

Climate Change

It's time.

Seemingly overnight, Canadians have witnessed a cultural shift. Instead of questioning “Does climate change really exist?” we now find ourselves asking “What can we do about it?” This booklet offers some answers. Written for you and your family, it gives you an overview of what we know about climate change today and, most importantly, what we can do about it.





What is climate change?

Climate change is a shift in the average weather of a given region over time.

It includes changes in temperature, wind patterns and precipitation. Global climate change refers to changes in the climate of the Earth as a whole.

According to the Intergovernmental Panel on Climate Change (IPCC) — a group of the world's leading scientists on climate change and recipient of the 2007 Nobel Peace Prize — the average surface temperature of the Earth has risen by about 0.7 degrees Celsius over the past century.

“The warming of the climate system is unequivocal,” concludes the IPCC in its *Climate Change 2007: Synthesis Report*, “as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global sea levels.” Global climate change is not something that *could* happen: it is what we are witnessing right now in the form of melting glaciers, higher sea levels, and more severe weather events.



What causes climate change?

According to the IPCC, most of the increase in the average surface temperature of the Earth since the mid-20th century is “very likely due to the observed increase in anthropogenic [human-caused] greenhouse gas concentrations.” The IPCC defines *very likely* as more than 90% certainty.

Greenhouse gases are actually essential to life on Earth. Made up of water vapour, carbon dioxide (CO₂), methane and other gases, they produce what is referred to as a *greenhouse effect*, acting as a layer of insulation for the planet that reduces the amount of heat that is lost into space. Although greenhouse gases make up only a small part of the atmosphere’s gases (nitrogen and oxygen comprise 99%), they play a vital role in controlling the planet’s temperature.

For millions of years, the Earth’s atmosphere has been in a delicate balance, fostering the growth and evolution of millions of plant and animal species. Human activities over the last 200 years, especially our increasing reliance

on fossil fuels, have upset that balance. Deforestation has compounded the problem of burning coal, crude oil and natural gas by putting even more CO₂ into the atmosphere. In 1750, prior to the industrial revolution, the concentration of CO₂ in the atmosphere was about 280 parts per million (ppm). By 2008, the concentration of CO₂ had risen dramatically to 385 ppm.

In recent decades, energy supply, transport and industry have accelerated global greenhouse gas emissions.

Between 1970 and 2004, global greenhouse gas emissions from human activities grew by 70%. CO₂ emissions alone grew by 80%.

A photograph showing a white car partially submerged in floodwaters. A person wearing a black shirt and a black cap is standing in the water next to the car, looking down at the front of the vehicle. The water is dark and turbulent, with some debris visible. The background shows a dark, rocky or concrete structure.

Why does climate change matter?

The 0.7°C rise in global average surface temperature that has occurred to date has already had far-reaching effects. Since 1979, the area of the Arctic covered by sea ice in the summer has been shrinking by about 10% per decade. In 2007, the Arctic summer sea ice shrank to 23% below its previously recorded low. The impact of melting sea ice on polar bears and other Arctic wildlife is now well documented.

We have also seen an increase in extreme weather events — droughts, storms, floods — and the human devastation and dislocation that so often follow.

Eleven of the last twelve years (1995–2006) are among the twelve warmest ever recorded for global surface temperature. Over most land areas, cooler days and nights have become less frequent, and warmer days and nights more frequent.

For each of the next two decades, the IPCC projects that the average surface temperature of the Earth will increase by another 0.2°C, bringing the total increase since pre-industrial times to 1.1°C. A business-as-usual approach in which global greenhouse gas emissions continue to go largely unchecked could increase the average surface temperature of the Earth by as much as 4°–6°C by 2100.

As a cold northern country, Canada will be one of the most greatly affected countries in the world.

— Environment Canada

Scientists predict a number of dangerous outcomes that are likely to occur during this century if emissions continue to rise unchecked.

- **a rise in sea level that floods coastlines**, dislocating millions of people who live in coastal cities and communities. Eleven of the world's largest cities lie along the coast or on estuaries, and even a one metre rise in sea level would displace more than 56 million people in developing countries;
- **severe pressure on many ecosystems**, the extinction of many plant and animal species, and the destruction of more than half of the world's coral reefs;
- **a continued decline in summer sea ice** around the North Pole that will threaten the traditional livelihoods of some Arctic communities and the survival of some Arctic wildlife;
- **more intense rainfall events and storms** that put communities at risk;
- **heat waves and droughts** that bring life-threatening water and food shortages to tens of millions of people.



With the displacement of so many people at stake, climate change could become as much a refugee and human security issue as an environmental issue. And with developing countries disproportionately at risk, decisions that world leaders make now will have as many health and social equity implications as they do trade and economic implications.

We are upsetting the atmosphere upon which all life depends. In the late 80s ... we referred to global warming as a slowmotion catastrophe, one we expected to kick in perhaps generations later. Instead, the signs of change have accelerated alarmingly.

— David Suzuki

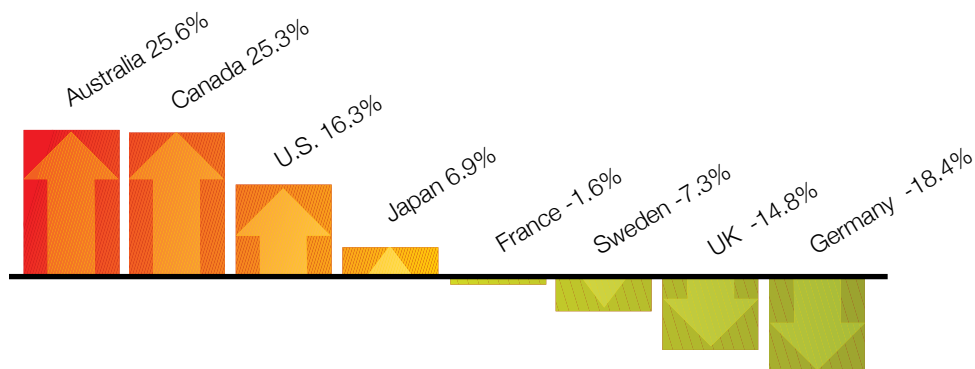
What is Canada's role?

Canada is among the world's top emitters of greenhouse gases per capita. Our country has, however, been comparatively weak in implementing solutions. Canada now lags behind many developed countries: per capita, we emit about twice as much greenhouse gas as Norway, for example, and more than three times as much as Sweden.

Many jurisdictions, including the European Union, have formally adopted 2°C as an upper limit to the increase in the Earth's average temperature (relative to the pre-industrial level) as a key part of their long-term climate policies. Canada has yet to adopt a similar limit, or to take any position on what temperature constitutes unacceptably dangerous climate change.

Figure 1. Per cent increase in human-caused greenhouse gas emissions in eight developed countries, 1990–2005.

Source: UNFCCC.



Staying within the recommended 2°C would require that global greenhouse gas emissions fall by as much as 80% below their 1990 levels by the year 2050. For the world to reach this ambitious target, developed countries will need to make larger reductions than developing countries. Developed countries have created most of the increased emissions concentrations to date, and we continue to emit more per capita than developing countries. While Canada contributes about 2% of global greenhouse gas emissions, our per capita emissions are still about four times higher than China's and more than ten times higher than India's.

Canada is in an excellent position to respond to this challenge. In fact, it is difficult to think of a country any better equipped to do so.

Canada has the wealth, skills, technology and renewable resources to emerge as a leader in clean energy technologies and other highly exportable solutions.

Countries have agreed to reach a new global deal to cut greenhouse gas emissions at the upcoming United Nations Framework Convention on Climate Change (UNFCCC) negotiations. Since 1994, when the UNFCCC came into force as international law, it has been at the centre of the global response to climate change.

The new global deal will likely cover 2012–2020: the years in which global greenhouse gas emissions will need to peak and begin to decline if the world is to stay within the 2°C limit. There is little doubt that many eyes will be on Canada at the upcoming UNFCCC meetings.



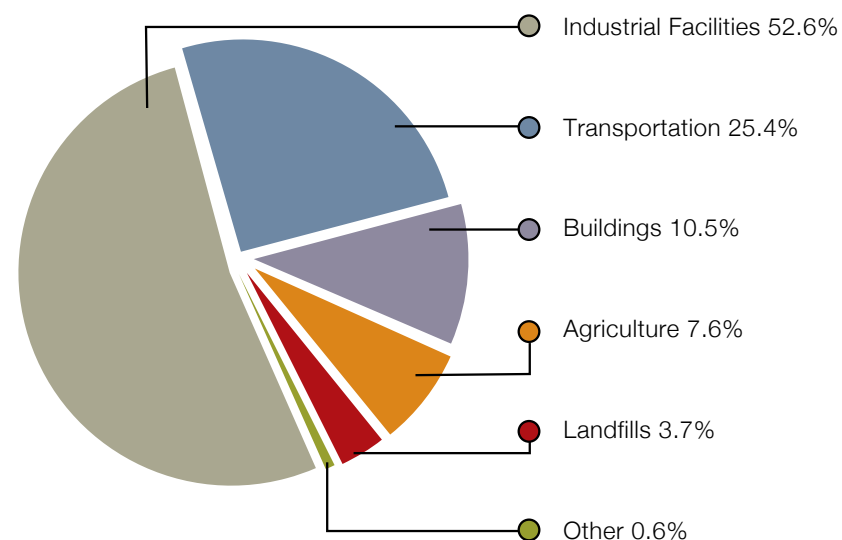
What can you do?

Energy conservation, energy efficiency and renewable energy are our best strategies for reducing greenhouse gas emissions.

Energy conservation means finding ways to use less energy in our daily lives. To improve our *energy efficiency*, we look to advances in technology to help us minimize our energy use. Low-impact *renewable energy* allows us to meet our energy needs with sources that have minimal impact on the Earth.

To adequately reduce our greenhouse gas emissions, we will need to make meaningful changes in every sector of Canadian society.

Figure 2. Canada's 2005 greenhouse gas emissions by sector.
Source: National Inventory Report, Environment Canada.



Ten actions you can take to make a difference.

- 1. Favour locally grown and locally made products.** The average North American dinner travels 2,400 kilometres before it arrives on your table. When you buy locally, you conserve energy: a quarter of Canada's greenhouse gas emissions comes from the transportation of freight and people. You also support local farmers, artisans and businesses.
- 2. Look for alternatives to driving.** Transportation emissions in Canada rose by 31.7% from 1990 to 2006. Whenever you choose to walk, ride a bike or take public transit, you make a difference. The bicycle is the world's most widely used mode of transportation, and its most energy efficient.
- 3. Turn down your thermostat,** at least at night and when no one is home. Install a programmable thermostat if you haven't already. A couple of degrees in your home or business may not seem like much in the face of global climate change, but heating buildings accounts for more than 10% of Canada's greenhouse gas emissions.
- 4. Weigh in on Canada's climate policy.** Demand international leadership and action from your politicians and other decision-makers, especially in these months leading up to a new global agreement on climate change. Insist on policy change for Canadian industries, municipalities and individuals, including a "carbon price" on emissions (through a "carbon tax" or "cap and trade system," for example).
- 5. Use less water, especially hot water.** If the hot water temperature in your home is at the standard factory setting, have a plumber turn it down to 49°C. Also opt for low-flow shower heads and dual-flush toilets. Scientists tell us that climate change will create acute water shortages for many populations in the coming decades. Canada can expect reduced water quantities from the Great Lakes to the Rockies.

- 6. Choose energy efficient appliances,** including an energy efficient hot water heater and furnace. Look for the Canadian EnerGuide label and the international ENERGY STAR® label. To conserve energy, you can also choose compact fluorescent light bulbs. Through energy conservation and advances in energy efficiency, Canadians succeeded in reducing their residential emissions by 8.5% between 1990 and 2006.
- 7. Increase your energy efficiency on the road.** You can reduce your emissions by getting regular maintenance for your vehicle and refusing to idle for more than ten seconds. When shopping for a new car, choose a best-in-class model that is more fuel-efficient than what you drive now.
- 8. Buy green power.** Meet your electricity needs with certified green power. Available in most provinces, green power comes from low-impact renewable sources and has minimal impact on the environment. Look online for *A Consumer Guide to Green Power in Canada*.
- 9. Fly less and teleconference more.** About 4% of global greenhouse gas emissions come from aviation, and that number is growing rapidly. A return flight from Calgary to Toronto, for example, can generate more than half a tonne of CO₂ per person. Look for alternatives to flying whenever possible. When you do fly, consider purchasing certified offsets that allow you to invest in an energy efficiency or renewable energy project to offset your emissions.
- 10. Realize your power as a consumer.** The home you buy, the car you drive, the appliances you install, the food you eat, the products you purchase: these all require energy to produce, transport and, in many cases, use. To address climate change, make choices that drive manufacturers and retailers toward energy efficiency and renewable energy.

Like many Canadians, you have likely made a number of lifestyle changes already. Consider adding one new step each month. Visit <http://www.onelesstonne.ca> to learn more.

**OneLess
TONNE^{CO₂}**

Visit <http://www.onelesstonne.ca> to take the Pembina Institute's OneLessTonne challenge. Calculate the effect that taking different actions could have on your personal emissions and your finances.



- For more information about climate change and the countdown to Copenhagen, visit <http://climate.pembina.org>
- To support age-appropriate energy education for young Canadians, visit <http://www.greenlearning.ca>
- For more information about energy and the environment in Canada, visit <http://www.pembina.org>

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