement Target
4. Changes to Internal Financial Signals
5. Employee Awareness and Incentives
6. Reporting on Plans and Progress
7. Climate-Friendly Purchasing

The credibility of the strategy and its chances for success depend largely on senior management being engaged in its design, committed to its implementation, and accountable for its results. Greenhouse gas emission measurement and monitoring are also fundamental components and will enable you to set a realistic emissions improvement target. Meeting the target will require specific actions to reduce emissions; internal financial signals are a valuable means to identify and implement such actions. Employee engagement and motivation will also be crucial. Reporting on plans adopted and progress achieved ensures accountability both inside and outside the company. Finally, your company can play an important role in reducing greenhouse gas emissions outside its own operations by selecting suppliers of electricity, vehicles, fuel, raw materials, freight services, and other goods and services based on the greenhouse gas emissions associated with those inputs.

**Do You Need a Climate Change Strategy?**

Significant effort may be needed to fully implement the seven elements of a climate change strategy as described in this chapter. Depending on the size of your business and your energy use, a simpler approach would be to start by monitoring energy use and using checklists* to identify energy savings opportunities. Chapter 5 describes a five-step process to identify a logical, staged implementation for your climate change strategy, taking into account your unique business environment and available resources. Depending on your situation, you may want to focus in the short term on implementing some of these seven elements more fully, and leave others for later as your experience with and knowledge of climate change grows. Clearly, a "one size fits all" climate change strategy does not exist.

* Checklists to identify common energy savings opportunities are available from many sources, including worksheet 1b in Chapter 5 and several sources described in Chapter 6: Energy Efficiency Manual, Global Environmental Management Initiative Business and Climate, Greenbiz.com, Industrial Energy Efficiency Initiative, National Association of Manufacturers, Wise Rules for Industrial Efficiency, and others.

## 4.1 Commitment from Management

The first step for a climate change strategy, in common with any successful business initiative, is obtaining upper management commitment. Without this commitment, any new initiative is bound to fail because it will never be able to compete successfully with other priorities for resources and management attention.

Commitment from management means more than simply asking them to sign a letter or approve a new policy. Senior managers need to "walk the talk" when it comes to their commitment to your climate change strategy. If they do not, employees will quickly learn that

management is only paying lip service to climate change. Senior managers should regularly reinforce their commitment to a proactive climate change strategy by, for example:

- ensuring adequate financial resources are allocated to address climate change in budgets and other financial planning processes;
- appointing a respected champion to lead the climate change strategy;
- sending the message that achieving the goals of your climate change strategy is good for a manager's and an employee's career;
- paying close attention to the results of your climate change efforts and communicating these widely; and
- using all available communication channels with employees to constantly emphasize the ongoing business benefits of your climate change strategy.

Many of the most successful implementation efforts include a designated or self-selected champion who focuses on developing a powerful team, overcoming internal and external barriers, and ensuring that new ways of doing things become well established. The champion needs to be a person with credibility in the organization, the right combination of skills and experience, and the energy and attitude to get the job done whatever it takes. Having a climate change champion who is considered to have good career prospects in your company will also reinforce management's perceived commitment to your climate change strategy.

The degree of formality required for these efforts will depend on several factors, including the size of your company and the maturity of its management systems. This is discussed in more detail in "Changes to Internal Financial Signals" (Section 4.4) and "Employee Awareness and Incentives" (Section 4.5).

**Taking Waste to the Mat**

One of the greatest obstacles to change is how most companies are organized, says Rahumathulla Marikkar, a chemical engineer and environmental champion with Interface Canada in Belleville. "Operations want to get the product out the door, while health and safety act like policemen. And that's a major obstacle," says Marikkar.* As Director of Technology *and* Environment at the Belleville plant, Marikkar doesn't have to deal with that obstacle. His leadership has been instrumental in reducing greenhouse gas emissions by more than 8,000 tonnes, virtually eliminating wastewater, reducing energy consumption per unit produced by 70 percent and saving the Belleville plant $3-million in energy, water and waste costs. In 1999, Marikkar was recognized by Canada's VCR Inc. for his role in helping Interface become a leader in industry and in the community through sustainability and impressive reduction of energy use.

* A. Nikiforuk, "Pure Profit," *Canadian Business.* April 3, 2000; p. 71.

## 4.2 Greenhouse Gas Emissions Measurement and Monitoring

Accurate measurement of greenhouse gas emissions—and emission reductions—is of central importance to your company's climate change strategy. Information on sources of greenhouse gases, their relative contributions to total emissions, and the projected and actual impact of reduction measures gives management the information it needs to identify priority areas for reduction, set appropriate reduction targets, track and assess progress, and ultimately obtain recognition and credit for actions taken to reduce emissions. Without credible and transparent measurement and monitoring, you risk not gaining credit for early action to reduce emissions, and you risk losing emission reduction credits.

Three key components to greenhouse gas emissions measurement and monitoring are:

- a base year inventory of greenhouse gas emissions and subsequent annual inventories of emissions;
- a projection of future greenhouse gas emission levels; and
- estimates of the potential greenhouse gas emissions associated with specific projects or actions.

### 4.2.1 Greenhouse Gas Emissions Inventories

A base year greenhouse gas emissions inventory provides a necessary starting point for an emissions management plan. Greenhouse gas emission limitation targets can be established relative to the base year quantity. Subsequent annual inventories of greenhouse gas emissions allow your company to assess progress against its climate protection goals and understand the factors producing changes in emission levels.

Detailed tools for calculating and reporting on business greenhouse gas emissions are available through the resources described in Chapter 6. Several industry associations have also prepared tools for emissions calculation and reporting.

The scope of activities covered by your greenhouse gas emissions inventory defines what you will need to manage. You will need to make strategic decisions about the scope of the inventory, including organizational boundaries, base year, range of gases to be included, sources of emissions, and the amount of detail to be provided.

**Organizational boundaries**. The organizational boundaries of the inventory should include greenhouse gas emissions from any source owned or leased by your company. In cases of joint ownership, each company involved should clearly identify the joint ventures they are involved in and, in each case, which company operates the joint venture and is therefore responsible for reporting its emissions.[42]

**Base year**. Selecting a base year is an important decision, since your company's absolute greenhouse gas reductions over time will be compared against the base year emissions levels. The VCR program (see Chapter 6) recommends that 1990 be used as the base year, consistent with Canada's commitments under the United Nations Framework Convention on Climate Change and the Kyoto Protocol. Most companies reporting under the VCR use 1990 as their base year.

In some instances, your company might select another base year because of special circumstances that make 1990 unrepresentative. Alternatively, your company may not be able to access records of its energy and fuel consumption for 1990, or your company may not have been operating in 1990. In these cases, another base year as close as possible to 1990 should be chosen.

If your production capacity has changed significantly since the base year due to purchase or sale of business units, baseline adjustments will be needed to reflect current operations. For example, if your company's base year is 1990 and it purchased an operation from another company in 1995, you should adjust the 1990 inventory by adding the emissions produced in 1990 by the newly purchased operation. If your company sold one of its operations in 1995, it should adjust the 1990 inventory by subtracting the emissions produced in 1990 by the sold operation. Generally, baseline changes should pass a test of "materiality" (often defined as at least a five or ten percent change in emissions) before making adjustments. These adjustments do not apply to new operations (i.e., "organic growth") or to operations that are closed down.

[42] For a more detailed discussion of ownership and control issues and how they influence greenhouse gas reporting, see the WRI/WBCSD Standard described in Chapter 6, or Pew Center on Global Climate Change, *An Overview of Greenhouse Gas Emissions Inventory Issues* (Cambridge, MA: 2000).

**Range of gases to be included**. All greenhouse gas emissions due to your company's activities should be included in your inventory. In some cases, it may be expedient to begin your inventory with carbon dioxide emissions only. You can eventually expand the scope to include all six greenhouse gases covered by the Kyoto Protocol: carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons, and perfluorocarbons. These gases should be reported in absolute amounts and also expressed in terms of carbon dioxide-equivalents.

**Sources of emissions**. Both direct and indirect emissions should be included in your inventory. Direct emissions include all releases of greenhouse gases from sources on sites that are owned, leased and operated by your company, including mobile sources (vehicles and mobile equipment), buildings, on-site waste treatment, possible "fugitive" emissions, and fossil fuel use and combustion at your facilities and operations.

Indirect emissions include emissions from sources not owned or operated by your company that occur because of your activities. Indirect emissions often represent a considerable proportion of total greenhouse gas emissions, and companies can substantially reduce them by choosing less greenhouse gas-intensive products and services in their procurement activities and by collaborating with their suppliers and contractors. At a minimum, your inventory should include the indirect greenhouse gas emissions associated with generation of the electricity used on site.[43] Other common sources of indirect emissions include off-site steam generation and district heating systems.

**Amount of detail**. Once the sources of greenhouse gases have been identified, your company needs to determine both the level of detail that would be useful in the inventory, as well as the level of detail it is possible to provide. The more information there is on individual sources (referred to as the "level of disaggregation") the better, since it enables you to identify more specific emission reduction opportunities.

Emissions data should be presented both as absolute emissions and as normalized emissions per unit of production, with production units clearly specified. Production units will vary by industry, and could include physical units (number of units produced, weight of product produced, area of carpet produced, area of office space used, etc.) or financial units (sales revenue, value added, etc.). Your company will use the absolute value of emissions to assess its contribution to Canada's progress in meeting our international climate change commitments under the Kyoto Protocol, and this information also enables governments and the public to assess progress. Tracking emissions per unit of production (normalized emissions) allows a company to monitor its greenhouse gas intensity or "carbon intensity," independently of other variables such as the level of production.

The information presented in your greenhouse gas inventory should be verifiable and reproducible. This means that it is essential to document the methodologies used to calculate emissions, and to describe clearly the key assumptions and uncertainties inherent in the calculations.

[43] To enable more climate-friendly choices of fuel, companies should aim eventually to include in their inventories the indirect "upstream" emissions associated with the production of the fuels and other materials they use. To take account of the climate change impacts of the distribution and use of your products, your inventory should also eventually include the indirect "downstream" emissions associated with the transportation and use of your products. See the description of Life-Cycle Value Assessment in the Glossary for details.

**Table 5: Inventory Example: Excerpt from St. Lawrence Corp. Greenhouse Gas Inventory**

| | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|
| Towel Production (kg) | 2,740,477 | 2,728,867 | 2,922,287 | 2,754,528 | 3,211,614 |
| Natural Gas Cost | $393,006 | $407,471 | $645,326 | $605,658 | $759,079 |
| Natural Gas Consumption (GJ) | 125,619 | 109,991 | 153,838 | 114,875 | 134,597 |
| $CO_2$ Emissions (tonnes) | 6,241 | 5,464 | 7,643 | 5,707 | 6,687 |
| $N_2O$ Emissions (tonnes) | 24 | 21 | 30 | 22 | 26 |
| $CH_4$ Emissions (tonnes) | 3 | 3 | 4 | 3 | 3 |
| Total GHG Emissions from Natural Gas ($CO_2$-e tonnes) | 6,268 | 5,488 | 7,676 | 5,732 | 6,716 |

*Source:* http://www.vcr-mvr.ca

### 4.2.2 Emission Projections

Another important component of greenhouse gas emissions measurement and monitoring is your emissions projection. Projections enable your company to understand the potential extent and distribution of your future emissions and can be used to identify future challenges and opportunities associated with your emissions goal. Projections should extend at least five years into the future, in line with your business planning processes. If possible, emissions projections should be made up to 2010, to be consistent with Canada's target levels under the Kyoto Protocol.[44] Projections should address both "business as usual" scenarios and "with measures" scenarios.

**"Business as usual" scenarios** project greenhouse gas emission levels if no special emissions reduction measures are implemented. That is, they project the expected emission levels if "business as usual" continues without any unusual improvements in energy use or other areas of performance that affect emissions. Greenhouse gas emissions are directly or indirectly affected by a number of production-related variables, including:

- production level;
- prices of inputs, which influence the production level and most business decisions;
- operating mix (i.e., balance between different products or processes); and
- capital stock turnover.

Your company should define and document its assumptions about these variables in its emissions projections. For example, business-as-usual projections should reflect plans to close any existing facilities or expand production capacity. Projections should also reflect the fact that energy efficiency will improve over time, as capital stock is replaced with new, more energy efficient equipment. The federal government assumes an annual energy efficiency improvement in its business-as-usual projections of Canada's future emission levels.

Best practice is to project three business-as-usual scenarios based on different assumptions. These scenarios should cover the likely range of outcomes you expect.

A **"with measures" projection** estimates future levels of greenhouse gas emissions that reflect actions taken to date under your climate change strategy as well as the potential impact on emissions of planned emission reduction initiatives. Once analyzed, this projection

[44] The Kyoto Protocol emissions limitation targets are averages that have to be met over the five-year period 2008-2012.

identifies progress made to date, relative to the base year and the business-as-usual scenario, and projected progress based on implementation of your strategy.

### 4.2.3 Assessing Individual Projects

As your company plans emission reduction projects and actions, you will need to understand and track the impact and the relative effectiveness of these different activities on emission levels. Quantifying emission reductions from each project or activity enables your company to assess the overall impact and determine which activities are having the greatest effect. The VCR program (see Chapter 6) awards points for including an assessment of the impact of individual projects in a company's annual progress report.

At a minimum, project assessments should consider the impacts of emission reduction measures and any new or acquired operations on direct emissions and on key sources of indirect emissions such as electricity generation.[45] To demonstrate an emission reduction from a proj??ect activity, the use of a specific technology or a change in management practice must be clearly identified. The quantity of the associated emissions reduction is then the difference between the "baseline" or "business as usual" emissions and the "with measures" actual emissions for the individual technology, service or process that is affected by the project.

To ensure credibility, it is essential when reporting emissions reductions from specific proj??ects to indicate the methods used to calculate the reductions. For example, to qualify for Gold status under the VCR reporting system, current year results must be verifiable. According to the Greenhouse Gas Emission Reduction Trading Pilot (GERT), "an emission reduction is verifiable if the calculation methodology is acceptable, transparent and replicable and the raw data required to verify/audit the calculations is available."[46]

Other environmental, social and economic benefits and costs associated with specific projects should also be recorded. These may include local air quality improvement, employment creation or losses, or financial costs and benefits to customers. This information allows company representatives to better understand and communicate the full spectrum of tradeoffs associated with your climate change strategy to various stakeholders.

Your company should evaluate and record the effectiveness of its emission reduction projects—that is, whether they fell short of, met or exceeded expectations. This ensures that projects are evaluated often, and that frequent assessments are made of whether to continue existing projects or divert limited investment dollars into potentially more effective measures.

It is also important for your company to assess the greenhouse gas emission implications of any new or acquired operations. Such investments will increase the company's overall greenhouse gas emissions liability, with potential implications for the feasibility of meeting voluntary or regulated greenhouse gas emission control targets. To meet due diligence requirements, companies should take steps to identify this liability and should seek to minimize it in the construction and design phase of new facilities, and through retrofits of any newly-acquired operations.

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[45] Companies with a more enhanced climate change strategy will also include estimates of "upstream emissions" and an estimate of indirect and more-difficult-to-quantify emission reductions from activities such as public education and outreach.

[46] While the VCR does not require external verification of reported reductions, it is likely that any future greenhouse gas emission reduction credit trading initiatives will require external verification of emissions and reported reductions. If you hope that an emission reduction project will qualify in a future credit trading system, be sure to calculate and document the methodologies and assumptions used to calculate both the "business as usual" and "with measures" cases associated with the project.

## 4.3 Greenhouse Gas Emissions Target

Your company can demonstrate its commitment to managing greenhouse gas emissions by establishing an aggressive greenhouse gas emissions target. An aggressive target signals to employees, customers, shareholders, governments and the public that an organization is willing to go beyond "business as usual" to reduce greenhouse gas emissions. When taken seriously, such publicly stated goals also give employees and management a strong incentive to identify and take advantage of cost-effective emission reduction opportunities.

Companies have a number of options when it comes to choosing a target. For example, many companies have made commitments to reduce greenhouse gas emissions per unit of production. Such a target ensures that overall efficiency in the creation of a product is improved on a continuous basis. While this type of target will reduce emissions from what they would otherwise have been, it does not guarantee an absolute reduction in emissions. If production grows more rapidly than the rate at which the greenhouse gas intensity of production is falling, absolute levels of greenhouse gas emissions will continue to increase.

Thus, it is likely that companies will ultimately have to adopt targets that limit greenhouse gas emissions in absolute terms. While the Government of Canada has not yet determined how it will allocate responsibility for meeting its commitment under the Kyoto Protocol, that commitment is clearly expressed in absolute terms. This means that if some emitters are allowed to increase absolute emissions, others will have to reduce emissions by an even larger amount than the government's overall six percent Kyoto commitment. Your company should therefore seriously consider developing a greenhouse gas emission target that aims to reduce emissions in absolute terms relative to the 1990 level, which is the generally accepted baseline year (see Section 4.2).

The emissions limitation target should be communicated to employees, customers, investors and the general public. This ensures that the company will be accountable to all these stakeholders for achieving the target.

### Case Study: Suncor Energy's Emissions Limitations Target

Suncor Energy's emission limitation goals are as follows:

- Suncor's interim target is to strive to limit the net contribution of greenhouse gases to the atmosphere, as a result of its operations, to 1990 levels. This assumes access to the flexibility mechanisms currently included in the Kyoto Protocol, and the implementation of a meaningful credit-for-early-action program in Canada. This goal will be reviewed and modified as necessary to reflect evolving provincial, national and international policies and commitments. Suncor seeks to address its greenhouse gas emissions in a way that does not compromise the economic viability of its businesses and the economies of the communities and countries in which it operates.
- Each of the company's businesses continues to pursue aggressive internal efficiency targets, supported by performance incentive programs.
- The company's growth strategy and long range planning process incorporates plans to reduce or mitigate the impacts of current and future greenhouse gas emissions.

*Source: Suncor Fourth Annual Progress Report for the VCR, October 1998.*

## 4.4 Changes to Internal Financial Signals

Management behaviour and business decision making are driven by profitability goals within an internal management accounting framework. In many cases, as illustrated by the examples in Chapter 3, actions that respond to climate change can reduce costs, improve productivity and are immediately profitable using traditional financial analysis methods. These types of actions are sometimes referred to as "no regrets" actions because, even if environmental, social and political concerns about climate change disappeared (a highly unlikely scenario!), companies would not regret them because of their cost savings and other business benefits.

By using internal financial signals to assign a value to greenhouse gas emission reductions, climate change concerns can be better reflected in the business decision-making process. Such signals encourage the identification and implementation of cost-effective emissions reduction activities that would not have occurred otherwise. They can also encourage emission reduction activities that are not cost-effective using traditional financial criteria, but that provide additional business value in areas such as regulatory risk management and brand image.

Below are some examples of internal financial signals that small and medium-sized businesses in Canada could consider.

**Internal charges**: Companies can impose an internal charge on greenhouse gas emissions, or a benefit on reductions. Putting a cost on greenhouse gas emissions within existing decision-making processes effectively increases the value of activities that reduce these emissions. Alternatively, it could give a financial boost to emissions-reducing activities by adding to their revenue stream. This cost/benefit allocation should be targeted to the profit centre of the product, facility or business unit responsible for the emissions production or emissions reductions.

**Shadow prices**: Companies that do not want to go as far as imposing an actual internal charge on greenhouse gas emissions or a benefit on reductions can put a price on emissions for internal investment analysis to test the robustness of proposed projects against future risk. This helps identify projects that may look attractive now, but would be much less attractive when estimated future costs for greenhouse gas emissions are considered.

**Extended payback periods**: Companies can extend the acceptable payback period or reduce the return on investment hurdle rate for investments that reduce greenhouse gas emissions. While this might impose an "opportunity cost" on alternative investments by the company, this can be compensated for by both tangible and intangible benefits that increase shareholder value.

**Revolving capital pools**: Companies can establish revolving capital pools for investment in greenhouse gas emission reductions. This mechanism creates a set amount of capital for investing in emission reduction activities. When a capital pool has been established, business cases are developed for emission reduction projects. Various criteria are used to select the preferred projects that can be funded by available capital. Any financial proceeds from these activities are reinvested in emissions reduction activities or used to provide a financial return to general revenue for establishing the capital pool.

## 4.5 Employee Awareness and Incentives

The people directly involved in your company's day-to-day operations will ultimately determine the success or failure of your climate change strategy. The active engagement of employees is critical, and this section examines two tools that small and medium-sized businesses in Canada can use to motivate and secure active employee involvement.

### 4.5.1 Employee Education and Training

One of the most common barriers to implementing cost-effective emissions reduction activities is a lack of awareness about opportunities on the part of those who make investment and operating decisions within a company. Companies that provide substantive education and training about climate change and greenhouse gas emission reduction opportunities can:

- generate interest in climate protection;
- inspire action; and
- increase the range of actions that will be considered and analyzed to address climate change within their operations.

Companies should also establish education programs to give employees the information and encouragement they need to reduce greenhouse gas emissions in their homes and through their transportation and lifestyle choices. This will make responding to climate change more personal and tangible and will encourage more employee engagement with your climate change strategy in the workplace.

Employee education programs could include:

- editions of company newsletters dedicated to climate change or greenhouse gas emission education;
- employee training modules that promote technical excellence and explore greenhouse gas emission reduction opportunities;
- a climate change, energy efficiency or emission reduction component in all company educational materials; and
- opportunities for employees to enrol in climate change, energy efficiency or emission reduction courses on company time and at company expense.

Businesses can draw on a range of existing material to develop their own employee education programs on climate change. Environment Canada has produced many educational materials on climate change in various formats, and Natural Resources Canada's Office of Energy Efficiency has an information package available to help set up your own employee awareness program (see "Office of Energy Efficiency" profile in Chapter 6 for contact details). The "Action by Canadians" (ABC) program described in Chapter 6 may also be of interest.

Companies can visit www.climatechangesolutions.com, the Pembina Institute's "one-stop shop" for climate change information on the Internet. Supported by the federal government's Climate Change Action Fund and nine business partners, the site contains practical information on greenhouse gas emissions reduction for individuals, communities and business. It features success stories, resources, contact information and numerous interactive tools to identify and implement ways to reduce greenhouse gas emissions.

### 4.5.2 Financial Incentives for Employees

Several companies promote greenhouse gas emissions management through financial incentives to individual employees or teams; the Interface success story in Chapter 3 is one such example. These incentives encourage employees to look for actions that will reduce greenhouse gas emissions within existing operations and to work towards implementing them through company decision-making processes. Mechanisms to provide such a financial incentive for employees include:

- bonus points for employee performance evaluations (these could be used for company-wide profit sharing or annual bonuses);
- salary bonuses as a proportion of employee salaries;
- shared revenue from savings that may accompany emissions reductions; and
- flat bonuses for each action that is actually implemented.

## 4.6 Reporting on Plans and Progress

Regular monitoring of greenhouse gas emissions gives managers and employees the information they need to gauge the effectiveness of actions in meeting targets and objectives. A strong monitoring and reporting program lets management detect variances from anticipated results and enables prompt analysis and corrective action, where required, to keep the reduction strategy on track.

### 4.6.1 Internal Monitoring and Reporting

Where possible, tracking of greenhouse gas emissions should be incorporated into existing monitoring and reporting mechanisms, within the framework of a company's management systems. This integrated approach encourages management to consider greenhouse gas reductions in the broader context of other issues it is actively managing.

A greenhouse gas monitoring and internal reporting system should include several mechanisms, each designed to fulfill a specific information need.

1. **Operators** should receive daily or weekly information on energy consumption, process efficiency and associated greenhouse gas emissions. This frequency will enable early detection of anomalies due to factors such as equipment malfunction, operator error or poor quality inputs, allowing prompt corrective action. Many utility companies can provide software programs designed to track and analyze greenhouse gas emissions.
2. **Operational managers** should receive information on the energy consumption, process efficiency and associated greenhouse gas emissions on a weekly or monthly basis. This will allow trends to be identified and analyzed in a timely manner, and will provide regular feedback on progress towards achieving targets and objectives at the business unit level. Wherever possible, this information should be collected and presented within established monitoring and reporting systems for operational and financial data.
3. **Senior management** should receive monthly or quarterly updates on greenhouse gas reductions relative to the plan. Analysis should explain positive and negative variances from expected results, providing management with information on which to base decisions about further action. Regular communication of this information to all employees will encourage broad participation in and support for a company's climate change strategy.

4. **Boards of Directors** should receive progress reports on implementing the climate change strategy at each Board meeting. Greenhouse gas emissions represent a potentially significant liability in a carbon-constrained economy, and responsible Boards of Directors will want to be kept apprised of company progress.

Internal monitoring programs should be designed to collect all the information needed to effectively manage greenhouse gases, as well as any information the company intends to report publicly. This streamlining will reduce the amount of work required to compile information for external reports. Key data to be collected and reported include:

- Greenhouse gas emissions per unit of production; this indicator reflects the "greenhouse gas efficiency" of the company.
- Absolute emissions, relative to absolute emissions in the baseline year and previous year; when disaggregated according to source of emissions, this indicator provides information on relative contributions of greenhouse gas emissions within the operations.
- Greenhouse gas emissions per unit of production and on an absolute basis, relative to projections ("Business as Usual" and "With Measures" projections).
- Reductions in greenhouse gas emissions from the base year and for each subsequent year (in tabular and graphic format) to illustrate trends in carbon liabilities over time.
- Analysis of reductions against objectives and targets.
- Analysis of reductions to determine relative contribution of each category of reductions (internal efficiencies, fuel switching, etc.) and to determine what impact measures are having on trends.

Based on analysis of this information, the company can assess the efficacy of measures undertaken and determine the need for additional or corrective action.

### 4.6.2 External Reporting

Stakeholders, including the general public, increasingly expect corporations to share information about their environmental performance. Certain stakeholders, such as shareholders, financial institutions and insurance providers, require information on greenhouse gas emissions and reductions to assess potential liabilities under the scenario of a carbon-constrained economy. Other stakeholders, such as customers, local communities, governments, non-government organizations and the general public use the information to gauge the company's level of social responsibility. Companies communicate this information to external audiences in two main ways: they participate in the Voluntary Challenge and Registry program, and they include greenhouse gas emissions information in their annual report or annual environmental report.

### 4.6.3 VCR Reporting

The Voluntary Challenge and Registry (VCR) program calls on Canadian organizations to voluntarily limit or reduce greenhouse gas emissions, and to report progress publicly through the VCR Registry.

The VCR program was revised in 1999 to allow differentiation of reports based on the quality of information they contained. Three grades of "Champion" reporting were introduced at that time: Gold, Silver and Bronze. Table 6 shows some SMEs that have achieved one of these levels. All reports are assessed against specific criteria in the following seven categories:

1. Senior management support
2. Base year quantification
3. Emission projections
4. Target setting
5. Measures to achieve targets
6. Results achieved
7. Education, training and awareness.

**Table 6: SMEs Achieving VCR Champion Level Reporting**

| SME Name | Business Sector | VCR Reporting Level |
|---|---|---|
| Archean Energy Ltd. | Upstream Oil and Gas | Silver |
| Canadian Natural Resources Limited | Upstream Oil and Gas | Gold |
| CANOR Energy Ltd. | Upstream Oil and Gas | Bronze |
| Commute Ex Inc. | Transportation | Gold |
| Encal Energy Ltd. | Upstream Oil and Gas | Bronze |
| Enviros RIS | Environmental Consulting | Silver |
| Mikro-Tek | Biotechnology / Silviculture | Gold |
| Penn West Petroleum Ltd. | Upstream Oil and Gas | Silver |
| Richland Petroleum Corporation | Upstream Oil and Gas | Bronze |
| Rio Alto Exploration Ltd. | Upstream Oil and Gas | Silver |
| St. Lawrence Corp. | Textiles | Silver |
| Triumph Energy Corporation | Upstream Oil and Gas | Silver |

*Source:* Brian Rawson (brawson@vcr-mvr.ca), VCR, personal communication, March 3, 2001.

However, even the Gold level reporting requirements fall short of the likely requirements for participation in a future credit for early action or emissions trading system. A future system involving carbon credits will likely require participants to report the following additional criteria:

- absolute greenhouse gas emissions;
- methodological detail on how the baseline, projections and actual reductions were calculated, including information on assumptions and emissions factors used; and
- third party verification of actual emission reductions.

Companies should be collecting and documenting this information now to position themselves to qualify their reduction efforts under a future credit for early action or emissions reduction trading system.

## 4.7 Climate-Friendly Purchasing

Consumers of many products and services are beginning to consider, as part of their purchasing decisions, the greenhouse gas emissions associated with those products and services. Likewise, companies can use their influence as consumers to reduce greenhouse gas emissions outside their own operations by making this a factor in their selection of suppliers of electricity, fuels, vehicles, raw materials, freight services, and other goods and services.

To implement a climate-friendly procurement policy, a company should:

- identify and adopt climate change criteria, like greenhouse gas emissions intensity, fuel source, and other emission related criteria, in addition to conventional criteria such as cost, performance and reliability.
- make a commitment in its procurement policies to favour suppliers who have developed action plans to reduce greenhouse gas emissions; and
- work directly with suppliers to implement actions that will reduce greenhouse gas emissions associated with the interaction between the two organizations (e.g., communications, transport of goods).

### Climate Friendly Purchasing at Interface Flooring Systems (Canada)

Interface Flooring Systems (Canada) Inc. has adopted one of the most aggressive energy procurement policies in the country. Interface is a leading producer of commercial flooring.

Interface's energy procurement policy is to use 100 percent sustainable energy for all production-related requirements by the year 2002. Sustainable energy is defined as solar, wind and run-of-the-river micro hydro with no dams. As of February 1998, Interface was purchasing 25 percent of the energy requirements of its Belleville, Ontario facility from certified green energy. This commitment complements internal energy and production efficiency commitments described in Chapter 3, all of which have substantially reduced the greenhouse gas emissions from producing a unit of carpet.

*Source: Action Plan/Progress Report to CIPEC – Results of Interface Flooring Systems (Canada) Inc. 1998.*

# 5.0 Identifying Next Steps

This chapter presents a process to identify the first important steps in your company's strategic response to climate change. It was designed to help you answer the following questions:

1. Where are you now? What are your specific risks and opportunities and what is the current status of your response to climate change?
2. Where do you want to go? What climate change strategy is appropriate to the unique circumstances of your company?
3. How are you going to get there? What high leverage actions can you take now to move you closer to where you want to be?

Using simple worksheets you can assess your current status, determine where you want to go, and identify high leverage activities to help get you there. The five-step process is shown in Table 7.[47]

**Table 7: Outline of Process to Identify Next Steps**

| Step | Description | Worksheets |
|---|---|---|
| #1<br>Identify Risks, Opportunities and Current Status<br>↓ | Identify the specific risk and opportunities facing your company, and the current status of your response to climate change. | 1a<br>1b |
| #2<br>Determine Climate Change Strategy<br>↓ | Determine the elements of climate change strategy appropriate to the risks, opportunities and business strategy of your company. | 2 |
| #3<br>Analyze Gaps<br>↓ | Identify actions to close the gap between your desired climate change strategy, and the current status of your response to climate change. | 3 |
| #4<br>Rank Actions<br>↓ | Identify 2-5 high leverage actions you can take now to move you closer to your desired climate change strategy. | 4 |
| #5<br>Anticipate Obstacles<br>↓ | Anticipate and avoid potential obstacles for the 2-5 high leverage actions you plan to implement. | 5 |
| Next Steps Identified | | |

[47] The Pembina Institute acknowledges Five Winds International for much of the framework used to develop this process.

There is no such thing as a "one size fits all" climate change strategy. Each company needs to develop a response to climate change that suits its particular situation—identifying and addressing its own unique risks and opportunities. The worksheets in this chapter and the resources and tools described in Chapter 6 will help you identify and begin implementing the high leverage items that can give you quick and lasting results. As you progress and become more familiar with the climate change issue as it affects your company, you may want to repeat the process described in this chapter and make more extensive use of the resources from Chapter 6 for evaluating, extending and continuously improving your response to climate change.

As you go through this process, you need to be proactive but don't get ahead of yourself. Setting long-term goals and taking action to reach them is a wise approach but don't try to do everything at once. The visible actions of some leading companies profiled in the success stories of Chapter 3 were built on a solid foundation and it is important to ensure that your foundation is in place before building too much on top of it. In other words "start where you are." Recognize that it's good to have long-term goals, but you can't expect to reach them immediately; it will take time and effort. It is better to develop a short list of high leverage actions you can implement successfully now rather than try to plan every detailed action you need to take to reach your long-term strategic goals.

Responding to climate change is a long-term challenge and can be likened to an extended journey for which you know the direction you want to go but the ultimate destination may change. You can be confident that circumstances will indeed change and that the bar for what constitutes a "world class" response to climate change will be continuously raised by your competitors and other companies. As you start implementing your response to climate change, it is essential to monitor and evaluate your results to validate your assumptions and determine if you are making satisfactory progress towards your goals. This continuous evaluation will allow you to adjust your response over time to take account of better information, changing circumstances and changing driving forces inside and outside your company.

## 5.1 Identify Your Specific Risks, Opportunities and Current Status

The objective of this step is to identify the specific risks and opportunities facing your company, and the current status of your response to climate change. This information will be used to develop your climate change strategy and identify priority actions.

Chapter 3 described the most important general risks and opportunities for business associated with climate change. Table 8 summarizes these risks and opportunities and also indicates which ones are likely to be most important for different types of businesses. For example, most small and medium-sized manufacturers are "energy consumers." From Table 8, the most important risk for energy consumers is likely to be from policies and measures responding to climate change, whereas the most important opportunity is likely to be from improving energy efficiency.

**Table 8: Risks and Opportunities by Type of Business**

| Type of Business | Risks | | Opportunities: Internal Efficiencies and New Revenue | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Changing Climate | Policies and Measures | Energy Efficiency | Material Efficiency | Carbon Efficiency | New Products/ Services | Brand Image | Emission Reduction Credits |
| Energy Producers | | – – | + + | | + + | + + | + | + |
| Energy Consumers | | – – | + + | + | + | + | + | + |
| Non-Energy Greenhouse Gas Emitters | | – – | | + + | ++ | | + | + |
| Vulnerable Assets and Operations | – – | | | | | | | |

Key: – moderate risk
– – significant risk
+ some opportunity
+ + significant opportunity

Completing the self-assessments shown in Worksheets 1a and 1b[48] will give you a better understanding of your company's risks and opportunities and the current status of your response to climate change. Going through these worksheets with various stakeholders in your company (e.g., senior managers, production managers, product developers, marketing and sales managers, financial managers and human resources staff) will ensure that their expertise and knowledge are incorporated into your assessment. It will also raise their awareness about how the risks and opportunities associated with climate change could affect your business—an important step towards implementing your response.

After completing worksheets 1a and 1b, you will have a quick assessment of the relative importance of climate change to your business and a list of possible steps to consider in your response. You should complete this step before moving on to step 2.

[48] These worksheets are adapted from a self-assessment tool developed by the Global Environmental Management Initiative (GEMI), available at www.businessandclimate.org.

### Worksheet 1a: Assess your company-specific risks

Instructions: Answer each question by circling Y for "Yes" if appropriate for your company. Only a "Yes" response will adversely affect your risks. If your response is "No," you can safely ignore that question.

| | | |
|---|---|---|
| 1. | Is it a primary business of your company to extract, process, transport, or sell fossil fuels or generate electricity for sale? | Y |
| 2. | Is it a primary business of your company to manufacture nitric acid, adipic acid, cement, lime, aluminum, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), or sulphur hexafluoride ($SF_6$)? | Y |
| 3. | Do your production processes emit nitrous oxide ($N_20$), carbon dioxide ($CO_2$), methane ($CH_4$), HFCs, PFCs or $SF_6$ gases as by-products? | Y |
| 4. | Are your total energy costs (including electricity) more than 2% of total operating costs? | Y |
| 5. | Are your total energy costs (including electricity) more than 5% of total operating costs? | Y |
| 6. | Does your company use material inputs produced through energy intensive processes? | Y |
| 7. | Do your important customers include large energy-intensive companies that are likely to face greenhouse gas emission reduction limitations? | Y |
| 8. | When the products sold by your business are used, do they consume electricity or fossil fuels to operate? | Y |
| 9. | When the products sold by your business are used or retired from use, do they release methane, HFCs, PFCs or $SF_6$? | Y |
| 10. | Are any of your important operations, suppliers, customers, or distribution channels at sea level or vulnerable to disruptions from drought, extreme weather or flooding? | Y |
| 11. | Do you have important operations in Europe or Japan (which may lead Canada in government actions to reduce emissions from business operations)? | Y |
| **Total "Yes" Responses** | | |

#### *Interpreting your results*

Answering any one of the above questions "yes" could mean significant risk for your business. However, in general, more "yes" responses indicate higher business risks from climate change. If you answered "yes" to four or more questions, your business risk from climate change is high, and your response to climate change should be strategic and comprehensive. If you answered "yes" to two or fewer questions, your business risk from climate change is relatively low, and a more tactical and less comprehensive response may be sufficient. For more information about the business risks from climate change, see Chapter 3.

## Worksheet 1b: Assess your company-specific opportunities and the current status of your response to climate change

Instructions: Answer each question by circling the appropriate response for your company, Y for "Yes" or N for "No." If the response that applies to your company is not shown, you can safely ignore that question.

| | |
|---|---|
| **Section 1: Business Strategy** | |
| 1. Has your business conducted, within the last 5 years, energy audits of your buildings and production processes to identify opportunities to improve efficiency and reduce fuel consumption? | N |
| 2. Does your business sell products/services or have expertise relevant to energy efficiency, cogeneration, renewable energy, energy storage, hydrogen-based fuel technologies, cooling or water conservation? | Y |
| 3. Does your business position itself as a leader in environmental performance? | Y |
| **Section 2: Marketing Strategy** | |
| 4. Do important business customers of your company have supplier initiatives aimed at assuring or improving the environmental performance of your company? | Y |
| 5. Does your business receive frequent inquiries (from customers or others) or publicity concerning its environmental performance? | Y |
| 6. Would many customers or end-users of your business's products or services take their business to one of your competitors if the competitor's environmental record were stronger than yours? | Y |
| **Section 3: Stakeholder Engagement** | |
| 7. Are many of your company's internal stakeholders (e.g., senior management, production, product development, marketing and sales, finance, human resources) involved in improving internal efficiencies or generating new revenue related to your response to climate change? | N |
| 8. Are many of your external stakeholders (e.g., customers, suppliers, investors, communities) engaged in your climate change strategy? | N |
| **Section 4: Commitment from Management** | |
| 9. Does your business have a written commitment from senior management to reduce greenhouse gas emissions? | N |
| 10. Does your business have an approved climate change policy, or an environmental policy incorporating climate change? | N |
| 11. Are climate change considerations included in your management systems (e.g., quality management system, environmental management system)? | N |
| **Section 5: GHG Emissions Measurement and Monitoring** | |
| 12. Has your business conducted a first-pass assessment to identify which activities under your control or influence constitute your largest sources of GHG emissions? | N |
| 13. Have you established direct and indirect GHG emissions for your base year? | N |
| 14. Does your business update your direct and indirect GHG emissions inventory annually? | N |
| 15. Have your projected your future GHG emissions with and without emission reduction measures? | N |
| 16. Are all of your new projects assessed for their impact on GHG emissions? | N |

| | |
|---|---|
| **Section 6: GHG Emissions Target** | |
| 17. Has your business established a relative energy consumption or GHG emissions reduction target (i.e., improvement in GHG intensity) from your base year? | N |
| 18. Has your business established an absolute GHG emissions reduction target from your base year? | N |
| **Section 7: Changes to Internal Financial Signals** | |
| 19. Does your business maintain a capital pool earmarked for energy efficiency improvements that meet pre-defined financial criteria? | N |
| 20. Has your business implemented other changes to internal financial signals (e.g., internal charges, shadow prices, extended payback periods) to encourage GHG emissions reducing investments? | N |
| **Section 8: Employee Awareness and Incentives** | |
| 21. Does your corporation have a program in place to monitor and reduce business travel? | N |
| 22. Does your business reward or evaluate facility managers for the environmental performance of their facilities? | N |
| 23. Does your business have a formal program to reward employee suggestions that improve energy efficiency and reduce emissions? | N |
| 24. Have you established training to improve employee's awareness of climate change, the business risks and opportunities, and opportunities for individual action? | N |
| 25. Does your business sponsor van-pooling, ride-share, telecommuting or similar programs to reduce total employee commuter mileage and emissions? | N |
| **Section 9: Reporting on Plans and Progress** | |
| 26. Does your business track and report its total energy consumption or GHG emissions on a regular (e.g., monthly, annually) basis? | N |
| 27. Does your business formally report your annual GHG emissions externally using the VCR, your annual report, or your annual environmental report? | N |
| **Section 10: Climate Friendly Purchasing** | |
| 28. Does your business use climate change criteria to help choose between competing suppliers? | N |
| 29. Does your business produce renewable energy on site or purchase "green power" (electricity generated from low impact renewable energy)? | N |
| **Section 11: Operations and Programs** | |
| 30. Has your business participated in voluntary initiatives such as Canadian Industry Program for Energy Conservation (CIPEC), Voluntary Challenge and Registry (VCR Inc.), Industrial Energy Innovators, Eco-Efficiency Initiative, etc.? | N |
| 31. Has your business conducted an assessment of potential savings from co-generation investments? | N |
| 32. Does your business have guidelines in place for the energy efficient and environmentally conscious construction and renovation of facilities? | N |
| 33. Does your business use oil or coal-fired machines or boilers? | Y |
| 34. Do your buildings make maximum feasible use of blinds, natural shade and natural ventilation to reduce air conditioning costs? | N |
| 35. In the last 5 years, has your facility upgraded the efficiency of your systems for process cooling? | N |
| 36. In the last 5 years, has your business upgraded the efficiency of your systems for process heating? | N |

| | |
|---|---|
| 37. In the last 5 years, has your business upgraded the efficiency of motors, pumps, air compression, and/or process machinery? | N |
| 38. In the last 5 years, has your business upgraded the efficiency of your HVAC (Heating, Ventilation and Air Conditioning) systems? | N |
| 39. In the last 5 years, has your business upgraded the efficiency of your lighting systems? | N |
| 40. Do you have plans to implement further energy efficiency measures? | N |
| **Section 12: Results and Verification** | |
| 41. Has your business reduced its GHG intensity per unit output from your base year? | N |
| 42. Has your business significantly reduced its GHG emissions from your base year? | N |
| 43. Does someone other than your project staff verify your GHG emissions reductions? | N |
| **Total Circled Responses (Yes or No)** | |

### *Interpreting your results*

Each answer ("Yes" or "No") you circle in response to the above questions indicates a potential opportunity for your business. A high number of "Total Responses" indicates more business opportunities yet to be exploited from your response to climate change. A low number of "Total Responses" indicates fewer opportunities or that your business has already taken advantage of many opportunities related to climate change. For more information about business opportunities related to climate change, see Chapter 3.

## 5.2 Determine Your Climate Change Strategy

The objective of this step is to identify what level of climate change strategy is appropriate for your business.

The most appropriate climate change strategy for your business will take into account your company-specific risks and opportunities, the current status of your response to climate change and your existing business strategy. If your business strategy is focused on growth, it may make sense to focus on revenue opportunities to develop new markets and/or new climate friendly products or services. On the other hand, if your industry and company compete mostly on the basis of cost, you may want to focus on reducing your cost structure through internal efficiencies.

In addition to the results from worksheets 1a and 1b, some of the questions you may need to consider before determining your climate change strategy include:

- What are the current business priorities of your company (e.g., cost reduction, market growth, acquisition)?
- What trends are affecting your company and industry (e.g., competitive trends, technology trends, market trends, regulatory trends)?
- What are your company's environmental aspects or significant environmental impacts?[49]
- Which of these most affect greenhouse gas emissions?
- What programs that could address climate change are currently in place, and how effective are they?
- What people, programs, procedures and tools are available to support any new initiatives?

The range of possible responses to climate change is huge and forms a continuum from active denial to "world-class" response. Worksheet 2 shows the elements of three levels of climate change strategy. An "entry level" climate change strategy aims to manage risks and take advantage of some of the most obvious opportunities. A "moderate level" climate change strategy goes beyond the entry level strategy by systematically exploiting some internal efficiencies and, where appropriate, positioning new or existing products or services as "climate change solutions" to take advantage of growing market needs. A "world-class" climate change strategy aggressively exploits all possible opportunities for internal efficiencies and develops new businesses based on "climate change solutions."

In the interests of clarity, not all potential elements of a climate change strategy are shown in worksheet 2. Also, there is no such thing as a "one size fits all" climate change strategy. The three levels shown in the worksheet illustrate elements of a typical climate change strategy at different stages of maturity. Instead of choosing one level and attempting to match all of the elements shown, companies are encouraged to mix and match elements from the three different levels to meet their unique needs and available resources. This worksheet is a menu of options to help you match your chosen climate change strategy to your business needs.

[49] An "environmental aspect" is an element of an organization's activities, products or services that can interact with the environment. An "environmental impact" is any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services. Source: ISO 14001: 1996, *Environmental Management Systems – Specifications with Guidance for Use* (Geneva: International Organization for Standardization, 1996).

## Worksheet 2: Elements of Model Climate Change Strategies

Instructions: For each of the climate change strategy elements shown below, choose the level that best matches your company's specific risks and opportunities, the current status of your response to climate change and your existing business strategy. Note: These levels are cumulative; that is, the moderate level includes all components of the entry level, and the world-class level includes all components of the moderate level.

| Element | Entry Level | Moderate Level | World-Class |
|---|---|---|---|
| Business Strategy | Risk assessment;<br>Manage risks;<br>Exploit obvious opportunities | Systematically exploit internal efficiencies;<br>Position existing or new products as "climate change solutions" | Aggressively exploit all possible internal efficiencies;<br>Develop new businesses based on opportunities |
| Marketing Strategy | None | Defensive – avoid disqualification from bids based on climate change criteria | Differentiation from competitors based on climate friendliness |
| Stakeholder Engagement | Few | Engagement from many departments within company | Engagement with external stakeholders (customers, suppliers, investors, communities, etc.) |
| Commitment from Management | Written commitment from management | Company policy established;<br>Champion designated as focal point for programs and internal communication network | Commitment reinforced constantly using all available internal and external communication channels;<br>Climate change programs adequately funded;<br>Management systems include climate change dimensions |
| GHG Emissions Measurement and Monitoring | Direct emissions estimated for current and base year | Direct and indirect emissions for base year established; Direct and indirect emissions inventory updated annually;<br>Projections with and without measures established;<br>Actual and planned emissions reduction projects inventoried | Indirect emissions extended upstream and downstream;<br>All new projects assessed for impact on GHG emissions;<br>Certifiable methodology used |
| GHG Emissions Target | Annual percentage improvement in energy efficiency or GHG emissions intensity | Relative emissions reduction target from base year | Absolute emissions reduction target from baseline year established;<br>Process for target review and update |
| Changes to Internal Financial Signals | None – implement projects that meet standard financial criteria (payback, ROI, etc.) | Some of internal charges, shadow prices, extended payback periods, or revolving capital pools | Most or all of internal charges, shadow prices, extended payback periods, or revolving capital pools |

| Element | Entry Level | Moderate Level | World-Class |
|---|---|---|---|
| Employee Awareness and Incentives | Existing employee incentives extended to include climate change considerations | Awareness training for most employees;<br>Incentives for managers | Awareness training for all employees including opportunities for individual action;<br>All employees have incentives built into their compensation schemes |
| Reporting on Plans and Progress | Informal internal reporting | Formal internal reporting to operators, line managers, senior management and Board of Directors | Formal annual external reporting using VCR, annual report or annual environmental report |
| Climate Friendly Purchasing | Climate change criteria added to other purchasing criteria | Climate change criteria used to decide between suppliers | Partner with suppliers to reduce GHG emissions |
| Operations and Programs | Ad hoc upgrades as opportunities are identified | Systematic assessment and upgrades to some systems | Systematic assessment and upgrades to all significant systems |
| Results and Verification | 1st party verification by project/facility staff | Reductions in GHG intensity per unit output from base year;<br>2nd party verification by arms length staff (e.g., company staff or consultant) | Significant absolute GHG emissions reductions from base year;<br>3rd party verification by independently certified party |

## 5.3 Gap Analysis: Current Status versus Preferred Response

The objective of this step is to identify actions to close the gap between your desired climate change strategy identified above and the current status of your response to climate change.

After you have determined your desired response to climate change, you need to compare it with your current situation to identify the most important gaps between where you are now and where you want to be. In virtually all cases there will be significant gaps between where you are now and where you want to be. These gaps will drive change at your company. By taking a hard look at some of these gaps and realistically assessing which are the most important to address first, you can focus your search for high leverage actions.

## 5.4 Priority Actions to Close Gaps

The objective of this step is to identify the top two to five high-leverage actions you can take now to move you closer to your desired climate change strategy.

Before identifying the benefits and costs of each action and attempting to rank them, it may be useful to group similar actions together to streamline the ranking process.

## Worksheet 3: Identify actions to close gap between current and desired status

Instructions: For each of the climate change strategy elements identified below, enter your company's desired status from worksheet 2. Then assess your current status, using the results from worksheet 1b. Finally, identify actions that would close the gap between your current and desired status. Don't worry about which actions you will eventually decide to purse at this point; these will be identified in the next step using worksheet 4. This step requires brainstorming to identify many actions that could bring you closer to your desired climate change strategy.

| Element | Desired Status (worksheet 2) | Current Status (worksheet 1b) | Actions to Close Gap |
|---|---|---|---|
| Business Strategy | | | |
| Marketing Strategy | | | |
| Stakeholder Engagement | | | |
| Commitment from Management | | | |
| GHG Emissions Measurement and Monitoring | | | |
| GHG Emissions Target | | | |
| Changes to Internal Financial Signals | | | |
| Employee Awareness and Incentives | | | |
| Reporting on Plans and Progress | | | |
| Climate Friendly Purchasing | | | |
| Operations and Programs | | | |
| Results and Verification | | | |

## Worksheet 4: Identify Priority Actions to Close Gaps

Instructions: For each of the actions or group of actions identified from worksheet 3, identify the benefits. These include economic (e.g., lower costs, higher revenue), environmental (e.g., lower greenhouse gas emissions, lower air pollution) and other (e.g., improved employee morale, enhanced brand image) benefits. Now assign these benefits an overall rating of High, Medium or Low. Absolute precision is not as important as being able to use this rating to differentiate between the various actions. Similarly, for each action, identify the costs and difficulty of implementation, and assess an overall rating of High, Medium or Low.

The Benefit/Cost ratio can be used to highlight actions with high benefit/cost ratios and eliminate actions with low benefit/cost ratios. Depending on the number of people involved, various ranking processes can be used. One method for quickly identifying group preferences is to give each participant 14 points, to vote for their #1 (5 points), #2 (4 points), #3 (3 points) and #4 (2 points) options.[50]

| **Action (worksheet 3)** | **Benefits**<br>• **Economic**<br>• **Environmental**<br>• **Other**<br>**(H, M, L)** | **Costs**<br>• **Economic**<br>• **Difficulty**<br>**(H, M, L)** | **Benefits/Costs (H, M, L)** | **Ranking (1, 2, 3 …)** |
|---|---|---|---|---|
| Action 1 | | | | |
| Action 2 | | | | |
| Action 3 | | | | |
| | | | | |
| | | | | |
| | | | | |

[50] A practical way of doing this is to give each participant four different coloured self adhesive dots corresponding to their #1, #2, #3 and #4 choices, and ask them to place these dots beside their preferences on a flipchart listing all actions.

## 5.5 Overcoming Potential Obstacles and Barriers

The objective of this step is to anticipate and avoid potential obstacles for the few high leverage actions you plan to implement.

Some of the highest-ranked actions from worksheet 4 should be implemented within a reasonable time period. Depending on available resources, it is advisable to pick only the top two to five ranked actions and focus initially on implementing them. Before assigning people, money and a schedule to these actions, you need to anticipate potential obstacles or barriers to their implementation, so that you can plan ways of overcoming them. Potential obstacles could include:

- lack of awareness and knowledge about climate change and the associated business risks and opportunities;
- lack of technical or management expertise to exploit internal efficiencies or new revenue opportunities;
- lack of money to make proposed changes or investments; and
- lack of time or competing priorities for management attention.

You may identify other potential obstacles or barriers.

It is important to be realistic and pragmatic when identifying potential obstacles or barriers. This means not being overly optimistic about the ease of making changes, nor being overly pessimistic about the difficulties. The reality is that changing the way things are done in a business can be challenging, and the larger the business, the harder change tends to be. However, change does occur and obstacles and barriers can be overcome.

The information in this Guide and in associated presentations and workshops,[51] will help you start to overcome some of the potential obstacles you've identified. The additional tools and resources described and referenced in Chapter 6 can take you several steps further towards overcoming potential barriers. To help identify appropriate resources, they have been classified using the following categories:

- Awareness and Education
- Expertise and Consulting
- Financial Assistance and Incentives
- Networking with Solution Providers
- Success Stories
- Management and Technical Tools
- Turnkey Solutions

If any of these categories are identified as a way of overcoming obstacles to the priority actions on worksheet 5 below, then Table 9: Quick Reference Guide to Resources, at the beginning of Chapter 6, should be consulted to help find appropriate resources.

After identifying potential obstacles and some strategies, resources and tools to help overcome them, assign people, money and a schedule to your highest priority actions. Best of luck implementing your actions to respond to the risks and opportunities of climate change!

[51] To help managers of small and medium-sized businesses learn how they can respond to and profit from actions to address the climate change challenge, the Pembina Institute began offering presentations in September 2000. More detailed workshops using this Guide will be offered between March and June 2001. For more information, see the response form at the end of this Guide.

## Worksheet 5: Overcoming Potential Obstacles and Barriers

Instructions: Enter the top two to five ranked actions identified on worksheet 4. Brainstorm potential obstacles or barriers to implementing these actions and strategies to overcome them. If appropriate, use Table 9 at the beginning of Chapter 6 to identify resources and tools to help overcome the identified obstacles.

| Priority Action (worksheet 4) | Potential Obstacles or Barriers | Strategies for Overcoming Obstacles | Resources and Tools to help Overcome Obstacles (see Chapter 6) |
|---|---|---|---|
| #1 ranked action | e.g., lack of money | Obtain financial assistance from government programs | See list of available programs under the category "Financial Assistance/ Incentives" in Table 9, Chapter 6 |
| #2 ranked option | | | |
| #3 ranked option | | | |
| | | | |

# 6.0 Resources to Help Make it Happen

As you develop, implement and continuously improve your company's plan to respond to climate change, it is important to keep in mind potential obstacles or barriers you are likely to encounter, so you can incorporate ways of overcoming them into your plans. These may include lack of awareness about climate change, lack of expertise about how to exploit internal efficiencies or new revenue opportunities, lack of money required to make proposed changes, and lack of time or competing priorities for management attention.

The information in this Guide, including examples of how other companies have responded to climate change, along with tools and worksheets for planning your own response, will help you start to overcome some of these potential obstacles. More than 50 additional tools and resources are described and referenced below. They can take you several steps further towards overcoming potential barriers and planning and implementing a profitable response to climate change for your company. Many of these are available immediately through the Internet address given. They include resources and tools from governments, industry associations and the private sector.

Each resource and tool described below has been classified to help you quickly find what you need to start planning and implementing your response to climate change. The classifications use seven categories:

- Awareness and Education
- Expertise and Consulting
- Financial Assistance and Incentives
- Networking with Solution Providers
- Success Stories
- Management and Technical Tools
- Turnkey Solutions

In addition to the alphabetical listing of each resource that includes a description and contact details for more information, the first part of this chapter includes a quick reference (Table 9) showing which resources include content in each of the categories. A brief description of each category follows.

### Awareness and Education

These resources are useful for increasing the level of awareness about climate change and the associated risks and opportunities for business.

### Expertise and Consulting

These resources are useful to access technical and/or management expertise that will help you plan and implement your company's response to climate change.

### Financial Assistance and Incentives

These resources are useful to identify potential sources of funding or financial incentives to help implement your company's response to the business risks and opportunities of climate change.

### Networking with Solution Providers

These resources are useful to identify opportunities to network with potential solution providers who can help you plan and implement your company's response to climate change.

### Success Stories

These resources are useful to obtain additional success stories similar to the ones discussed in Chapter 3.

### Management and Technical Tools

These tools will help you design and implement your company's response to climate change.

### Turnkey Solutions

These resources will help you identify turnkey solution providers to design and implement elements of your company's response to climate change.

## Table 9: Quick Reference Guide to Resources

| Resource | Aware-ness | Exper-tise | $ Incen-tives | Net-working | Success Stories | Tools | Turnkey Solutions |
|---|---|---|---|---|---|---|---|
| Alberta Food Processors Association GHG Guide | √ | | | √ | √ | √ | |
| Action by Canadians (ABC) | √ | | | | √ | √ | |
| Automotive Parts Manufacturers' Association | √ | √ | | | √ | √ | |
| BEPO | √ | | | √ | | √ | |
| CADDET | √ | | | | √ | √ | |
| Canadian Centre for Pollution Prevention | √ | | | √ | √ | | |
| Canadian Environmental Solutions (CES) | | | | √ | | | |
| Canadian Industry Program for Energy Conservation | √ | √ | | √ | √ | √ | |
| Canadian Manufacturers & Exporters/NRC Technology Visits/Innovation Insights | √ | √ | | √ | √ | | |
| Canadian Pollution Prevention Information Clearinghouse | √ | | | √ | √ | √ | |
| Canadian Renewable Fuels Association | √ | | | √ | | √ | |
| Clean Air Strategic Alliance | √ | | | √ | | √ | |
| Climate Change Action Fund | | | √ | | | | |
| Climate Change Central | √ | | √ | √ | | | |
| Climatechangesolutions.com | √ | | | | √ | √ | |
| Climate Neutral Network | √ | √ | | √ | | √ | |
| CO2e.com | √ | | | | | √ | |
| Cool Companies | √ | √ | | | √ | √ | |
| Count Me In | √ | | | | √ | √ | |
| Eco-Efficiency Innovation | | √ | √ | | | | √ |

| Resource | Awareness | Expertise | $ Incentives | Networking | Success Stories | Tools | Turnkey Solutions |
|---|---|---|---|---|---|---|---|
| eMission Software | | | | | | √ | |
| Energy Efficiency Manual | √ | | | | | √ | |
| Energy Star Simple Savings Calculator | √ | | | | | √ | |
| ENMAX Greenmax | | | | | | | √ |
| Environmental Services Association of Alberta | | | | √ | | | |
| EPCOR ECO-PACK Green Power | | | | | | | √ |
| EPCOR EnVest Energy Efficiency Program | | √ | √ | | | | √ |
| FleetSmart | √ | | | √ | √ | √ | |
| GEMI Business and Climate | √ | | | | √ | √ | |
| ghgtechnology.com | √ | | | √ | | | |
| Greenhouse Gas Emission Reduction Trading (GERT) Pilott | √ | | | | | √ | |
| GHG Indicator: UNEP Guidelines | √ | | | | | √ | |
| Global Climate Change | √ | | | | | | |
| GreenBiz.com | √ | | | | | √ | |
| Independent Power Producers' Society of Ontario | √ | | | √ | | | |
| Industrial Energy Efficiency Initiative | √ | | | √ | √ | √ | |
| Industrial Research Assistance Program (IRAP) | | √ | √ | √ | | | |
| National Association of Energy Service Companies | √ | | | √ | | | |
| National Association of Manufacturers Toolkit | √ | | | | √ | √ | |
| NRC - IRAP Design for Environment Guide | √ | | | | | √ | |
| Office of Energy Efficiency | √ | √ | √ | √ | √ | √ | |
| Office of Energy Efficiency library | √ | | | | | | |
| Ontario Centre for Environmental Technology Advancement | √ | √ | √ | | | | |
| Ontario Environment Business Directory | | | | √ | | | |
| Ontario Power Generation Inc. Green Power | | | | | | | √ |
| Pilot Emission Reduction Trading Project/Clean Air Canada Initiative | √ | | | | | √ | |
| Rocky Mountain Institute | √ | √ | | | √ | √ | |
| Tax Incentives | | | √ | | | | |

| Resource | Awareness | Expertise | $ Incentives | Networking | Success Stories | Tools | Turnkey Solutions |
|---|---|---|---|---|---|---|---|
| Technology Early Action Measures (TEAM) | | | √ | | | | |
| The Energy Efficiency InfoSearch Database | √ | | | | √ | √ | |
| Renewable Energy Deployment (REDI) | √ | | √ | | | | |
| Stoneyfield Farm Environmental Cookbook | √ | | | | √ | √ | |
| Vision Quest Windelectric Inc. | | | | | | | √ |
| Voluntary Challenge and Registry (VCR) | √ | | | √ | √ | √ | |
| Wise Rules for Industrial Efficiency | √ | | | | | √ | |
| WRI/WBCSD Measurement & Reporting Standard | √ | | | | | √ | |

## Complete Alphabetical Listing of All Resources

### Alberta Food Processors Association GHG Guide

***Awareness, Networking, Success Stories, Tools***

The association's guide "Increasing Profit$ by Reducing GHGs" is available for sale to non-members and has everything you need to get started in the food processing industry: climate change information, methods to improve your business's eco-efficiency, case studies, useful tools and resources.

web: http://www.afpa.com/env/greenhouse.shtml
Contact: Ken Gibson, President
tel: (780) 444-2272
fax: (780) 483-7590
e-mail: ken@afpa.com

### Action by Canadians (ABC)

***Awareness, Success Stories, Tools***

The ABC Program is a national level public education and action initiative designed to engage Canadians in voluntarily reducing their individual greenhouse gas emissions. The program is delivered to citizens at their workplace. The ABC Program seeks to demystify the complexity of climate change by giving participants the information they will need to understand the link between climate change, greenhouse gases and energy use, as well as the actions individuals can take to reduce their own greenhouse gas emissions. In addition, with feedback on the positive impact these reductions can have when added together, Canadians will see the collective difference they can make.

web: http://www.energy.ca/abc
Contact: Sara Melamed, Director ABC Program
tel: (613) 952-3316
e-mail: epc@energy.ca

### Automotive Parts Manufacturers' Association (APMA)

***Awareness, Expertise, Success Stories, Tools***

APMA's Energy Efficiency Management Training Program is designed to provide engineering co-op students with the skills to analyze and implement cost saving measures in your facilities. The cost of a four-month co-op student placement is equivalent to only about three percent of the energy cost of a typical parts plant. The program includes training of co-op students and plant engineering and maintenance staff in energy efficient management and how to identify opportunities; a manual to help identify opportunities, as well as provide technical and management information and direction; and ongoing support for the co-op students during their work term. Benefits include cost savings, improved energy efficiency and reduced greenhouse gas emissions.

web: http://www.capma.com/index.html
Contact: Patrick Curran, Director of Environment
tel: (416) 620-4220
fax: (416) 620-9730
e-mail: info@apma.ca

### BEPO: Business Environmental Performance Office

***Awareness, Networking, Tools***

The Canadian Business Environmental Performance Office (BEPO) is an office without the bricks and mortar. Their goal is to provide quick and easy access to environmental and business information, advice and services for Canadian companies in all industry sectors along five functional lines: Waste Management; Emergency, Health and Safety Management; Resource Conservation and Pollution Prevention; Resource Centre and Policy Development; and Climate Change. BEPO is a public-private sector partnership and includes the following industrial sectors: automotive parts, pharmaceuticals, oil and gas, agriculture, chemical producers, health care, law and policy, paint and coating industry, pulp and paper, plastics, hotel sector, sustainable development, dairy council, seafood sector, and aquaculture.

web: http://virtualoffice.ic.gc.ca/BEPO
Contact: Roy Prokopuk, Business Development Marketing and Communications
fax: (613) 995-9584
e-mail: roy.prokopuk@nrcan.gc.ca

### CADDET Energy Efficiency

***Awareness, Success Stories, Tools***

Using a range of printed, electronic and online material, CADDET (Centre for the Analysis and Dissemination of Demonstrated Energy Technologies) provides an international information network to help managers, engineers, architects and researchers find out about the energy-saving techniques that have worked in other countries. CADDET Energy Efficiency's objective is to enhance the exchange of information on new, cost-effective, energy-saving technologies that have been demonstrated in applications in industry, buildings, transport, utilities and agriculture. Over 2,000 success stories are available from their web site, including 52 from Canadian industry (as of October 2000).

web: http://www.caddet-ee.org
Contact: Caddet Technology Coordinator, Natural Resources Canada
tel: (613) 947-3812
fax: (613) 947-1016
e-mail: michel.lamanque@nrcan.gc.ca

### Canadian Centre for Pollution Prevention (C2P2)

***Awareness, Networking, Success Stories***

The C2P2 was founded to stimulate the adoption of pollution prevention approaches. Serving as a catalyst for change, the C2P2 disseminates information so that others will include pollution prevention in their decision making and helps businesses, governments and the public find solutions that result in pollution prevention action.

web: http://www.c2p2online.com
Contact: Marianne Lines, Executive Director
tel: 1-800-667-9790
fax: (519) 337-3486
e-mail: info@c2p2online.com

### Canadian Environmental Solutions (CES)

***Networking***

CES currently addresses industry sector problems and solutions related to water, air, soil, research and development, and energy. CES contains 1,980 environmental problems, 1,920 solutions and their descriptions, along with the 872 companies that can provide the solutions. All are accessible using full-text search. This product is continually updated to ensure the information remains accurate.

web: http://strategis.ic.gc.ca/SSG/es00001e.html
Contact: Louise Chandra, Information Product Office
tel: (613) 954-2989
e-mail: chandra.louise@ic.gc.ca

### Canadian Industry Program for Energy Conservation (CIPEC)

***Awareness, Expertise, Networking, Success Stories, Tools***

This initiative is a voluntary government-industry alliance that recognizes that improved energy efficiency can help Canadian industry stay competitive and limit greenhouse gas emissions. CIPEC defines sector-specific, energy efficiency targets. It develops and implements action plans to achieve these targets and measures and reports on progress annually. CIPEC's 23 voluntary industry sector task forces determine the potential for energy-efficiency improvements within their sector, establish a means of reporting and tracking progress, and create action plans for reaching targets. They also provide a forum for identifying common needs in areas such as energy-management planning, technical information, financing, training and employee awareness. Natural Resources Canada then works with the task forces to develop appropriate services to satisfy these needs.

web: http://cipec.nrcan.gc.ca/ieei
tel: (613) 995-6839
fax: (613) 947-4121
e-mail: info.services@nrcan.gc.ca

### Canadian Manufacturers & Exporters/NRC Technology Visits/Innovation Insights

***Awareness, Expertise, Networking, Success Stories***

Giving Canadian executives a chance to see how others meet manufacturing challenges is the goal behind the Technology Visits Program, sponsored by Canadian Manufacturers and Exporters and the National Research Council–Industrial Research Assistance Program (NRC IRAP). Since its launch in mid-1994, over 3,500 senior level executives have visited host plants across the country. The goal of these "shop floor" visits is to prompt Canadian firms to increase their use of technology. The variety of participating plants allows visitors to see everything from the latest in automated guided vehicles, lasers and robots, to new team-based production techniques. The technology is discussed and described in terms of how it fits into production schedules, inventory control, order shipments and other manufacturing concerns. The program is open to anyone who directly influences manufacturing policy and processes in their company, providing they are not direct competitors of the host company. Companies that have hosted visits include: Allen-Bradley, Canadian Tire, Ford, Honda, IBM, Nortel Networks, Spar Aerospace, and over 100 other world-class manufacturers across Canada.

web: http://www.tvp-ii.org
tel: 1-800-798-0210
fax: 1-888-722-2904
e-mail: tvp@the-alliance.com

### Canadian Pollution Prevention Information Clearinghouse (CPPIC)

***Awareness, Networking, Success Stories, Tools***

The CPPIC is an Internet-based information tool. Its purpose is to link users to pollution prevention information in order to help them develop and implement pollution prevention plans. CPPIC's many features include: About Pollution Prevention, Generic Search, Sector Search, Success Stories, Problems and Solutions, Related Sites, Partners and What's New in P2 – a joint bulletin produced with the Canadian Centre for Pollution Prevention (C2P2). CPPIC provides the core concepts for pollution prevention and links to practical, generic and sector-specific tools such as fact sheets and manuals, real success stories, legislation, regulations, new developments, potential solution-providers and more.

web: http://www3.ec.gc.ca/cppic/index_e.htm
Contact: Anne Legault
tel: (819) 994-7977
fax: (819) 953-7970
e-mail: Anne.Legault@ec.gc.ca

### Canadian Renewable Fuels Association (CRFA)

***Awareness, Networking, Tools***

Officially incorporated in 1994, the CRFA is a non-profit organization mandated to promote renewable bio-fuels (ethanol, biodiesel, etc.) for automotive transportation through consumer awareness and government liaison activities. CRFA's activities include government liaison, generic promotion and awareness of ethanol and biodiesel, and ongoing research prioritization. CRFA's efforts now also focus on promoting public awareness of the merits of renewable fuels; this is done through workshops for automotive sales and service personnel and fuel retailers, media awareness activities, newsletters and publications, annual convention, expanding the CRFA Internet information site, and other means.

web: http://www.greenfuels.org/

Contact: Bliss Baker, President
tel: (416) 304-1324
fax: (416) 304-1335
e-mail: publicinfo@greenfuels.org

### Clean Air Strategic Alliance (CASA)

***Awareness, Networking, Tools***

CASA is a non-profit association comprising diverse stakeholders from three sectors. Senior representatives from government, industry, and non-government organizations (such as health and environmental groups) are committed to developing and applying a comprehensive air quality management system for the people of Alberta through a collaborative, consensus-based process. One of CASA's recent initiatives, the "ClimateWise" pilot program, was designed to engage the public through presentations and education. In late 2000 and early 2001, a series of six workshops were held in each of four Alberta communities.

web: http://www.casahome.org
tel: (780) 427-9793
fax: (780) 422-3127
e-mail: casa@casahome.org

### Climate Change Action Fund (CCAF)

***$ Incentives***

The CCAF was established by the federal government in 1998 to help Canada meet its commitments under the Kyoto Protocol. The CCAF supports early actions to reduce greenhouse gas emissions as well as efforts to increase understanding of the impacts, costs and benefits of the Protocol's implementation and various implementation options open to Canada. Of the four components of the CCAF, two are potential sources of funding for small and medium-sized businesses: 1) Technology Early Action Measures (TEAM), focusing on cost-shared support for the development and deployment of emission-reducing technologies, and 2) Public Outreach, focusing on public education and outreach activities to inform Canadians about climate change and encourage them to take action.

web: http://www.climatechange.gc.ca/english/actions/action_fund/
tel: (613) 943-2671
fax: (613) 943-2694

### Climate Change Central

***Awareness, $ Incentives, Networking***

Climate Change Central is a private-public partnership established as a catalyst for and co-ordinator of activities by Alberta individuals, businesses, institutions and governments to reduce greenhouse gas emissions. Multi-stakeholder programs will focus on innovation, technology, education and public participation to strengthen Alberta's environmental-energy advantage.

web: http://www.climatechangecentral.com
tel: (403) 517-2700 or toll-free at 1 (866) 609-2700
fax: (403) 517-2727
e-mail: contact@climatechangecentral.com

### Climatechangesolutions.com

***Awareness, Success Stories, Tools***

Climatechangesolutions.com is an online resource centre of success stories, opportunity areas, tools and resources on how to reduce greenhouse gas emissions. This comprehensive web site demonstrates how to reduce emissions in three sectors: Individuals and Families, Municipalities and Industry (with many sub sectors); content for three more sectors (Public Institutions, Commercial, and Agriculture) is being developed. Climatechangesolutions.com is unique in two ways. It is the first resource to provide detailed information on the economic and environmental benefits of greenhouse gas success stories across such a broad range of sectors. Secondly, it provides the tools and resources needed to turn inspiration into action.

web: http://www.climatechangesolutions.com
Contact: Janet Sumner, Project Manager
tel: (613) 235-6288
fax: (613) 235-8118
e-mail: webmaster@climatechangesolutions.com

### Climate Neutral Network

***Awareness, Expertise, Networking, Tools***

The Climate Neutral Network is an alliance of companies and other organizations committed to developing products and enterprises that eliminate their impacts on the Earth's climate. Climate Neutral products or services reduce and offset the greenhouse gases generated at each stage of their life-cycle on a "cradle-to-cradle" basis: the sourcing of their materials, their manufacturing or production, their distribution, use, and ultimate end-of-life or reincarnation as recycled materials. A company that chooses to become a Climate Neutral enterprise agrees to reduce and offset all of the climate impacts for the full spectrum of its internal operations--from the point at which raw materials are received to the point at which finished product is delivered. The Climate Neutral Network has developed a straightforward metrics system to help companies build practical, credible estimates of the climate impacts resulting from their products or enterprises. Armed with these numbers and with consulting assistance from the Network, companies can set realistic and profitable goals and take their first steps towards becoming good stewards of the Earth and its atmosphere.

web: http://www.climateneutral.com
Contact: Simone Cooper, Climate Neutral Network Co-ordinator
tel: (503) 697-5633
fax: (503) 697-8853
e-mail: simone@climateneutral.com

### CO2e.com

***Awareness, Tools***

CO2e.com was formed to help corporations around the world understand and manage the impact of a greenhouse gas-constrained future. The cornerstone of CO2e.com is a 24-hour Internet marketplace for trading greenhouse gas emissions offsets. The site will eventually offer a full suite of carbon commerce enabling services, including decision-making and trading tools, a daily news service and issue-specific briefings, a specialized search engine, and access to a select group of international consultants and experts.

web: http://www.co2e.com
Contact: Carlton Bartels, CEO
tel: (212) 938-8700
fax: (212) 938-7775

### Cool Companies – The Center for Energy and Climate Solutions (CECS)

***Awareness, Expertise, Success Stories, Tools***

The CECS is a one-stop shop that helps organizations reduce greenhouse gas emissions with practical advice, tools and technologies. A key objective of the CECS is to help businesses, large and small, use resources more efficiently to benefit both financial and environmental performance. Center partners and clients include Fortune 100 corporations, foundations, environmental organizations, and federal agencies.

web: http://www.cool-companies.org
Contact: Dr. Joseph Romm, Executive Director
tel: (703) 750-6401
fax: (703) 750-6506
e-mail: cecs@getf.org

### Count Me In!

***Awareness, Success Stories, Tools***

The Count-Me-In! program is a two-hour interactive workshop designed to engage participants at their place of work. The workshop focuses on actions Canadians can take to reduce greenhouse gas emissions in their homes and "on the road." Count-Me-In's face-to-face interaction is considered the most valuable aspect of the program. Another unique and far-reaching method is its delivery in the workplace with company endorsement. The visible buy-in of management helps strengthen the message and commitment while encouraging employees, stakeholders and other Canadians to take climate change seriously. The program's first phase will deliver the program to 30 locations (15 Energy Innovator companies, 10 federal, provincial, and municipal buildings, and five small to medium enterprises), with a target audience of up to 2,700 employees. An evaluation and strategy for rollout across Canada will be developed. Phase 2 is a "Train-the-trainer" program, a capacity-building program that delivers its content throughout Canada by training corporate and community representatives. The proposed Phase 3 involves a country-wide rollout.

web: http://www.risltd.com
tel: (416) 480-2420
fax: (416) 480-2419
e-mail: info@risltd.com

### Eco-Efficiency Innovation (A pilot initiative of IRAP and OCETA)

***Expertise, $ Incentive, Turnkey Solution***

Eco-Efficiency Innovation (EEI) provides Ontario manufacturers with a customized energy/eco-efficiency audit and evaluation of improvement opportunities. Specialized engineering consulting firms complete the audits. Eligible manufacturers receive a contribution from the National Research Councils' Industrial Research Assistance Program (IRAP) to cover 50 percent of the audit cost. Manufacturers also have access to financing from the dedicated EEI Credit Facility to implement capital investment projects. This pilot initiative with the Ontario Centre for Environmental Technology Advancement (OCETA) is financed by the Climate Change Action Fund and involves collaboration with a number of partners including Natural Resources Canada's Office of Energy Efficiency.

web: http://www.oceta.on.ca/index.html
Contact: Kevin Jones
tel: (416) 778-5288
fax: (416) 778-5624
e-mail: oceta@oceta.on.ca

### eMission Software

***Tool***

This software, developed by Torrie Smith, does a number of things, but of particular importance is that it quantifies greenhouse gas emission reductions from efficiency improvements, fuel switching, district heating, business travel and various other measures. In this way, the software can be used as a planning tool to see what your emissions will be under a business-as-usual scenario. The software will indicate how much you need to reduce your emissions to reach your target.

web: http://www.torriesmith.com
tel: (613) 238-3045
fax: (613) 238-8776
e-mail: info@torriesmith.com

### Energy Efficiency Manual: the World's Energy Conservation Handbook

***Awareness, Tools***

The first 1,200 pages of this 1,800-page reference contain 400 activities for improving energy efficiency. They are grouped into sections on the boiler plant, the chiller plant, service water systems, air handling systems, room conditioning units, building air leakage, building insulation, control and use of sunlight, artificial lighting, and independent energy-using components. Each activity is scored based on its savings potential, rate of return for new facilities and, for facilities considering a retrofit, reliability and ease of retrofit. The last third of the book contains information on various aspects of energy management tools, energy sources, mechanical equipment, building envelope and lighting. The intended audience includes those involved in new construction (architects, engineers, construction managers, code officials); those who own, manage, or operate facilities; and specialists and advocates of energy efficiency.

Reference: Donald R. Wulfinghoff, *Energy Efficiency Manual* (Energy Institute Press, 2000). ISBN 0-9657926-7-6.
web: http://www.energybooks.com
tel: 1-888-280-2665
fax: (732) 225-1562

### Energy Star Simple Savings Calculator

***Awareness, Tools***

The U.S. Environmental Protection Agency's Energy Star calculator computes total annual operating costs and total life-cycle costs of Energy Star-labelled products compared with non-Energy Star products. It includes consumer electronics; computers; business equipment; heating, ventilation and air conditioning systems (HVACs); office equipment; light fixtures; and other products.

web: http://www.epa.gov/nrgystar/purchasing/calculators/
e-mail: dolin.jennifer@epa.gov

### ENMAX Greenmax

***Turnkey Solution***

ENMAX markets green energy, produced by companies holding an Environmental Choice eco-logo licence, as a customer-focused premium product. ENMAX has 10-year contracts with Natural Resources Canada and Environment Canada to supply approximately 12 GWh per year of green energy to their various facilities in Alberta. Wind turbines and combustion of waste-wood from remote sawmills generate this energy. ENMAX has also introduced a program for its residential customers, based on energy generated by additional wind turbines, to accommodate identified customer needs and expectations.

web: http://www.enmax.com
tel: (403) 268-1953
fax: (403) 268-3406
e-mail: ehucman@enmax.com

### Environmental Services Association of Alberta (ESAA)

***Networking***

Dedicated to building a strong environment industry, ESAA is a business association with a business approach to providing programs leading to its members' success. ESSA's strategic initiatives focus on four main areas to give members a competitive edge: education and training; information management and market development; regulation, policies, and government relations; and member services and communications.

web: http://www.esaa.org
Contact: Jerry Keller, Executive Director
tel: (780) 429-6363
toll free: 1-800-661-9278 (Western Canada only)
fax: (780) 429-4249
e-mail: info@esaa.org

### EPCOR ECO-PACK Green Power

***Turnkey Solution***

In 1999, Edmonton-based EPCOR launched its Green Power program for residential customers. When a customer purchases an EPCOR ECO-PACK, EPCOR commits to purchase Environmental Choice certified energy that is added to the provincial power grid. Customers can choose among four packages based on average monthly residential electricity consumption. EPCOR began offering Green Power to commercial customers late in 2000.

web: http://www.epcor-group.com
Contact: Marilyn Noble
tel: (780) 412-3028
fax: (780) 412-7828
e-mail: mnoble@epcor-group.com

### EPCOR EnVest Energy Efficiency Program

***Expertise, $ Incentive, Turnkey Solution***

The EnVest™ program is a comprehensive three-stage, electricity, gas, and water efficiency program created specifically for industrial and commercial facilities. The program is designed to add value to facilities through asset renewal, which upgrades aged equipment to newer, more efficient technologies. The program allows commercial and industrial customers to avoid the large capital requirements traditionally needed for energy and water saving upgrades to existing facilities. By becoming a partner in the EnVest™ program, commercial and industrial customers get access to all the resources required for major energy improvements to their current water, gas and electric systems. The program also shows customers how to decrease their operating costs, limit the impact of their operations on the environment, and get affordable financing to cover project costs. Turnkey programs aimed at reducing utility costs are also available.

web: http://www.epcor.ca/business/alberta/commercial+business/products/energy+products/envest+energy+efficiency+program/default.htm
Contact: Lloyd Bertschi
tel: (780) 412-3438
fax: (780) 412-3346
e-mail: envest@epcor.ca

### FleetSmart

***Awareness, Networking, Success Stories, Tools***

The FleetSmart program of Natural Resources Canada helps fleet managers improve fleet performance and reduce operating costs through increased energy efficiency. Participating fleets receive information on energy management in specifying, maintenance, driving practices and the latest new technologies designed to keep their fleets competitive.

web: http://fleetsmart.nrcan.gc.ca/
tel: (613) 992-9608
e-mail: fleet.smart@nrcan.gc.ca

### GEMI: Global Environmental Management Initiative Business and Climate Change

***Awareness, Success Stories, Tools***

The Business and Climate Change web site helps businesses to integrate climate change into their planning, policies and activities. The site provides background information about climate change science and policy, and the risks and opportunities for business. It also has practical information on planning, and includes two interactive self-survey tools, as well as case studies of specific emissions reductions measures. This site is a great primer for businesses that want to know more about climate change and, more importantly, to do something about it.

web: http://www.businessandclimate.org
Contact: Amy Goldman, Project Manager
tel: (202) 296-7449
fax: (202) 296-7442
e-mail: GEMI@worldweb.net

**ghgtechnology.com**

***Awareness, Networking***

The Greenhouse Gas Technology Showcase will be designed to facilitate the transfer of technology to benefit potential buyers and sellers of greenhouse gas technologies. The Showcase will contain background information on the Kyoto Protocol and the challenges at hand, discussion areas and forums, links, an internal search engine and reference areas as well as the Technology Showcase itself. As of March 2001, the Showcase and all of its areas are still being developed and will be brought online over the next few months. The site has some information specifically on climate change and some links to other sites related to climate change.

web: http://www.ghgtechnology.com
e-mail: info@ghgtechnology.com

**Greenhouse Gas Emission Reduction Trading (GERT) Pilot**

***Awareness, Tools***

The GERT pilot is designed to test the effectiveness of emission reduction trading for greenhouse gases in the Canadian context. This pilot is a partnership involving the Canadian federal government and a number of provinces, as well as industry, labour and environmental groups. Information on the web site includes guidelines for preparing a project document and an emission reduction report. Those interested in participating in the pilot program to experience the potential for emissions trading first hand are invited to submit their application.

web: http://www.gert.org/
Contact: Warren Bell
tel: (250) 387-4773
fax: (250) 356-7197
e-mail: warren.bell@gems8.gov.bc.ca

**Greenhouse Gas Indicator: UNEP Guidelines for Calculating Greenhouse Gas Emissions for Businesses and Non-Commercial Organisations**

***Awareness, Tools***

This tool is designed to help companies account for and report on greenhouse gas emissions, both for internal management purposes and to respond to self-imposed or governmental emission reduction targets. The 61-page document—the result of consultations with accountants, academics, companies, consultants, environmentalists, financial institutions, government agencies and non-governmental organizations—provides a methodology whereby information about fuel and energy use readily obtainable by companies is converted and aggregated to compute greenhouse gas emissions. The authors take a step-by-step approach to deriving the greenhouse gas indicator and provide a set of worksheets with clear instructions. The tool is applicable at all levels of a company regardless of size or location, and can also be used by governments, non-government organizations and other entities. The publication's introductory material provides good background on the need for indicators and is designed for companies at both ends of the learning spectrum.

web: http://www.greenbiz.com/toolbox/tools_third.cfm?LinkAdvID=6023
fax: +011 41 22 796 9240
e-mail: eteu@unep.ch

### Global Climate Change (Government of Canada)

***Awareness***

Included in this site, with related links, are the topics of: understanding climate change, taking action to avert climate change, how nations are addressing climate change, and the potential effects of climate change on the provinces in Canada.

web: http://climatechange.gc.ca
e-mail: csleeth@NRCan.gc.ca

### GreenBiz.com

***Awareness, Tools***

A very good Internet resource centre for business, the environment and the bottom line. It includes a broad selection of tools and resources to help you assess your company, calculate your impact, locate software and do many other useful things.

web: http://www.greenbiz.com/toolbox/tools.cfm

### Independent Power Producers' Society of Ontario (IPPSO)

***Awareness, Networking***

IPPSO is a non-profit organization for the promotion of independent power, or "Non-Utility Generation," with an emphasis on implementing clean and sustainable renewable energy systems in Canada and around the world. IPPSO offers extensive resources of many types to help business, government, utilities and scientific researchers acquire useful information on sustainable energy systems. Magazines, fact sheets, financial and technical bulletins, industry directories, technical handbooks, educational materials, and Internet documents are available through the web site on request (see publications list on the web site).

web: http://www.newenergy.org/ippso.html
Contact: Jake Brooks, Executive Director
tel: (416) 322-6549
fax: (416) 481-5785
e-mail: ippso@ippso.org

### Industrial Energy Efficiency Initiative (Natural Resources Canada)

***Awareness, Networking, Success Stories, Tools***

This initiative includes the Canadian Industry Program for Energy Conservation (CIPEC). After the CIPEC task forces have drafted targets and action plans, the Industrial Energy Innovators Initiative provides a means for turning sector commitments into company actions. Projects begin with CEOs and other senior officials committing to implement energy-saving measures in their organizations. When this commitment has been assured, the Industrial Energy Innovators Initiative provides the information and support services necessary to start an upgrade.

web: http://cipec.nrcan.gc.ca/ieei/home_e.htm
tel: (613) 995-6839
e-mail: indust.innov@nrcan.gc.ca

### Industrial Research Assistance Program (IRAP)

***Expertise, $ Incentives, Networking***

The Industrial Research Assistance Program (IRAP) is designed to help Canadian small and medium-sized enterprises (SMEs) meet the technological challenges they face in delivering new products, processes or services. Specifically, IRAP offers technical assistance, resources and facilities, financial, marketing, and management services. IRAP and Industry Canada's Technology Partnerships Canada have joined forces to support innovative SMEs by investing in projects in the pre-commercialization stage by providing repayable contributions that share in both the risks and rewards. IRAP can also support SMEs that want to hire college and university graduates who are unemployed or underemployed to assist in their proposed project.

web: http://www.nrc.ca/irap
toll free: 1-877-994-4727 (anywhere in Canada, will connect you to the IRAP regional office closest to you) or
Contact: Chantal Daigneault
tel: (613) 990-8577
fax: (613) 952-1086
e-mail: publicinquiries.irap@nrc.ca

### National Association of Energy Service Companies (NAESCO)

***Awareness, Networking***

NAESCO fosters working partnerships with generation and distribution companies and promotes the benefits of energy efficiency, including distributed resources, in a changing market. This commitment ensures that customers and ratepayers can make optimal supply and demand side choices. NAESCO also works with vendors to assure the quality of services and products. On behalf of the industry, NAESCO educates customers about industry successes and the breadth of industry experience, producing reports, case studies, data surveys, and articles for the general media to promote industry trends and practices. Their services include a database of information and a publications database. A potentially useful manual on energy efficiency for SMEs is *The Energy Efficiency Project Manual: The Customer's Guide to Upgrading Equipment While Reducing Facility Operations and Maintenance Costs through Energy Efficiency Contracting*, by Jessica Lefevre (available from http://www.naesco.org/bookstor.htm)

web: http://www.naesco.org/index.htm
Contact: Mary E. Johnson
tel: (202) 822-0950 ext. 225
fax: (202) 822-0955

### National Association of Manufacturers (NAM) – Energy Efficiency Toolkit for Manufacturers

***Awareness, Success Stories, Tools***

The Manufacturing Institute – the education and research affiliate of the National Association of Manufacturers – shares the success story of American manufacturers with policy-makers, the media and the public. Of specific interest on the site is its access to an energy efficiency toolkit. It includes topics such as: Eight Proven Ways to Reduce Your Costs, Company Success Stories, Links to Resources and Manufacturers' Energy Use Statistics.

web: http://www.nam.org/secondary.asp?TrackID=&CategoryID=295
Contact: Nancy Fullerton
tel: (202) 637-3050
fax: (202) 637-3182
e-mail: manufacturing@nam.org

### National Research Council (NRC) - IRAP Design for Environment Guide

***Awareness, Tools***

Small and medium-sized enterprises (SMEs) often believe that incorporating environmental considerations into product and process design is too time consuming and too expensive to implement. However, incorporating design for environment (DfE) can be a powerful tool to make your company more competitive and more innovative, as well as more environmentally responsible. The aim of the *Design for Environment Guide*, which includes hundreds of references, is to make it easier for an SME to get started with some practical DfE applications. As an SME, you will have a solid framework to build an internal team to implement DfE and make the best use of external advisors. You are encouraged to work with the local IRAP Industrial Technology Advisor as your initiative takes form.

web: http://www.nrc.ca/dfe/
Contact: Jim Rollefson
tel: (613) 613-993-7025
fax: (613) 952-1086
e-mail: publicinquiries.irap@nrc.ca

### Office of Energy Efficiency (OEE) – Natural Resources Canada

***Awareness, Expertise, $ Incentives, Networking, Success Stories, Tools***

Established in April 1998 as part of Natural Resources Canada, the OEE's mandate is to renew, strengthen and expand Canada's commitment to energy efficiency. The OEE manages 17 energy efficiency and alternative fuels programs aimed at the residential, commercial, industrial and transportation sectors. Clients range from individual consumers to school boards, hospitals and large corporations. The OEE is charged with identifying opportunities for new and heightened energy efficiency measures, informing Canadians of technological developments in energy efficiency, and keeping key decision makers in government, industry and the environmental and international communities informed about Canada's energy efficiency efforts and successes. To this end, the OEE publishes an annual report entitled *The State of Energy Efficiency in Canada*. The OEE communicates information to Canadians and others through a comprehensive web site with details on OEE programs. The Office also runs the popular "Dollars to Sense" energy management workshops; offers practical advice to consumers, businesses, governments and institutions; and has links to hundreds of related web sites.

web: http://oee.nrcan.gc.ca
fax: (613) 943-1590
e-mail: general.oee@nrcan.gc.ca

### Office of Energy Efficiency (OEE) library

***Awareness***

The Office of Energy Efficiency (OEE) of Natural Resources Canada has numerous publications on energy efficiency and alternative energy. These publications can be ordered free of charge in Canada and several can be viewed online. The OEE has publications on energy efficiency at home, on the road, and for businesses, institutions, and governments.

web: http://energy-publications.nrcan.gc.ca/index_e.cfm
toll free: 1-800-387-2000
tel: in Ottawa, call 995-2943
fax: (819) 994-1498

### Ontario Centre for Environmental Technology Advancement (OCETA)

***Awareness, Expertise, $ Incentives***

OCETA is a private, not-for-profit corporation providing technical and business assistance for the commercialization of Ontario-based environmental technologies. Services include: market, financial and business consulting services; business plan development; sourcing of funding; strategic alliances; joint venture partnerships; market assessments; export market development; evaluation, development and demonstration of environmental technologies; and information services. OCETA manages the Environmental Technology Verification Canada program and the Ontario Waste Materials Exchange, and provides overall management and delivery of the Eco-Efficiency Initiative in partnership with IRAP as described above. OCETA also produces Environmental Technology and Business profiles of Canadian environmental technologies and businesses.

web: http://www.oceta.on.ca
Contact: Ed Mallett, President and CEO
tel: (416) 778-5264
fax: (416) 778-5624
e-mail: oceta@oceta.on.ca

### Ontario Environment Business Directory

***Networking***

The Ontario Environment Business Directory is a searchable online Directory geared to the environment industry in Ontario. You can use their Search Engine to quickly and efficiently source environmental goods and services, and can contact companies electronically through hyperlinked advertisements, web sites and e-mail addresses.

web: http://www.envirodirectory.on.ca
tel: (416) 327-1454
fax: (416) 314-7919
e-mail: kukande@ene.gov.on.ca

### Ontario Power Generation Inc. Green Power

***Turnkey Solution***

Ontario Power Generation Inc. (previously known as Ontario Hydro) is developing a wholesale green power offering. The green power pool will consist of certified new and existing renewable energy. The brand name and associated details are being developed at this time.

Contact: Murray Paterson
tel: (416) 592-4940
fax: (416) 592-3090
e-mail: murray.paterson@ontariopowergeneration.com

### Pilot Emission Reduction Trading (PERT) Project/Clean Air Canada Initiative

***Awareness, Tools***

The PERT project is evaluating emission reduction trading as a tool to a) assist in the reduction of smog and other air pollutants in the Windsor-Quebec corridor, and b) address the effects of climate change. PERT's mission with respect to implementing emission reduction trading between companies is to help shape future legislation and commitments on emissions. This pilot project is based on a similar program in the Northeast United States where participants have achieved cost-effectiveness and operating flexibility in almost 100 trades involving over 10,000 tons of pollutants. The pilot phase of this program is moving to a more permanent status that will be called the "Clean Air Canada Initiative."

web: http://www.pert.org
Contact: Robin James
tel: (416) 926-7573
fax: (416) 961-1173
e-mail: secretariat@pert.org

### Rocky Mountain Institute (RMI) - Climate: Making Sense and Making Money

***Awareness, Expertise, Success Stories, Tools***

RMI brings a unique perspective to resource issues, guided by the following core principles: Advanced resource productivity; Systems thinking; Positive action; Market-oriented solutions; End-use/least-cost approach; Biological insight; Corporate transformation; the Pursuit of interconnections; and Natural capitalism. RMI offers many resources to the public, one of which has particular interest to SMEs--*Making Sense and Making Money*, by Lovins et al. Many other studies have shown how the United States can reduce its greenhouse gas emissions while stimulating the economy. This paper offers practical, market-based mechanisms for actually making that happen without relying on the carbon tax or other "command-and-control" strategies that some economists and politicians fear would harm the economy.

web: http://www.rmi.org
Report: http://www.rmi.org/sitepages/pid173.asp
tel: (970) 927-3851
e-mail: outreach@rmi.org

### Tax Incentives for Business Investments in Energy Conservation and Renewable Energy

***$ Incentives***

A brochure on tax incentives is available on Natural Resources Canada's (NRCan) web site: http://www.nrcan.gc.ca/es/erb/reed/taxbook_e.htm. For detailed information on Canadian Renewable and Conservation Expenses or Class 43.1, please order the guide entitled Class 43.1 Technical Guide to Canadian Renewable and Conservation Expenses (CRCE). To order your copy ($100) or for a prior written opinion, contact:

Class 34/43.1 Secretariat
CANMET Energy Technology Centre, Natural Resources Canada
1 Haanel Drive, Bldg. 3
Nepean, Ontario K1A 1M1
tel: (613) 996-0890
fax: (613) 995-7868

### Technology Early Action Measures (TEAM)

***$ Incentives***

TEAM is a component of the Climate Change Action Fund (CCAF) that provides cost-shared support for the development and deployment of greenhouse gas emission-reducing technologies. TEAM supports a variety of projects in three main areas: Canadian industrial projects, community-based implementation, and international technology transfer, particularly to developing countries. Technologies supported range from wind turbines for green power in Toronto to hydrogen fuel cell refuelling systems to sequestration of carbon dioxide in deep coal beds in Alberta. TEAM also supports projects that reduce greenhouse gas emissions outside of Canada, including natural gas vehicles in Romania and landfill methane recovery in Egypt.

web: http://www.climatechange.gc.ca/english/actions/action_fund/techno.shtml
Contact: Rudy Lubin, TEAM Operations Office
tel: (613) 996-6220
e-mail: rlubin@nrcan.gc.ca

### The Energy Efficiency InfoSearch Database

***Awareness, Success Stories, Tools***

This new, user-friendly electronic library has 3,500 records each containing tried and true energy-saving ideas from over 30 credible sources in Canada and around the globe. It includes sources of information that can help you dramatically reduce energy costs, improve the value of your facilities and contribute to a cleaner environment. A range of built-in, flexible search capabilities enables you to find materials especially suited to your needs.

web: http://buildings.nrcan.gc.ca/ts/eeis.htm
toll free: 1-800-387-2000
tel: in Ottawa (613) 995-2943
e-mail: info.services@nrcan.gc.ca

### Renewable Energy Deployment Initiative (REDI)

***Awareness, $ Incentives***

This initiative for business is an incentive program to help business and industry purchase certain types of solar and biomass heating systems. The idea behind the program is simple: by using proven renewable energy technologies, a company can save money and reduce its environmental impact and dependence on non-renewable fuels. REDI for business is a partnership between business and Natural Resources Canada, which administers the incentive program. Eligible businesses and corporations will be eligible for a contribution of 25 percent of the purchase and installation costs of a qualifying system, to a maximum of $50,000.

web: http://www.nrcan.gc.ca/es/erb/reed/redi_e.htm
tel: 1-877-722-6600
fax: (613) 943-1590
e-mail: redi.penser@nrcan.gc.ca

### Stoneyfield Farm Environmental Cookbook

***Awareness, Success Stories, Tools***

In 1996, yogurt maker Stonyfield Farm, located in New Hampshire, committed to offset 100 percent of the carbon dioxide emissions from energy used at its production facility by the year 2002. In 1997, five years ahead of schedule, it achieved this goal by investing in a reforestation project in Oregon. Determining how to counteract its global warming emissions meant calculating Stonyfield's carbon "footprint" – a measurement of the $CO_2$ emissions for which it was responsible. The company created a "$CO_2$ Neutrality Portfolio," a carbon "fund" to enable companies to invest in offset projects. The portfolio offers a range of projects from which to choose, including national and international projects in reforestation, renewable energy and fuel switching (from carbon-laden wood and coal, for example, to natural gas or renewable energy). The company published this "Environmental Cookbook," describing the project.

web: http://www.stonyfield.com/earth/climate_change.htm
tel: 1-800-PRO-COWS (776-2697)

### Vision Quest Windelectric Inc.

***Turnkey Solution***

Vision Quest develops and operates wind turbine power plants to produce clean electrical energy. Wind energy enters the Alberta electrical grid and displaces electricity from other sources, primarily fossil fuels such as coal and natural gas, resulting in a one tonne per megawatt-hour offset of the emissions from those fuels. Alberta grid customers receive credit for their environmental purchase, with optional emissions offsets and electricity price hedge. Tradable emissions offsets are available worldwide from these facilities for use in regulated and market driven emissions reductions programs. The product is sold in blocks and is suitable for industrial, commercial, government and residential customers, in Alberta, across Canada, or internationally.

web: http://www.greenenergy.com
Contact: Jason Edworthy
tel: (403) 289-4553
fax: (403) 282-1238
e-mail: info@greenenergy.com

### Voluntary Challenge and Registry (VCR)

***Awareness, Networking, Success Stories, Tools***

The VCR is a storage site for the greenhouse gas emissions reductions initiatives submitted on a voluntary basis from various private and public sector organizations across Canada. The VCR promotes, assesses and recognizes the effectiveness of the voluntary approach in addressing climate change. The site itself is a valuable tool, enabling visitors to read of the energy conservation, energy efficiency and related emissions reductions initiatives undertaken by many companies and other organizations across Canada. A search engine on the site makes it easy to locate specific industry types or geographic areas of interest.

web: http://www.vcr-mvr.ca/
Contact: Robert Flemington, President
tel: (613) 565-5151
fax: (613) 565-5743
e-mail: info@vcr-mvr.ca

### Wise Rules for Industrial Efficiency

***Awareness, Tools***

The Wise Rules for Industrial Efficiency—"Wise Rules Tool Kit"—was developed to generate interest and commitment in support of energy efficiency and pollution prevention efforts. The 65-page toolkit features "some of the best information available on industrial energy efficiency," says EPA's Climate Wise program. These rules are based on energy efficiency research and engineering principles, the experience of Climate Wise Partners, and government sources such as the U.S. Department of Energy's Industrial Assessment Center energy audit database. These resources provide a wealth of information on energy efficiency and other topics in the manufacturing sector, including energy, cost and operating data. The Wise Rules capture broad categories of efficiency improvements such as "air compressor efficiency measures" and more detailed actions such as "optimize boiler air-to-fuel ratio."

web: http://greenbiz.com/toolbox/tools_third.cfm?LinkAdvID=4795
tel: (703) 750-6401
fax: (703) 750-6506
e-mail: getf@getf.org

### WRI/WBCSD Measurement and Reporting Standard for Corporate Greenhouse Gas Emissions

***Awareness, Tools***

This initiative brings together many leading experts on greenhouse gas emissions. The participating partners, drawn from business, governments and non-governmental organizations are working to design, disseminate and promote the use of an international corporate protocol for measuring and reporting business greenhouse gas emissions. Volunteer testing of the corporate inventory standard, guidance and selected tools is now underway. Estimation tools are available for common sources of greenhouse gases, such as stationary combustion, mobile combustion, HFCs from air conditioning and refrigeration, and solid waste. Tools are also available to measure greenhouse gases from sector-specific sources such as cement, lime, adipic acid, aluminum, nitric acid and ammonia manufacture.

web: http://www.ghgprotocol.org
Contact: Janet Ranganathan
tel: (202) 729-7600
fax: (202) 729-7637
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# Glossary

Note: Cross-references to other entries in the glossary are shown in **bold** font style.

**Biomass**

Biomass refers to fuel derived from living systems (plants and animals) that were recently alive. Examples include wood, agricultural waste, and grain ethanol. Fossil fuels such as coal, oil and natural gas were formed from plants and animals that lived millions of years ago, and are not considered biomass.

**Carbon Dioxide Equivalent ($CO_2$-e)**

The $CO_2$-e quantity of a greenhouse gas is the amount of carbon dioxide that would produce the equivalent **global warming potential**.

**Cogeneration (also known as Combined Heat and Power, or CHP)**

The use of waste heat from electricity generation, such as exhaust from gas turbines.

**Emission Reduction Credits**

Legally recognized instruments representing emission **offsets** that can be traded under an emission trading system. Credits can be created when an entity's emissions fall below a baseline level. Trading of greenhouse gas emission reduction credits that are not yet legally recognized is already occurring in anticipation that governments will recognize them in the future.

**Emission Trading**

Under an emissions permit (or allowance) trading system, government passes a regulation or law requiring greenhouse gas emitters (e.g., business) to hold permits for any emissions they produce. Governments create the permits and allocate some or all of them among emitters, but limit (cap) the number of permits available to ensure that an overall emission target is met. Any emitter that wants to produce more greenhouse gas emissions than it has permits for must purchase additional permits either from the government or in the open market from brokers or directly from other emitters that have surplus permits to sell. As a result, activities that produce greenhouse gas emissions become relatively more expensive than activities that do not because a permit must be acquired to allow the activity to proceed. The fact that the permits have value as an item to be sold or traded gives emitters an incentive to reduce their emissions. Under an emission reduction credit trading system, **emission reduction credits** are traded rather than emissions permits. The overall emissions reduction achieved by a credit trading system depends on emitters' baselines.

**Global Warming Potential (GWP)**

An index that allows for valid comparison of the different greenhouse gases, taking into account their varying power to trap heat and their longevity in the atmosphere. GWPs are used to convert quantities of various greenhouse gases into an equivalent amount of carbon dioxide (the **carbon dioxide-equivalent**). By convention, carbon dioxide has a GWP of 1.

**Greenhouse Gases (GHGs)**

GHGs include both naturally occurring and man-made gases that trap heat in the Earth's lower atmosphere, keeping the planet warm and helping to support life. Due to human activity, in particular the burning of fossil fuels and deforestation, atmospheric concentrations of GHGs, notably carbon dioxide ($CO_2$), methane ($CH_4$) and nitrous oxide ($N_2O$) have been rising.

**Green Power**

Electricity generated from low impact **renewable energy** sources, such as wind and solar power, geothermal, small run-of-river hydropower and some forms of biomass.[52]

**Life-Cycle Value Assessment (LCVA)**

A systematic methodology to identify, quantify and analyze the environmental, financial (and, if desired, social) implications of each of the activities involved in producing and consuming a product or service. Along the way, it can unearth opportunities to improve the technical design, upgrade operating procedures, or substitute processes and materials to reduce costs and reduce environmental pollutants and other impacts. LCVA extends this systematic analysis beyond the normal boundaries of direct company activities, to include all life-cycle stages of a process or product. These life-cycle stages typically range from extraction of raw materials, through manufacturing, transportation and customer use, to final disposal or recycling. This "cradle-to-grave" analysis ensures that decision makers are aware of the total impacts of a decision, and do not unknowingly shift costs or environmental burdens onto others at "upstream" or "downstream" stages of the life cycle.[53]

**Nitrogen oxides ($NO_x$)**

Part of the group of air pollutants referred to as "acidifying emissions." Common sources include combustion products from transportation and stationary sources.

**Offsets**

Activities that an emitter invests in to reduce the net greenhouse gas emissions they are responsible for. They provide a mechanism for emitters to reverse the impact of their own direct or indirect (e.g. from electricity consumption) greenhouse gas emissions. Offsets can involve actual emissions reductions or the absorption of greenhouse gases from the atmosphere (e.g. through planting trees or changing agricultural practices).

**Renewable Energy**

Energy derived from sources that do not use fuels that are naturally replenished more slowly than they are used. Examples include wind, solar, hydro, geothermal, and some forms of biomass.

[52] For more information, see The Pembina Institute Green Power Guidelines for Canada, available at http://www.pembina.org

[53] For more information about life-cycle value assessment, see http://www.pembina.org/ces/lcva.htm

**Sulphur dioxide ($SO_2$)**

An "acidifying emission." It dissolves in water to yield a mixture of sulphuric and sulphurous acids. Common sources include power plants that burn sulphurous coal and smelters that refine metal ores.

**Supply Chain Management (SCM)**

The organization of business activities (production, distribution, marketing, etc.) across different companies to optimize the performance, availability, cost, quality and environmental burdens of materials, components, goods and services that an organization buys and uses.

**Tonne (t)**

A metric ton or 1,000 kilograms (about 2,200 pounds). A megatonne is one million tonnes.

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# Is Your Small or Mid-Sized Business Ready for Climate Change?

**"Global warming is here to stay as a hot button for policymakers, a wild card for business, and a disturbing prospect for us all." *Fortune* Magazine**

At the World Economic Forum in Davos, Switzerland in 2000, business leaders voted global climate change as the most pressing issue confronting the world's business community. To help managers of small and mid-sized businesses learn how they can respond to and profit from actions to address the climate change challenge, the Pembina Institute is offering a series of presentations and workshops. Key topics include:

- What is climate change?
- What are the major risks and opportunities for business?
- Success stories: how leading businesses are profiting from their response to climate change
- Tools and approaches to guide your response to climate change
- What to do next and where to find help and resources

These sessions will give senior management and business owners a business rationale for taking action on climate change. The workshops will provide detailed information about how to respond profitably to climate change and will guide participants through interactive exercises to identify the most promising first steps for their business. A detailed "Cool Business Guide" is available and will be provided free of charge to all workshop participants.

### *Cool Business Guide: Lower Costs, Higher Productivity and Climate Change Solutions*

This 100-page guide includes a step-by-step approach to show how your business can plan and implement its response to climate change and achieve lower costs, higher productivity and increased competitiveness. The guide's short, easy-to-read sections will:

- Introduce you to climate change
- Identify how climate change could affect your business
- Give examples of how leading businesses are profiting from their response to climate change, and
- Provide practical, straightforward worksheets that you can use immediately to plan and implement your response.

The *Cool Business Guide* is also a valuable reference that describes many government and private sector resources and tools to help you obtain expertise, networking and financial assistance.

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