



# **A Guide to Climate Change for Small- to Medium-sized Enterprises**

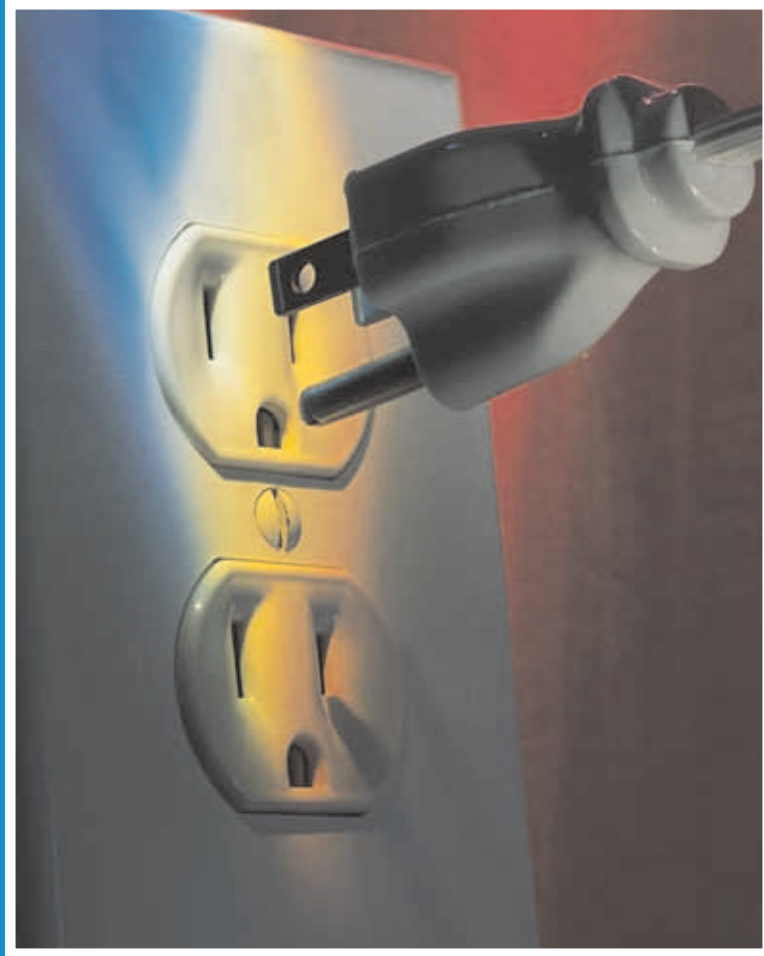
*How to Plan for Climate Change, Reduce Operating  
Costs and Develop New Business Opportunities*



THE CANADIAN  
CHAMBER  
OF COMMERCE

LA CHAMBRE  
DE COMMERCE  
DU CANADA





**The Canadian Chamber of Commerce** is the voice of Canadian business. Since 1925, the Canadian Chamber of Commerce has been the largest, most influential advocate for business in Canada. Founded with the aim of creating a strong, unified voice for Canadian business and a set of values from which policies encouraging prosperity would emerge, the Canadian Chamber of Commerce continues to be the only voluntary, non-political association that has an organized grassroots affiliate in every federal riding.

***Mission:*** As the national leader in public policy advocacy on business issues, the Canadian Chamber of Commerce’s mission is to foster a strong, competitive, and profitable economic environment that benefits not only business, but all Canadians.

***How we achieve this?*** Through a two-way consultative process with our membership, the Canadian Chamber of Commerce steers the debate on federal and international policies affecting business. In collaboration with our members, the Canadian Chamber of Commerce acts on policy resolutions, researching and developing strategies on a “best practices” basis for business. It then communicates these viewpoints to officials in Ottawa and internationally, to the Canadian public, and to the media.

***Why is the Canadian Chamber of Commerce effective?*** The Canadian Chamber of Commerce is the leading organization to bring together all types of Canadian business. It speaks for all business – from the smallest to the largest company – in every sector and in every corner of the country. The Canadian Chamber of Commerce has solidified its position as “The Voice of Canadian Business”™ to the public, the media and the federal government and is an articulate and persuasive advocate for business viewpoints and a champion of fiscal responsibility and national unity.

The Canadian Chamber of Commerce’s 170,000 members reflect a strong and diverse network and include chambers of commerce, boards of trade, business associations, and businesses of all sizes and from all sectors and regions of Canada.

**Pollution Probe** is a non-profit charitable organization that works in partnership with all sectors of society to protect health by promoting clean air and clean water. Pollution Probe was established in 1969 following a gathering of 240 students and professors at the University of Toronto campus to discuss a series of disquieting pesticide-related stories that had appeared in the media. Early issues tackled by Pollution Probe included urging the Canadian government to ban DDT for almost all uses, and campaigning for the clean-up of the Don River in Toronto. We encouraged curbside recycling in 140 Ontario communities and supported the development of the Blue Box programme. Pollution Probe has published several books, including *Profit from Pollution Prevention*, *The Canadian Green Consumer Guide* (of which more than 225,000 copies were sold across Canada) and *Additive Alert!*

In the 1990s, Pollution Probe focused its programmes on issues related to air pollution, water pollution, climate change and human health, including a major programme to remove human sources of mercury from the environment. Pollution Probe's scope has since expanded to include new concerns, such as the unique risks that environmental contaminants pose to children, the health risks related to exposures within indoor environments, and the development of innovative tools for promoting responsible environmental behaviour.

Since 1993, as part of our ongoing commitment to improving air quality, Pollution Probe has held an annual Clean Air Campaign during the month of June to raise awareness of the inter-relationships among vehicle emissions, smog, climate change and human respiratory problems. The Clean Air Campaign helped the Ontario Ministry of the Environment develop a mandatory vehicle emissions testing programme, called Drive Clean.

Pollution Probe offers innovative and practical solutions to environmental issues pertaining to air and water pollution. In defining environmental problems and advocating practical solutions, we draw upon sound science and technology, mobilize scientists and other experts, and build partnerships with industry, governments and communities.



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The Canadian Chamber of Commerce and Pollution Probe are solely responsible for the contents of this publication.

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chapter one

# Introduction

This publication is designed to help small- and medium-sized businesses in Canada understand the potential impacts of climate change on their operations, learn how to assess and manage the risks and opportunities posed by climate change, and decide how to take action to both reduce their contribution to climate change and lower their energy costs. Business owners need to know which risks from climate change are most relevant to them so that they can respond appropriately. Those who understand the issues surrounding climate change will be better equipped to reduce any negative impacts and to identify new business opportunities to generate revenue.

## What is an SME?

Industry Canada uses the term small-to medium-sized enterprise, or SME, to refer to businesses with fewer than 500 employees, while classifying firms with 500 or more employees as “large” businesses. More specifically, according to Industry Canada, goods-producing businesses with fewer than 100 employees and service-based businesses with fewer than 50 employees are considered “small” businesses. Firms with more employees than these thresholds, but fewer than 500 employees, are classified as “medium” businesses. Statistics Canada defines an SME as any business establishment with 0 to 499 employees and less than \$50 million in gross revenues.

## Understanding Climate Change

Temperatures are on the rise all around the globe. During the past 125 years, the warmest years on record were 1998 and 2005. The number of extremely hot days is expected to dramatically increase in the future. There is scientific evidence that the climate is changing. The changes in climate are related to increases in the concentration of greenhouse gases in the atmosphere, which trap infrared radiation close to the Earth’s surface. Human activities have contributed to the build-up of these gases.

As a result of global warming, sea levels are rising, glaciers are retreating, polar ice caps are melting, and the number and severity of extreme weather events are increasing. In light of these and anticipated future impacts, there is increasing urgency to reduce emissions of greenhouse gases and to prepare to adapt to the impacts of the changing climate.

### *The Greenhouse Effect*

Gases that occur naturally in the Earth’s atmosphere — mainly water vapour, carbon dioxide and methane — are responsible for keeping the Earth warm enough to sustain life as we know it. These “greenhouse gases” work much like the glass of a greenhouse, allowing the sun’s rays to pass through and warm the Earth, and then trapping some of this heat in the atmosphere. Without these naturally occurring gases the Earth would be a frozen landscape.

For thousands of years, levels of greenhouse gases in the atmosphere have remained relatively stable. Natural processes on Earth absorbed as much carbon dioxide as was released. More recently, however, many scientists have concluded that human activity has upset this balance.

Burning fossil fuels, deforestation and intensive agriculture have released unprecedented quantities of carbon dioxide and other greenhouse gases into the atmosphere. As a result of these emissions, too much heat is being trapped in the atmosphere and the Earth's long-term weather patterns — known as “climate” — are changing.

## Greenhouse Gases

Six greenhouse gases are primarily responsible for climate change: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

- **Carbon dioxide** (CO<sub>2</sub>) is the main contributor to climate change, especially through the burning of fossil fuels. Today's atmosphere contains 32 per cent more carbon dioxide than it did at the start of the industrial era.
- **Methane** (CH<sub>4</sub>) is released when vegetation is burned, digested or rotted in the absence of oxygen. Manure from livestock, waste dumps, rice farming, and the production of oil and gas are all significant sources of methane emissions. Levels of methane (as well as carbon dioxide) in the atmosphere are the highest they have been in nearly half a million years. Methane has a global warming potential 23 times that of carbon dioxide.
- **Nitrous oxide** (N<sub>2</sub>O) is released through the application of chemical fertilizers, land application of manure and burning fossil fuels. Nitrous oxide has a global warming potential 310 times that of carbon dioxide.
- **Hydrofluorocarbons** (HFCs) are used as solvents, as well as chlorine-free substitutes of chlorofluorocarbons (CFCs) in refrigeration and air conditioning. Hydrofluorocarbons have global warming potentials from 12 to 12,000 times that of carbon dioxide.
- **Perfluorocarbons** (PFCs) are emitted principally from aluminium production and have global warming potentials from 5,700 to 11,900 times that of carbon dioxide.
- **Sulphur hexafluoride** (SF<sub>6</sub>) is emitted by the electric power industry in the production of circuit breakers, gas-insulated substations and switchgear. It has a global warming potential 22,200 times that of carbon dioxide.

The emission of these gases must be reduced if we are to have an impact on curbing climate change.



## Turning Up the Heat

Sixteen of the 17 hottest years on record have occurred since 1980:

- **1991** to **1995** were the five hottest consecutive years on record.
- **1998** replaced **1997** as the hottest year in recorded history.
- **2001** replaced **1997** as the second hottest year.
- **2002** replaced **2001** as the second hottest year.
- **2005** replaced **1998** as the hottest year on record.
- The **1990s** was the hottest decade of the past millennium.

The global atmosphere is warming at a faster rate than at any time in the past 10,000 years.

**Source:** *The Heat is Online.*

<http://new.heatisonline.org>, accessed February 22, 2006.

## Impacts of Climate Change

An increase in the Earth's overall temperature, referred to as global warming, is one of the impacts of climate change.

Global warming is happening now. Over the past 100 years, the global average temperature has risen 0.6°C. The 1990s was the warmest decade on record since the mid-1800s (as far back as our records go). According to recent research from the Arctic Climate Impact Assessment, over the past 50 years average temperatures in Alaska, western Canada and eastern Russia have increased by an average of 3 to 4°C.

Many experts project that average global temperatures could rise by as much as 1.4°C to 5.8°C over the next century.

## Impacts in Canada

So why is climate change a concern? To many Canadians, it may seem that slightly warmer temperatures would be welcome. But warmer global temperatures bring with them serious impacts, some positive and many negative.

Some negative impacts of climate change predicted for Canada include the following:<sup>1</sup>

- Sea levels on the northern coast of British Columbia could rise by up to 30 cm by 2050.<sup>2</sup> The Fraser River Delta is expected to experience flooding. Salmon will move farther north in search of colder water. Melting permafrost and glaciers will increase the risk of landslides in mountain regions. Higher winter temperatures will allow insect pests to survive and spread (e.g., Mountain Pine Beetle).

- Overall crop yields on the prairies are expected to fall as drought offsets a longer growing season. Drier weather will make crops more vulnerable to pests and disease. Forest zones will shift northward, and longer and drier fire seasons will result in more frequent forest fires.
- Southern Ontario is expected to have shorter winters and hotter, more humid summer days with more smog. Water levels in the Great Lakes will be lower; for every centimetre below average water levels, ships have to reduce their cargoes by 50 to 100 tonnes. Reduced water availability will affect hydro-electricity generation. Farmers will have a longer growing season, but will encounter more pests, floods and droughts. Forest fire frequency will likely increase.
- In Quebec, more severe weather-related events, such as heat waves, floods and winter storms, are predicted. Water levels in the St. Lawrence River are projected to be about 1.25 metres lower, leading to a decrease in shipping handled by the Port of Montreal.
- In the Atlantic provinces, rising sea levels of up to 70 cm are projected, as are more intense and frequent storms, leading to flooding, coastal erosion and harm to plant and animal life. Plants will flower earlier each spring, making them more vulnerable to late frosts.
- Permafrost is melting in Canada's north, putting buildings and transportation routes, such as winter ice roads, in jeopardy. The Arctic sea summer ice cover has already shrunk by approximately 15 per cent and is expected to thin and shrink further. Shorter ice seasons mean less feeding time for polar bears, impairing their ability to survive. An increase in the number of summer insects is already threatening caribou and reindeer populations.

Some of the positive impacts of climate change in Canada include the following:

- There may be lower heating requirements in winter, with reductions in energy costs and greenhouse gas emissions.
- A longer growing season may increase yields of some crops, such as corn and canola. As well, it may be possible to grow certain crops further north than is currently possible.
- Longer summers will extend the season for businesses that cater to summer tourism.
- Opportunities will develop for businesses providing goods and services that address the effects of climate change, such as building products that can resist high winds, heavy precipitation and extreme temperatures, and energy efficient products and services to help counter increasing energy costs.
- The opening up of the Northwest passage to shipping will reduce travel times and costs for the transportation of goods.



## chapter two

# Climate Change and SMEs

Climate change and government policies to address it present SME owners and operators with both risks and opportunities.

## Risks to SMEs

The main risks to business of climate change are increased costs and loss of revenue. As governments around the world develop and implement plans to address climate change, energy costs are predicted to increase. Other increases may include rising insurance premiums, more expensive raw materials and supplies, and higher production costs, such as for transportation. As the climate



changes, there are increasing risks of blackouts and damage to property and inventory from floods and high winds as a result of extreme weather events. In addition, crop failures from drought will affect farmers, and lack of snow in winter will affect ski resorts.

Policies, such as emissions trading or carbon taxes, will place a price on the generation of greenhouse gas emissions and increase the cost of products and services that cause such emissions. Greenhouse gas emissions will become a cost of doing business. As a result, the value of some business assets will decrease (such as an inefficient fleet of trucks), while the value of other assets will increase (such as energy efficient technologies and processes).<sup>3</sup>

Another business risk for SMEs associated with climate change is customer preferences. Customers are becoming increasingly aware of the impacts of climate change. In light of this understanding, they may favour businesses that are environmentally sensitive and that help customers reduce costs. Thus, risks can become opportunities for businesses that are addressing climate change.

## **Opportunities for Reducing Operating Costs and Developing New Business**

SMEs can anticipate and adapt to the impacts of climate change on their businesses by assessing their exposure to climate change and taking action to address these impacts. They can, for example, locate away from flood plains and coastal areas, use improved wind-resistant building materials, and develop new products and services that help others adapt to climate change.

SMEs can help mitigate climate change by reducing both the production of greenhouse gases and the consumption of fossil fuel-based energy. For example, greenhouse gas emissions can be reduced by implementing energy conservation measures, such as energy efficient lighting and space heating, incorporating greater recycled content in products and selecting production processes that either emit or use less greenhouse gases.

SMEs can capitalize on climate change as a revenue-generating opportunity by developing technologies, products and services that help others reduce their greenhouse gas emissions and improve their resilience to the effects of climate change. Government and large industry initiatives to reduce emissions will create new markets for such products and services, as will customer preferences for environmentally sensitive businesses. The results for SMEs that take action may include increased customer loyalty, new customers, cost savings and additional sources of revenue. The results of inaction may include increased operating costs, loss of business and even business failure.

Each business is unique and will respond differently to climate change. All SME owners and operators, however, can address climate change as they would any other business opportunity or challenge — by setting goals, determining priorities, and then developing and implementing a plan to address the challenge.

This guide is designed to help SMEs move in the right direction. It offers tips on ways to assess the exposure of your business to climate change and cut costs by reducing emissions and saving energy, and it shows how others are already capitalizing on opportunities that realize cost savings and generate additional revenue.



chapter three

# Adapting to Climate Risks

Climate change is underway. Actions to reduce greenhouse gas emissions will slow the rate of human-induced climate change and eventually hopefully stabilize it. As a result, we have no choice but to adapt to this reality. According to a Natural Resources Canada report, “to reduce the negative impacts of climate change and take advantage of new opportunities, Canadians will adapt. Adaptation is not an alternative to reducing greenhouse gas emissions in addressing climate change, but rather a necessary complement.”<sup>4</sup> Through adaptation, Canadians will adjust their behaviour and systems in response to actual or expected climatic changes to moderate harm and exploit beneficial opportunities.

## Assessing Climate Change Risks and Opportunities for Business

To anticipate and/or respond to the changing climate, businesses may need to make changes.<sup>5</sup> These might include such actions as re-locating a business to avoid the risk of flooding or planting new crops that can be grown in hotter, drier summer weather. Businesses and business sectors are particularly vulnerable to climate change if they are currently affected by weather events, and/or make long-term investments, especially in climate-sensitive infrastructure.

The UK Climate Impacts Programme (UKCIP) Business Areas Climate Impacts Assessment Tool<sup>6</sup> is a simple checklist for organizations to assess the potential impacts of climate change on their business. The checklist can be used at the level of a single organization or an entire business sector. It invites consideration of the opportunities, as well as the threats, from a changing climate. The following areas should be addressed in any climate change risk assessment to business:

- **Logistics** — Vulnerability of supply chain, utilities and transport infrastructure. How important are scheduled deliveries of supplies, uninterrupted power supply and clear roads in your business? If these things are threatened, will you be able to deliver products on schedule?
- **Finance** — Implications for investment, insurance and reputation. Will you be able to attract investors and obtain fire and/or flood insurance as the impact of weather affects your operation?
- **Markets** — Changing demand for goods and services. How will the demand for your products and/or services be affected by climate change? Will the demand remain constant, grow or be reduced?
- **Process** — Impacts on production processes and service delivery. Will you be able to access enough water, especially water that is sufficiently cool for manufacturing processes, or will you have to use something other than water for cooling?
- **People** — Implications for workers, customers and changing lifestyles. Will employees and customers have trouble getting to your place of business as a result of increased frequency and duration of severe weather events?
- **Premises** — Impacts on building design, construction, maintenance and facilities management. Will the building in which you operate have adequate cooling? Can it withstand higher winds, heavier rains and more severe ice storms resulting from climate change?
- **Management implications** — All business impact assessments should consider the expected changes to the climate and ask the question “What will this do to my sector or business?” With your own knowledge, and that of others, you can then assess what the threats are likely to be, as well as the opportunities presented by different climatic conditions.

## Examples of the Effects of Climate Change on Businesses

- Infrastructure for transport and utilities is particularly vulnerable and puts at risk transport and utilities companies and the businesses that use their systems. Effects on SMEs of severe weather events could include delays in shipments and electricity blackouts.
- Businesses may face increasing insurance costs resulting from more severe weather, or they may even be unable to get insurance in areas especially vulnerable to extreme events, such as those prone to flooding, forest fires and high winds.
- Businesses that have global markets or suppliers can be affected by climate change in other countries. For example, Canada could benefit significantly from the northerly shift of climatic conditions suited to maple trees.
- Increased insect infestations resulting from warmer weather may negatively impact forest industries.
- The retail sector is also vulnerable to changes in weather. For example, sales of cold weather clothing and winter supplies will be significantly reduced as the winter season gets shorter.
- Tourism is one of the business sectors particularly sensitive to weather changes. The lack of snow in northeastern North America during early winter in 2005/2006 severely reduced business for ski resorts and operators, as well as surrounding restaurants and other service providers. In resort areas that used to experience moderate summers, hotter summers are becoming the norm. This means that travellers are now insisting on air conditioned facilities in regions that previously did not need them. Beaches in more northerly locations, such as northern Ontario, may well become more popular as people search for a respite from the heat.
- When winters are warmer, construction can continue for longer periods during the year, providing extended periods of employment for construction workers and reducing the time and costs to complete construction. On the other hand, hotter summers may increase the risk of heat exposure for workers in the construction and manufacturing sectors, increasing health costs and reducing productivity in the summer.

Before beginning a risk and opportunities assessment, you will need to define the context for the assessment. According to the UKCIP, this context is defined according to seven aspects:

- **Time** — Over what time period are you interested in the climate impacts? A building development project intended to last 20 to 100 years will need to incorporate different climate change considerations than a restaurant in a summer tourist area that will be sold in five years.
- **Location** — Where is your business located? Some locations will be affected more, or differently, by climate change than others. For example, ice roads in northern Canada may be available for shorter periods of time due to warmer temperatures. This will affect the shipping of supplies to remote northern communities and mines. (Information about climate change projections across Canada is available through the Canadian Climate Impacts Scenarios website: [www.cics.uvic.ca/scenarios](http://www.cics.uvic.ca/scenarios).)
- **Greenhouse gas emissions** — How should you take account of different projections for greenhouse gas emissions? Your business model should be flexible enough to accommodate different climate scenarios. For example, buildings can be designed so that changes can be easily made to heating and ventilation systems to address hotter summers or cooler winters without requiring major structural changes.
- **Sector** — Which sector(s) are you considering? Some sectors may be more affected than others. For example, studies have suggested that yields of certain crops (e.g., grain corn in the Maritimes and canola in Alberta) may increase, while others (e.g., wheat and soybeans in Quebec) could decline.<sup>7</sup>
- **Business areas** — Which areas within your business are at greatest risk from climate change? Can your business benefit from greenhouse gas emissions trading or selling greenhouse gas credits?
- **Climate variables** — Which are the important climate variables when considering climate change impacts? Which weather aspects are most likely to affect your business (e.g., temperature, water availability, severe weather events)?

## Adjusting to Climate Change

Once the potential risks and opportunities of changing weather on your business have been identified, it is time to tackle the risks and take advantage of emerging opportunities. For example, addressing the risks of changing weather on a building project might result in a number of changes in the design.<sup>8</sup> In addition to reduced operating and maintenance costs, a benefit may be realized from reduced insurance rates.

Each business will need to evaluate its own risks and opportunities. Some actions that can be taken to prepare for climate change in building projects include the following:

- Constructing new buildings in areas predicted to experience higher winds with cladding designed to withstand such winds.
  - Increasing the capacity of gutters and down-pipes to avoid basement flooding during heavier rain events.
  - Incorporating increased insulation to keep buildings more comfortable in both winter and summer, and to reduce heating and cooling needs and the energy costs associated with them.
  - Incorporating a rainwater collection and recycling system that can provide water for landscaped and garden areas and reduce demand for fresh water.
- Selecting heating and ventilating systems that are energy efficient and incorporate renewable energy, such as solar water heaters and solar walls, to reduce energy needs and the dependency on large-scale electricity generating systems during periods of high energy demand.
  - Landscaping and tree planting to provide shade for passive cooling in summer and allow sunshine for passive heating in winter.



## Benefiting from Climate Change

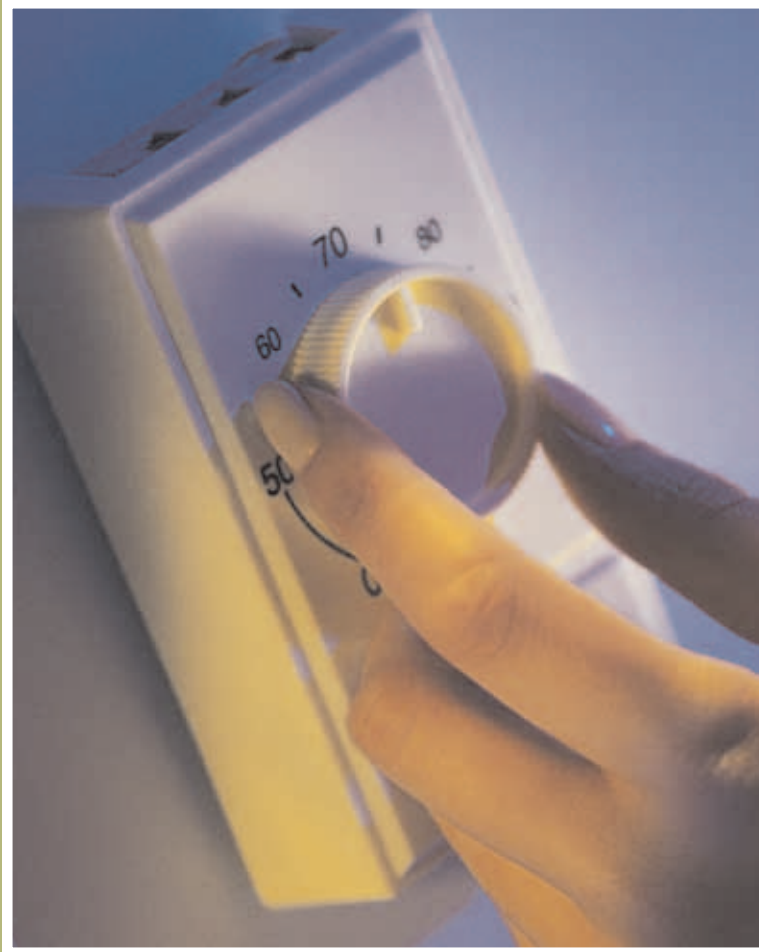
New businesses can be launched and existing businesses can be modified to serve the need for new goods and services resulting from the changing climate. Some Canadian examples are described below.

A new business, *Wildflower Farm*, was founded in 1988 in the Toronto area by a husband and wife team of self-trained horticulturalists. The enterprise provides consulting, landscape design and installation, and a wide variety of wildflowers and native grasses. One of its products is a drought-tolerant, low-maintenance turf grass called Eco-Lawn. The blend of fescue grasses forms finer and darker blades than traditional grass and grows more densely to force out weeds. The blades fall to the ground when they reach about ten inches in height and eliminate the need for mowing. Not only will these lawns stay green and attractive during droughts, but they will also reduce the need for watering because they are drought tolerant. Finally, they also reduce the energy needed for mowing, thereby reducing greenhouse gas emissions. For more information, see [www.dx.org/research/pdfs/Wildflower.pdf](http://www.dx.org/research/pdfs/Wildflower.pdf).

Companies that provide services complementary to energy efficiency can add a new line to their existing business. For example, *PowerComm Inc.*, an electricity contractor based in Edmonton, Alberta, has not only implemented energy efficiencies in its own facility, it has also added an energy efficiency and renewable energy service line to its existing business, reducing operating costs, increasing its business opportunities and reducing greenhouse gas emissions. For more information, see <http://powercomm.ab.ca>.

A small Vancouver-based company, *Westport Innovations Inc.*, has developed alternative fuel vehicle technology that combines the fuel efficiency of diesel engines with the environmental advantages of using clean burning gas fuels. Its patented Westport-Cycle™ high pressure direct injection technology allows direct injection of a natural gas and diesel fuel mixture into a combustion chamber of an internal combustion engine combined with a unique compression ignition system. Use of this system in a Westport heavy-duty truck engine will not only release almost 20 per cent less carbon dioxide compared to a truck with conventional technology, it will also release 60 to 70 per cent less particulate matter and 40 to 50 per cent less nitrogen oxides, both contributors to smog pollution. For more information, see [www.dx.org/research/pdfs/Westport.pdf](http://www.dx.org/research/pdfs/Westport.pdf).





chapter four

# Reducing the Rate of Climate Change

Significantly reducing greenhouse gas emissions globally should contribute to decreasing both the rate and overall magnitude of climate change, increasing the chances of successful adaptation and decreasing associated costs.

Reductions, both large and small, are needed and will also serve as examples to other companies and sectors that must be engaged for success to be achieved.

## Improving Energy Efficiency and Reducing Energy Costs

Most greenhouse gas emissions are associated with energy use. SMEs can act in many ways to improve energy efficiency, thereby reducing both greenhouse gas emissions and energy costs. According to a publication by Greenest City and the

## SMEs Can Get Help

When asked about climate change, SME business owners indicated a desire to reduce greenhouse gas emissions, but, for a number of reasons, did not see how they could take action now:

- Some had only recently rented space in a building or purchased a new building, had installed new equipment and did not understand that they could implement many measures at little or no cost.
- Some were having a tough time staying in business and could not afford the upfront investment needed to buy new energy efficient products.
- Some did not have the time to learn about how to become more energy efficient.
- Some were not aware that financing help was available.
- Some were interested in pursuing energy efficiency measures, but preferred to proceed on their own without government assistance.
- Some did not know where to get technical help about what to do.

There are many things SMEs can do to improve energy efficiency, thereby lowering energy costs and greenhouse gas emissions. There are many sources of information on how to get help and many measures that can be taken by SMEs on their own (see “References and Websites” at the end of this Guide).

Upper Village Business Improvement Area in Toronto, occupancy sensors that automatically turn off lighting when rooms are unoccupied can save on the order of 1.5 tonnes of greenhouse gases and \$150 per year.<sup>9</sup> If more than one million of the 2.2 million SMEs in Canada<sup>10</sup> were to reduce their emissions by 1.5 tonnes each, savings of greater than 1.5 million tonnes per year of carbon dioxide and \$150 million would be realized.

All businesses, including SMEs, can benefit from taking action to reduce greenhouse gas emissions and reduce energy bills. Actions that can be taken at different stages of a business cycle, along with case studies that demonstrate what some businesses have done, are provided in this chapter.

## Good Housekeeping Practices — Little or No Cost with Immediate Savings

For operating businesses, there are some “quick and easy” actions that can reduce energy needs, cost little or nothing, and save you money right away. The overall success of an energy efficiency program depends on the cooperation, acceptance and involvement of everyone who can influence the organization — including employees and customers. Saving energy does not need to reduce occupancy comfort or the quality of the workplace. People are generally pleased to cooperate when they understand that their actions are contributing to a cleaner environment and a more viable business. Here are some examples of things that you and your employees can do without investing in new equipment:



## Save Money by Turning Off Equipment and Lighting

Every computer turned off when not in use can save up to \$75 a year in energy costs. Each incandescent light bulb turned off when not required could save about \$30 annually, as well as reduce the number of replacement bulbs needed each year.

**Source:** Natural Resources Canada. 2004. *Saving Money through Energy Efficiency: A Guide to Implementing an Energy Efficiency Awareness Program*. <http://oee.nrcan.gc.ca/Publications/infosource/Pub/ici/eii/pdf/eii-awareness.pdf>.

- Keep exterior doors closed during cold and hot days to prevent the loss of heated air in the winter and cooled air in the summer.
- Turn off computer monitors when not in use, even if only for 15 minutes. A computer monitor uses up to 75 per cent of the energy powering a computer.
- Enable ENERGY STAR® features on all computers. By activating the energy saving feature on a computer monitor, you will save energy. Look in the Windows control panel under display settings for this feature.
- Turn off photocopiers during off-hours. Operating photocopier equipment efficiently will reduce energy use by 25 per cent or more. Consider setting the copier to the energy efficient setting. This will reduce the amount of energy consumed when it's not in operation. Even then it is still using energy so, when practical, turn it off.
- Turn off lights when areas are not in use. Turn off lights when leaving your office/cubicle/area and other unoccupied areas, such as copy rooms, break rooms, conference rooms and restrooms.

- Make use of the sun. If lights can be controlled separately, turn them off whenever there is enough natural light available.
- Adjust lighting levels to match needs at different times. Before and after “public” hours, use lighting appropriate to your needs. Full lighting may not be necessary when performing several tasks, such as cleaning, stocking or presentations. Use dimmers and controls (when available) to turn down the lighting, or turn on only some lights in a room.
- Turn off machines and equipment when not needed. Turn off printers and other office machines when not in use. They can idle as much as 90 per cent of the workday and are often left running at night and on weekends. In many businesses, this simple approach can achieve big savings.
- Clean radiators and baseboard heaters once a year to keep them running efficiently.
- Change filters in furnaces regularly — at least every two to three months.
- Avoid idling of vehicles when stopped.
- Encourage the use of car pooling or public transit for travel to and from work.
- Monitor energy bills to track the energy savings resulting from these simple actions.

## Retrofitting and Designing — Some Upfront Capital Investment Required

Once the easy low or no cost changes have been made, you can investigate making further energy efficiency improvements in your business. These additional energy efficiency measures can be incorporated into new building designs and/or when retrofitting or replacing machines and equipment. The main opportunities for improvement are as follows:

- Improving lighting
- Reducing water use
- Upgrading heating and ventilation equipment
- Improving transportation
- Reducing air leakage by caulking and weather stripping
- Choosing energy efficient equipment and processes
- Reducing waste
- Selecting/designing business premises
- Involving employees

## Improving Lighting

Some lighting improvements require a complete change of lighting fixtures to accommodate more energy efficient lighting. However, savings in energy consumption can be achieved by replacing existing light bulbs with more energy efficient alternatives. Today, compact fluorescent light bulbs are available that readily fit existing incandescent light fixtures. In addition, energy efficient fluorescent lights are available for existing fluorescent light fixtures. The cost of these lighting alternatives has decreased substantially in recent years, and there are frequent promotions in retail stores that allow these lights to be obtained at even more reasonable prices. For businesses that use a lot of lighting, switching to energy efficient lighting can deliver substantial energy and cost savings with little upfront capital cost and little or no loss of lighting levels.

Further lighting efficiencies can be achieved by installing energy efficient fluorescent lamp ballasts and fixtures and by installing lighting controls, such as dimmer switches and light sensors, that automatically turn off lights when rooms are unoccupied.

The potential savings depend on assumptions about the types of lamps and fixtures to be replaced, the effectiveness of various lighting conservation measures, and how strong a lighting level is to be maintained.

## Ring Audio — Savings from Lighting Improvements in the Retail Sector

772 Queen Street East, Toronto,  
Ontario, 416-693-7464

Ring Audio, located in South Riverdale in Toronto, sells high-end retro electronic equipment as well as providing a repair service. The small store has tight profit margins. The owner is always looking for ways to lower operating costs. Switching all existing light bulbs to compact fluorescents made economic sense. With a small investment of \$60, Ring Audio is now saving 75 per cent on its monthly lighting bill. Ring Audio proves that small changes can save money and reduce energy use.

**Source:** Clean Air Foundation, Cool Shops. [www.coolshops.ca](http://www.coolshops.ca).

According to the US Department of Energy, the savings estimates under various assumptions span a wide range, from under 30 per cent to nearly 80 per cent of current use.<sup>11</sup> The estimated savings are as follows:

- **Savings from Compact Fluorescent Lamps:** Converting all incandescent bulbs (the typical screw-in type) to compact fluorescent lamps with reflectors is estimated to save close to 30 per cent of energy use for commercial lighting.
- **Savings without Compact Fluorescent Lamps:** Even greater savings can be achieved without using any compact fluorescents, but by converting all lamps and fixtures to the most efficient version of the same type (fluorescent, high-intensity discharge, or incandescent), together with lighting control devices, such as dimmer switches.
- **Savings from Comprehensive Improvements:** Universal replacement of lamps and fixtures with more efficient equivalents, together with lighting controls, could save as much as 72 per cent of current commercial lighting energy use. The replacements in this case include the best of the previous two cases. If, in addition, lighting levels are reduced by 25 per cent, total savings could reach nearly 80 per cent.



Another energy efficient option is the recently available light emitting diode (LED) lighting. One example of a use for LED lights is in exit signs. Exit signs are generally equipped with two regular 15W/25W incandescent light bulbs. Do-it-yourself LED retrofit kits are available and inexpensive and result in an energy usage of only 1W. LED exit signs result in savings of \$20 or more per year and last 50 years under normal sign usage.<sup>12</sup> Installing LED exit signs in a retail sector business has been estimated to cost \$30 and save \$20 per year, as well as reduce 0.3 tonnes of greenhouse gas emissions per year.<sup>13</sup>

## Reducing Water Use

Water use, especially hot water, can account for a substantial amount of energy consumption in some businesses, including hair salons and restaurants. Reducing water consumption and replacing hot water with cold water, where possible, can help. Actions to address water use include

- using cold water for commercial dish and laundry washes (where sanitizing is not required)
- reducing water use with low-flow toilets and faucets, and by avoiding multiple flushes
- installing higher efficiency hot water heaters and insulating them and the hot water piping.



## Swiss Chalet — Improving Water Heating Efficiency in a Restaurant

The Swiss Chalet restaurant in London, Ontario, replaced its hot water heater with a high efficiency condensing boiler having a thermal efficiency of 94 to 97 per cent. Because the restaurant uses a substantial amount of hot water for food preparation and dishwashing, this retrofit is saving 5,074 m<sup>3</sup>/year of natural gas, which translates into energy savings of 189 GJ and cost savings of \$1,674 annually.

**Source:** Natural Resources Canada. 2003. *Famz Foods: Restaurants Serving Up Energy Efficiency*. <http://oee.nrcan.gc.ca/Publications/infosource/Pub/ici/eii/pdf/M144-18-2003E.pdf>.

## Bank of Montreal — Reducing Heating, Ventilation and Air Conditioning Costs in a Commercial Building

In 1997, a Bank of Montreal building in Vancouver, British Columbia, had its heating, ventilation and air conditioning systems retrofitted as part of a building upgrade. The building's previous main air system consisted of a 75-hp supply fan and a 40-hp return fan, which provided air for variable and constant volume mixing, and heating boxes that provided heating and cooling to various zones. The fan was fitted with variable inlet vanes, which modulated to maintain the pressure in the system. The retrofit consisted of replacing the fan motors with a 50-hp supply and a 25-hp return, and installing a variable speed drive in place of the inlet vanes. The new system saved an estimated \$6,294 per year based on 1997 rates, with a payback period of only three years.

**Source:** Natural Resources Canada. 2002. *Use of Variable Frequency Drives for Fan and Pump Control*. <http://oee.nrcan.gc.ca/Publications/infosource/Pub/ici/eii/M92-242-2002-11E.pdf>.



### **Upgrading Heating and Ventilation Equipment**

Energy efficient equipment is most cost effectively acquired when either buying new equipment or replacing equipment that has reached the end of its useful life. It is also sometimes cost effective to “retrofit” a facility and regain your capital investment through savings on energy bills.

Heating, ventilating and air conditioning can account for some of the highest energy expenses. A number of measures, ranging from selecting more energy efficient systems to installing controls, such as smart thermostats and demand control ventilation, that reduce airflow to areas not in use, as well as regular maintenance programs, can significantly reduce energy costs. Further information about reducing motor and heating, ventilating and air

conditioning energy use is available from the Natural Resources Canada Office of Energy Efficiency (<http://oee.nrcan.gc.ca/english/index.cfm>).

### **Improving Transportation**

The transportation sector is the largest single source of greenhouse gas emissions in Canada. The way vehicles are driven and maintained can reduce greenhouse gas emissions, reduce fuel consumption and save money. Minimizing unnecessary engine idling, maintaining correct tire pressure and following other energy efficient practices can reduce fuel consumption. Energy can also be saved by using intermodal transport. Switching to fuels that emit fewer greenhouse gases, such as gasoline with ethanol content, biodiesel or natural gas, may also help.

When shopping for a new vehicle, ask your dealer about the city and highway fuel consumption ratings and the estimated annual fuel cost for that particular vehicle. Choosing the most fuel efficient vehicle for your everyday needs can save money and reduce greenhouse gas emissions that contribute to climate change.

Vehicle manufacturers are introducing more hybrid vehicles<sup>14</sup> and other environmentally advanced technology vehicles. While these vehicles are more expensive to purchase, they may offer significant reductions in fuel consumption. To offset some of the higher capital costs, some vehicle insurance companies have announced reduced insurance rates for buyers of hybrid vehicles, and some provinces have introduced incentives, such as reducing or eliminating the provincial sales tax on these vehicles.

### **Terra Nova Transport — Fuel Savings from Improving Vehicle Fuel Economy**

Terra Nova Transport is a less-than-truckload carrier operating out of Petitcodiac, New Brunswick. It began in 1983 and currently operates a fleet of 19 tractor-trailers and two straight trucks. Originally a livestock hauler, Terra Nova Transport became a dry-vans-only operation in 1995. With a terminal in Brampton, Ontario, the company operates mainly in a triangular service area, from the Maritimes to the Eastern Seaboard of the United States, to Ontario and back into the Maritimes. It also does runs to California, Florida and Texas in the US.

With the rapidly rising diesel fuel prices experienced in the late 1990s, the company needed to improve its fuel economy. Two major steps were taken: First, the company started keeping records of fuel economy by vehicle. Second, it used the SmartDriver program information from FleetSmart (an Office of Energy Efficiency program that offers free practical advice on energy efficient vehicles and how businesses can reduce fleet operating costs; <http://oee.nrcan.gc.ca/transportation/fleetsmart.cfm>) to initiate a fuel economy incentive program. With these initiatives, the company substantially improved its fleet fuel economy. Fuel economy has improved by at least one mile per gallon, leading to a savings of 180,000 litres of fuel per year, or nearly \$100,000 in fuel costs. Greenhouse gas emission reductions are estimated at about 470 tonnes per year.

## Reducing Air Leakage by Caulking and Weather Stripping

Older buildings have usually been constructed with less insulation than modern buildings. They can also have poorly fitting windows and doors that permit air leakage, thus increasing heating demands in winter and cooling requirements in summer.

A number of measures can improve a building's energy efficiency, including

- weatherstripping doors and windows
- using plastic secondary-door curtains inside delivery doors and bays
- improving the energy efficiency of windows with solar glazing or reflective film
- sealing leaks and cracks using foams, caulking and weatherstripping
- improving the insulation in attic spaces, basements and walls, where feasible.



## Choosing Energy Efficient Equipment and Processes

Energy efficient office equipment, appliances and motors are readily available and can consume substantially less energy than their older counterparts. Look for ENERGY STAR rated equipment, such as copiers, computers, faxes, washers and dryers, stoves and compressors, when replacing or buying new equipment.

A number of factors need to be considered when selecting motors. A motor's efficiency is a measure of the energy it delivers compared to the energy it uses. It is important to choose the right size of motor for the particular application. If a motor is oversized, its efficiency will be lower than if it is correctly sized. Variable speed drives and variable frequency drives regulate motor speeds according to the amount of work required. Reducing motor speed by 10 per cent can cut power consumption by 27 per cent; reducing speed by 20 per cent can cut consumption by 49 per cent. Combined with high efficiency motors, variable speed and variable frequency drives reduce both energy consumption and noise.

## Reducing Waste

When less waste is produced, less energy is required to collect, transport and dispose of the waste and less energy is needed to produce more new materials. Here are just a few actions you can take to reduce the amount of waste you produce:

- Recycle used materials, such as computer equipment and printer cartridges.
- Reduce your use of paper.
- Adopt nutrient management practices for livestock that reduce greenhouse gas emissions from manure.
- Find customers for residue by-products from manufacturing processes.

There are many more ways to reduce waste in a business. If you haven't already done so, incorporate separate bins for the collection of different types of wastes, such as plastics, paper products and organic products. Other measures to reduce waste include minimizing the number of paper copies of documents, ordering supplies in larger sized containers, and reducing the number of small quantity orders to reduce packaging and the number of deliveries.



## Timothy's World Coffee — Waste Reduction Saves Money

1070 Eglinton Ave. West, Toronto,  
Ontario, 416-785-8600

At Timothy's on Eglinton Avenue West in Toronto, being a part of the community is part of being in business. Located on a busy neighbourhood corner, the café works tirelessly to provide a comfortable community meeting place and central focus for the Upper Village area. Addressing environmental issues is also a strong emphasis in the business — one that saves money, increases customer loyalty and enhances Timothy's image in the community. Customers who bring in their own mug for coffee receive a free upgrade to a larger size. Through the City of Toronto's Yellow Bag Program, the coffee shop has managed to divert 84 per cent of its waste, saving more than \$2,000 annually. The Yellow Bag Program ([www.toronto.ca/yellowbag/](http://www.toronto.ca/yellowbag/)) is a waste management initiative that encourages Toronto's commercial customers to decrease garbage while increasing recycling and organics collection. Commercial customers eligible for municipal garbage collection place garbage in special yellow bags for pick-up.

**Source:** Clean Air Foundation, Cool Shops. [www.coolshops.ca](http://www.coolshops.ca).

## Metro Label — Industrial Facility Design Reduces Energy Use

Metro Label's new Scarborough, Ontario, manufacturing plant will be the first Leadership in Energy and Environmental Design (LEED) certified industrial building in the Greater Toronto Area. The 150-employee facility that makes labels for wine bottles, pharmaceuticals, cosmetics and other goods will use a heat recovery system to recycle energy from printing presses and reuse it to heat the building. It has skylights to improve natural light and reduce artificial lighting requirements. It provides showers and bike racks to encourage employees to cycle to work instead of driving. The plant is estimated to reduce overall building energy use by 22 per cent compared to a building of similar size, and to reduce printing process energy use by 38 per cent compared to its current operation.

**Source:** Bruser, David. "Label this factory 'green'; Metro Label's new Scarborough plant is not only environmentally friendly, it makes sound business sense." *Toronto Star* May 1, 2005: A21.

## Selecting/Designing Business Premises

Selecting the location and type of facility in which to run a business is an important decision. Choosing an energy efficient building will result in lower energy bills. Choosing a location near public transit will allow customers and employees to reach the business without having to drive their cars. For manufacturing facilities, selecting locations near transportation facilities may offer energy savings. Renting space in a building that has individual energy and water meters for tenants will allow you to track and manage your own energy and water consumption.

Selecting fuels that emit fewer greenhouse gases and using renewable energy can also help:

- Where available, use natural gas because it produces less greenhouse gas emissions than oil or coal.
- Participate in local utility "green energy" projects.
- Locate wind turbines on your properties to reduce reliance on electricity generated from fossil fuels.<sup>15</sup>
- Use solar power to heat buildings and water.



## Involving Employees

Last but not least, engaging the cooperation and innovation of employees is essential to achieving a successful energy efficiency program. Help employees understand and appreciate how individual actions can make a difference in reducing energy costs and greenhouse gas emissions. Provide examples of how things that they can easily do will contribute to the effort. A number of things can be done to engage the help of employees:

- Make energy efficiency a topic at staff meetings or during refreshment breaks.
- Encourage suggestions for creative energy efficiency improvements.
- Help employees understand that saving energy helps improve the viability of the business, their job security and the environment. Provide examples of how employees can help. For example,
  - share the results of energy savings with them
  - include news about energy efficiency in newsletters and on bulletin boards.

Informing employees about energy efficiency and greenhouse gas emissions can also have a further benefit by motivating them to undertake energy improvements in their homes. Further information about how individual Canadians can improve energy efficiency is available at [www.onelesstonne.ca](http://www.onelesstonne.ca).

## Absorbing and Storing Greenhouse Gases

In addition to reducing the use of fossil fuels through improved energy efficiency, businesses can help slow the rate and magnitude of climate change by pursuing opportunities to absorb and store greenhouse gases. Forests and agricultural soils both absorb and release carbon dioxide through natural processes of photosynthesis and decomposition. When, on balance, they absorb more carbon dioxide than they release, they become net carbon sinks. For example, as they grow, trees and other plants “breathe in” and store carbon dioxide from the atmosphere. A single tree can absorb many tonnes of carbon dioxide during its lifetime. Property owners can help improve energy efficiency by planting deciduous trees near the south- and east-facing sides of buildings. These trees will help shade the buildings and absorb carbon dioxide.

The BIOCAP Canada Foundation ([www.biocap.ca](http://www.biocap.ca)), a national not-for-profit research foundation, is advancing our understanding of the role of natural resources in mitigating climate change. This knowledge has useful applications:

- In addition to reducing greenhouse gas emissions by adopting climate-friendly practices that improve nutrients and livestock management, farmers can take action on climate change by planting more trees around farms to absorb carbon dioxide and reduce wind erosion of soil. Agricultural soils can be managed to store a portion of the carbon



dioxide that crops absorb from the atmosphere during the growing season. This happens when farmers increase crop yields and change tillage methods to reduce soil disturbance.

- Improved forest management practices, including intensive silviculture (the care and cultivation of forest trees) and improvements to forest conservation, could serve an important role in increasing the absorption of greenhouse gases by forest trees. Practices such as afforestation (planting new forests), reforestation (replacing forests) and avoided deforestation (avoiding harvesting of trees) can help significantly.

## Assessing Opportunities — Getting the Most Out of Energy Efficiency Investments

Once the easy and low cost opportunities to save energy have been implemented, the remaining opportunities to improve energy efficiency and reduce energy costs will require an investment of upfront dollars. Each business should assess its energy use and identify the opportunities and investments needed to realize energy savings. The steps to identify and select energy efficiency opportunities are as follows:

- Getting started — making a serious commitment to improve energy efficiency in your business.
- Doing an energy audit — determining the main sources and amounts of energy use.
- Identifying the opportunities to save energy and estimating the savings for each opportunity.
- Estimating the costs and payback time for each opportunity.
- Selecting energy savings measures and setting targets.
- Arranging to finance the upfront costs of implementing energy savings measures.
- Tracking and reporting savings on a regular and ongoing basis.
- Communicating progress to employees and customers.
- Continuing to improve. Don't rest on your laurels — keep looking for new opportunities.

## Getting Started

The most important step is to make a serious commitment to take action to improve the energy efficiency of your business, which will also result in a reduction of greenhouse gas emissions. As the owner of a business, you need to find an employee that will “champion” the initiative. If you are not the owner of the business, you will need to be sure that your employer supports your initiative and is committed to implementing the energy saving measures identified.

Successful energy efficiency programs involve changing the technologies you use, changing the way technologies are used, obtaining the cooperation of employees and customers, and, most importantly, demonstrating ongoing leadership through your own actions and decisions.

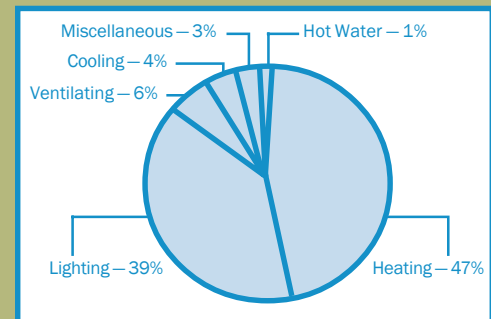
## Establishing a Baseline — Do an Energy Audit

To improve energy efficiency it is essential to know the types and amounts of energy used by the equipment and facilities in your business. Begin by looking at utility records from a recent representative period, such as a month, quarter or year, to create a baseline from which you can track progress. Utility bills can include natural gas, fuel oil, electricity, gasoline, steam and water. A number of guides are available to help convert the information on each bill to common units to calculate your average energy consumption.<sup>16, 17</sup>

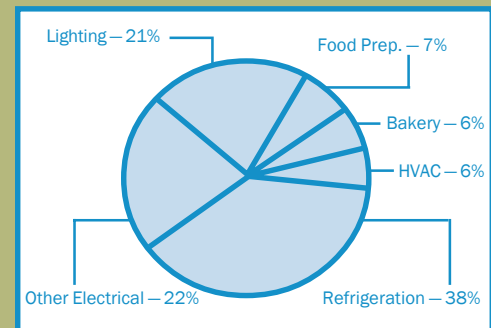
## Energy Use Profiles

Businesses in different sectors have different energy use profiles. For example, for most non-food retailers, the largest energy expenditures are for lighting and heating, ventilation and air conditioning. For food retailers, refrigeration is usually the largest energy user, followed by lighting, heating, ventilation, air conditioning and food preparation.

Big-Box Retail



Supermarket



**Source:** Natural Resources Canada. 2003. *Saving Energy Dollars in Stores, Supermarkets and Malls*. [http://oee.nrcan.gc.ca/publications/infosource/pub/ici/eii/M144\\_23\\_2003E/english/pdf/hosp\\_eng.pdf](http://oee.nrcan.gc.ca/publications/infosource/pub/ici/eii/M144_23_2003E/english/pdf/hosp_eng.pdf).

These guides provide both the energy totals and the energy used per unit of production (for manufacturing facilities). Further information about energy audits and eco-mapping is available at [www.inem.org/free\\_downloads/eco-mapping\\_download.html](http://www.inem.org/free_downloads/eco-mapping_download.html).

The next step is to walk through your facility to identify energy use by operations and equipment. Depending on the size and complexity of your operation and the level of detail you are seeking, there are different audit levels that you can consider: preliminary audits, walkthrough audits and engineering audits.

Preliminary audits are basic inspections to gather and analyze data on your facility's average energy consumption. Walk-through audits involve a review of the facility's energy use profiles and overall assessments of energy-consuming systems, processes and equipment. Engineering audits and feasibility studies are the most complex and costly energy use studies. These can provide detailed analyses of your facility's energy use profiles, as well as full descriptions of building systems, operations, levels of performance and potential for savings.

Overall energy consumption can be determined from utility bills. A more detailed analysis can be carried out by a professional energy management service provider. The Office of Energy Efficiency maintains a list of service providers.<sup>18</sup>

Detailed descriptions of audit types can be found in the Office of Energy Efficiency's *Audit Standards Guidelines*.<sup>19</sup> They summarize energy audits by level of detail required and level of information obtained. A description of each audit type is provided, along with sample terms of reference for requesting an audit, sample forms and graphs, approximate costs and time to completion.

You may wish to compare your energy use with the best practices of other businesses in the same sector. You can find information about the energy consumption of different businesses through the Energy Innovators Initiative (EII).<sup>20</sup> EII provides published guides for certain sectors, as well as technical information on equipment used in both industrial and non-industrial facilities.

### **Identifying Energy Savings Opportunities — Develop an Energy Management Plan**

Once you understand your company's energy uses (the amounts, types and time of use patterns of the energy consumed), you can develop an energy management plan. The plan will identify the measures that can be taken to improve energy efficiency, the capital costs of each measure and the projected energy savings. The different types of energy use should be identified (e.g., lighting, heating, ventilation and air conditioning, refrigeration, hot water, motors



for process equipment, such as pumps, compressors, and so on). For each category, energy efficient options should be listed and the costs to implement these options, as well as the resulting energy savings, should be estimated.

## Estimating the Costs and Payback Time for Each Opportunity

Before you decide to go forward with an energy investment or retrofit, you will want to know the “payback,” or how many years it will take a measure to pay for itself. Future savings depend on several factors, such as the accuracy of the calculations, equipment performance and fluctuating energy prices. To make a fully informed decision, look at both the expected return or cash flow projection and the risk that the returns will not be achieved. You should also consider other benefits of energy efficiency measures, such as improved building comfort, increased building value and reduced greenhouse gas emissions.

**Simple payback<sup>21</sup>** — If you want to install new equipment or adopt new measures, simple payback will indicate the amount of time needed for energy savings to equal the purchase price. For example, if a new energy efficient measure costs \$10,000 and will save you \$1,000 in energy costs each year, the simple payback is 10 years. You can estimate simple payback on new lighting using the Simple Payback Calculator on the Office of Energy Efficiency website (<http://oee.nrcan.gc.ca/commercial/technical-info/tools/payback-lighting.cfm?attr=20>). EnerGuide for Industry offers simple calculations of how much you could save by using more efficient equipment (<http://oee.nrcan.gc.ca/egi/english/index.cfm?attr=20>).

**Incremental payback<sup>22</sup>** — If you are installing a new type of equipment, or if your old equipment is at the end of its life cycle, incremental payback will tell you the length of time needed to pay for the difference between an efficient and less efficient unit. For example, suppose that an energy efficient replacement model costs \$700 and a less efficient model costs \$500. If you can save \$100 a year by buying the efficient model, the incremental payback of the efficient replacement model is two years, compared with buying the less efficient replacement model.

Some energy efficient equipment has no cost premium compared with conventional equipment. For example, Natural Resources Canada has indicated that energy efficient high-speed photocopiers, personal computers, fax machines, scanners and laser printers are available at the same price as conventional equipment. For an office of 200 employees, at no extra cost for the equipment, Natural Resources Canada has estimated annual energy savings of \$3,491, assuming an electricity cost of 10 cents per kilowatt hour.

A wide range of products that are energy efficient are identified by the ENERGY STAR label. This label indicates that the product is at the top of its class in energy performance and that it will result in lower energy consumption and fewer greenhouse gas emissions than equipment without the label.

## Choosing Energy Efficiency Measures

Once the different energy savings options have been identified and the energy savings and payback periods estimated, it is time to select the measures to implement in your business. Choosing a mix of options that include both short- and medium-term payback periods permits you to realize some immediate energy savings that can help pay for the higher cost, longer payback options — options that may well provide greater savings over the long run. It is important to develop a schedule to introduce the measures, including incorporating the measures into your budget, as well as your operating and maintenance schedules.

You may also find it helpful to set an energy savings target based on the estimated energy savings from the options you have decided to implement. You can then track energy savings on a monthly or quarterly basis to confirm that the estimated savings have been achieved.

## Arranging Financing<sup>23</sup>

There are a number of options for financing energy efficiency measures:

**Option 1: Financial Incentives** — Funding from the federal and provincial governments<sup>24</sup> for building retrofits and new buildings,<sup>25</sup> and other financial assistance<sup>26</sup> across Canada, can help reduce payback periods.

**Option 2: Internal Financing** — Savings should continue after the payback period ends, so energy efficiency measures are a worthwhile long-term investment. Your business may be able to pay for measures out of internal funds, while still balancing the books.

**Option 3: Borrowing and Bank Loans** — If your organization does not have cash in hand, talk to your bank. The value of energy savings is often greater than the loan payment, so you are ahead every year with a relatively small investment of funds. Try to combine measures so that the payback periods are shorter than the loan.

**Option 4: Energy Performance Contracting** — Energy management firms will sometimes plan, implement and monitor retrofit projects, and you pay them out of future energy savings with no upfront costs or risks. This is often more expensive than paying the costs yourself, and energy management services companies usually restrict this arrangement to larger clients. The Office of Energy Efficiency has developed an *Energy Performance Contracting Primer*<sup>27</sup> for general information.



**Option 5: Leasing or Instalment Payments** — Some leasing companies, equipment manufacturers and energy distributors will lease energy efficient equipment and systems. There is usually no upfront cost, and you make monthly or quarterly payments for a specified term, but repairs and ongoing monitoring may cost extra. If the financing is considered “instalment payments,” a “lease purchase,” “financing lease,” or “conditional sale,” you keep the equipment at the end of the term. As with leasing a car, small payments are spread out over time, but interest rates are typically higher than a traditional loan.

**Option 6: Manufacturer-guaranteed Savings** — Some manufacturers offer guaranteed energy savings in addition to performance warranties for their equipment.

**Option 7: Issuing Bonds** — Although this practice is rare, the University Health Network in Toronto has issued bonds to financial investors to pay for energy retrofits and new buildings.<sup>28</sup>

**Option 8: Sell your Greenhouse Gas Reductions** — Some of the costs of implementing energy efficiencies could possibly be financed by selling greenhouse gas emission reductions to large companies that may be required by governments to make emission reductions, or to others that have voluntarily committed to reducing their greenhouse gas emissions. To assist large emitters in meeting emission reduction targets in a cost-effective manner, a domestic emissions trading system<sup>29</sup> may be established. Emissions trading is based on the premise that some companies will be able to take action internally to reduce their emissions in a more cost-effective manner than other companies, particularly in the short term. Companies that meet and then exceed their greenhouse gas emission reduction targets will have surplus emission allowances to sell. Some large companies may find it more cost-effective to purchase emission allowances than to undertake reductions themselves. In addition to their internal efforts and purchasing surplus allowances from other companies, these companies also may be able to purchase emission reduction credits generated through an “offset” market. Offsets are project-based emission reductions or removals generated by agriculture and forestry operations. Landfill gas capture and flaring may also be included in offset markets. For more information on emissions trading in general, see Pollution Probe’s *Emissions*

*Trading Primer* ([www.pollutionprobe.org/Publications/Primers.htm](http://www.pollutionprobe.org/Publications/Primers.htm)). For information on domestic emissions trading and offsets, see [www.iisd.org/climate/canada/det.asp](http://www.iisd.org/climate/canada/det.asp).

**Other Options** — Your accountants and/or financial advisors may have additional suggestions about how to finance energy saving projects.

### **Tracking Savings<sup>30</sup>**

Once you have implemented energy efficiency measures, it is important to monitor and track energy savings. This step is crucial in your overall efficiency initiative. It allows you to

- protect your investment with an ongoing evaluation of the new measures
- identify further opportunities for maintenance and operational improvements
- identify opportunities when changes in utility rates and rate structures occur
- identify operational irregularities, such as extended run times
- identify billing irregularities and errors
- relate variables, such as outdoor temperature or occupancy, to building energy consumption.

Although tracking energy use sounds complex, it can be made simple by using specialized equipment, controls and software that help run your operations and also prepare reports that can be sent to a central location in your organization. With this information in hand, you are better able to continuously implement efficiency improvements.

## ***Keeping Everyone Involved — Communicate with Employees and Customers***

As you proceed with an energy efficiency plan, it is important to keep employees and customers aware of progress and achievements and to inform them of their contributions to cost savings and the environment.



## ***Continuing to Improve***

Once the idea of energy savings has been introduced and addressed in your organization, you can keep the momentum going and build on it. It is important not to treat this as a “one-off” initiative, but to provide ongoing reminders of your interest in savings. Once the initial plan has been implemented, revisit it and then review progress and the energy savings options. New technologies may have emerged that can improve payback times, and energy costs may have increased, making additional energy saving options more feasible.



chapter five

# References and Websites

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## Websites

**Canadian Chamber of Commerce**  
[www.chamber.ca](http://www.chamber.ca)

**Canadian Industry Program for Energy Conservation**  
[www.oee.nrcan.gc.ca/cipec](http://www.oee.nrcan.gc.ca/cipec)

**City of Toronto Energy Efficiency Office**  
[www.city.toronto.on.ca/energy](http://www.city.toronto.on.ca/energy)

**Climate Change Central**  
[www.climatechangecentral.com](http://www.climatechangecentral.com)

**Environment Canada, Information on Greenhouse Gas Sources and Sinks**  
[www.ec.gc.ca/pdb/ghg/ghg\\_home\\_e.cfm](http://www.ec.gc.ca/pdb/ghg/ghg_home_e.cfm)

**Environment Canada, Climate Change Overview — How Will This Affect You?**  
[www.ec.gc.ca/climate/overview\\_affect-e.html](http://www.ec.gc.ca/climate/overview_affect-e.html)

**Hydro One, Energy Efficiency Tips and Tools**  
[www.hydroonenetworks.com/en/efficiency](http://www.hydroonenetworks.com/en/efficiency)

**Hydro Quebec, Energy Wise Empower Program for Building Optimization: Business Customers — Medium Power**  
[www.hydroquebec.com/business/appui\\_batiments](http://www.hydroquebec.com/business/appui_batiments)

**Human Resources and Skills Development Canada, ON-SITE (A program available in Manitoba, Ontario, Newfoundland and Nova Scotia that matches Canadian firms and**

institutions with university or college graduates in a range of disciplines for up to six months at a cost to employers of \$100 a week)

[www.epi.ca](http://www.epi.ca)

### **Industry Canada — Sources of Financing**

<http://strategis.ic.gc.ca/epic/internet/insof-sdf.nsf/en/Home>

### **Natural Resources Canada, Office of Energy Efficiency**

[www.oe.e.nrcan.gc.ca](http://www.oe.e.nrcan.gc.ca)

### **Natural Resources Canada, Climate Change Impacts and Adaptation**

<http://adaptation.nrcan.gc.ca>

### **Pembina Institute**

[www.onelesstonne.ca](http://www.onelesstonne.ca)

### **powerWISE®**

[www.powerwise.ca](http://www.powerwise.ca)

### **UK Climate Impacts Programme**

[www.ukcip.org.uk](http://www.ukcip.org.uk)

### **United Nations Framework on Climate Change**

<http://unfccc.int/2860.php>

### **United States Department of Energy, Energy Efficiency Portal**

[www.eere.energy.gov](http://www.eere.energy.gov)

## **Canadian Programs on Energy Efficiency**

Natural Resources Canada maintains the *Directory of Energy Efficiency and Alternative Energy Programs in Canada*, which is an on-line inventory of Canadian programs that can be accessed to support energy efficiency assessments and investments (see <http://oe.e.nrcan.gc.ca/programs-directory>). Some of the useful programs and websites for SMEs are noted below.

- Canadian Industry Program for Energy Conservation (CIPEC) — [www.oe.e.nrcan.gc.ca/cipec](http://www.oe.e.nrcan.gc.ca/cipec)
- Cool Shops — <http://coolshops.ca>
- Industrial Energy Innovators (IEI) — <http://oe.e.nrcan.gc.ca/industrial/opportunities/innovator/index.cfm?attr=0>
- Dollars to \$ense Energy Management Workshops — [www.oe.e.nrcan.gc.ca/workshops](http://www.oe.e.nrcan.gc.ca/workshops)
- Industrial Buildings and Commercial Buildings Incentive (IBIP & CBIP) — [www.oe.e.nrcan.gc.ca/newbuildings](http://www.oe.e.nrcan.gc.ca/newbuildings)
- EnerGuide for Industry (EGI) — [www.oe.e.nrcan.gc.ca/egi](http://www.oe.e.nrcan.gc.ca/egi)
- Energy Retrofit Assistance (ERA) — [www.oe.e.nrcan.gc.ca/newbuildings](http://www.oe.e.nrcan.gc.ca/newbuildings)
- FleetSmart — [www.oe.e.nrcan.gc.ca/fleetSMART](http://www.oe.e.nrcan.gc.ca/fleetSMART)
- Renewable Energy Deployment Initiative (REDI) — [www.nrcan.gc.ca/redi](http://www.nrcan.gc.ca/redi)
- Incentives and Rebates — [http://incentivesandrebates.ca/gc\\_fi\\_search.asp](http://incentivesandrebates.ca/gc_fi_search.asp)
- Your municipal, provincial or private energy provider

## Endnotes

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