

eCards

Research Topic Climate Change

Climate Change

When Canadians first heard about global warming, many joked about the benefits of longer summers and less snow. Now we know that climate change is no joke. Many believe that climate change is the most significant issue of our time, maybe even the greatest challenge of this century.

Climate change has brought climate science and energy technology onto the nightly news. It has motivated books and films, blogs and debates, protests and demonstrations. It has prompted world leaders to establish international panels and committees, to participate in international negotiations, and to reduce their nations' carbon dioxide (CO₂) emissions. Climate change has mobilized people of all ages from around the world to act. In this video — [The Day the World Came Together](#) — see protesters on the 2009 International Day of Climate Action. Together they are calling for 350 parts per million as an upper limit on the amount of CO₂ in the earth's atmosphere.

The world's scientists confirmed in the 2018 IPCC report that at the current rate, the world could cross 1.5°C hotter as soon as 2030. That's only a decade from now, well within the lifespan of most people alive today. Now, as the use of fossil fuels spreads through the world, the amount of carbon in the atmosphere is skyrocketing — we're now well over 415 parts per million of CO₂ in the atmosphere. Now is the time for all Canadians to understand this issue and take action.

What is Climate Change?

Climate change is defined as a shift in the average weather of a given region over time. It includes changes in temperature, wind patterns and precipitation which can mean an increase in droughts, floods, storms, hurricanes, tornadoes and other weather events. Global climate change refers to changes in the climate of the Earth as a whole.

Global warming has led to the global climate change we are witnessing now. The average surface temperature of the Earth has risen by about 0.6 degrees Celsius over the past century, according to the Intergovernmental Panel on Climate Change (IPCC).

Increases in the Earth's average air and ocean temperatures, widespread melting of snow and ice, and rising sea levels around the world tell us that the warming of the Earth's climate system is now a fact. We are now experiencing global climate change in the form of melting glaciers, higher sea levels, and more severe storms and other weather events.

What is the IPCC?

The Intergovernmental Panel on Climate Change (IPCC) provides the world's most authoritative scientific assessments on climate change. It provides policymakers with regular assessments of the scientific basis of climate change, its impacts and risks, and options for cutting emissions and adapting to impacts we can no longer avoid.

What is Causing Climate Change?

We are. The Earth is warming in response to the amount of greenhouse gases that people have emitted into the atmosphere, primarily by burning fossil fuels and coal for energy supply, industry and transportation, and through deforestation. As populations have grown in size and become more industrialized, more dependent on the conveniences of urban life, we have sent more greenhouse gas into the atmosphere.

In the right quantities, greenhouse gases are 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. They blanket the planet, acting as a layer of insulation, and reduce the amount of heat that is lost into space. Although greenhouse gases make up only a very small part of the atmosphere's gases (about 1%), they play a vital role in controlling the planet's temperature and making the Earth inhabitable.

Human activities over the last two hundred years have created a thicker blanket of greenhouse gases. Scientists now distinguish between the natural greenhouse effect and the anthropogenic—or human-caused—greenhouse effect. In 1750, before the industrial revolution, the concentration of CO₂ in the atmosphere was about 280 parts per million (ppm). Today, after many decades of burning coal, oil and natural gas, the concentration of CO₂ had risen dramatically to 415 ppm.

In recent decades, energy supply, industry, transportation and deforestation have radically increased global greenhouse gas emissions. Global carbon emissions from fossil fuels have significantly increased since 1900. Since 1970, CO₂ emissions have increased by about 90%, with emissions from fossil fuel combustion and industrial processes contributing about 78% of the total greenhouse gas emissions increase from 1970 to 2011. Agriculture, deforestation, and other land-use changes have been the second-largest contributors. Emissions of non-CO₂ greenhouse gases have also increased significantly since 1900.

Canada is the world's 5th largest emitter of greenhouse gas pollution both per capita (per person). About half of Canada's greenhouse gas emissions come from large industrial facilities, including electricity generation. The next biggest polluter is the transportation sector.

Despite our small population, Canada contributes about 2% of the world's greenhouse gas emissions.

What Are The Effects of Climate Change?

Earth's average surface air temperature has increased by about 1°C (1.8°F) since 1900, with over half of the increase occurring since the mid-1970s, which doesn't sound like much, but it is. The Earth, like the human body, is in a delicate balance and very sensitive to any change in temperature. A few degrees in either direction goes a long way. The difference in the average surface temperature of the Earth between the last ice age and today, for example, is only about 7°C.

The 1°C rise in the Earth's average surface temperature that has taken place over the past century has already had far-reaching effects. For the last thirty years, the area of the Arctic covered by sea ice in the summer has been shrinking by about 13.1% each decade. Melting sea ice has meant a loss of traditional lifestyles for Inuit people. It has also meant a loss of habitat for polar bears and other Arctic mammals.

Cold days and nights are now less frequent in most areas. Hot days and nights are more frequent. The world has also seen more extreme weather events like heat waves, droughts, wildfires, cyclones, storms, blizzards, floods, and more of the human tragedy they often create. While it is not possible to tie any one weather event to global warming, climate scientists have long predicted more frequent severe weather events.

The IPCC projects that over the next twenty years the average surface temperature of the Earth will increase by another 0.4°C. Even if we could somehow stop all emissions today, the planet is already locked into about 1.5°C of warming since 1850. Because of the way greenhouse gases linger in the atmosphere, yesterday's emissions will keep adding to the warming of the Earth for decades, even centuries, to come.

If the world keeps operating as it has in the past, without much concern for the level of its greenhouse gas emissions, the average surface temperature of the Earth could rise by as much as 5.4°C by 2100. Just 2°C of warming from the pre-industrial level would be enough to harm many people and ecosystems and to create a large increase in the number of extreme weather events. Many dangerous outcomes can be expected during this century, some during our lifetimes, if greenhouse gas emissions continue to rise unchecked:

- **A one-metre rise** in sea level that floods coastlines and the homes and workplaces of millions of people who live in coastal cities and communities. A one-metre rise in sea level would make more than 23.5 million people homeless in the deltas of the Ganges River in Bangladesh, the Mekong River in Vietnam, and the Nile in Egypt.
- **More intense rainfall events** and severe storms that put communities at risk.
- **Heatwaves and droughts** that bring life-threatening water and food shortages to tens of millions of people.
- **Reduced agricultural yields**, particularly in the global South, where populations and food demand are growing fastest.
- **A continued decline in summer sea ice** around the North Pole that will continue to threaten the traditional livelihoods of some Arctic communities and the survival of some Arctic wildlife.
- **Severe pressure on many ecosystems**, the extinction of as many as 30% of the world's plant and animal species, and the destruction of more than half of the world's coral reefs.

- **Human health risks across all continents** that take the form of more cardio-respiratory, diarrhoeal, and some infectious diseases; more malnutrition; and an increase in deaths and injury due to extreme weather events.

Some populations are more at risk than others. Poor communities in high-risk areas, such as coastal areas and areas prone to droughts are especially vulnerable. With the displacement of so many people at stake, climate change is as much a refugee and human health issue as an environmental issue.

Climate change has become a matter of social justice. Developed countries have created most of the greenhouse gas emissions that have led to climate change, yet it is the people in developing countries who will be hurt the most.

What Kind of Energy Future Do We Need to Create?

To prevent the most dangerous consequences of climate change, we need to immediately and drastically reduce our greenhouse gas emissions and keep the rise in the average surface of the Earth as low as possible. If the world acts now, it is not too late to avoid the worst impacts of climate change.

Many countries, including those in the European Union, have formally adopted 2°C as an upper limit to the increase in the Earth's average temperature since pre-industrial times as a key part of their long-term climate policies. In July 2009, the leaders of the G8 and other major economies also recognized this limit. Now, this limit has been adopted to 1.5°C.

Scientists tell us that to stay within an upper limit of 1.5°C, global greenhouse gas emissions must drastically fall. They need to drop by as much as 85% below the 2000 level by the year 2050. Originally, the world's greenhouse gas emissions will have to peak no later than 2015, which has now been changed to no later than 2030.

How Do We Reduce Greenhouse Gas Pollution?

Because most greenhouse gas emissions come from burning fossil fuels for energy, to pollute less we need to change the ways we generate and use energy. 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. You conserve energy when you bike instead of drive, or you use less electricity.
- With better **energy efficiency**, advances in technology help us reduce energy use. You increase your energy efficiency when you replace old appliances with energy-efficient appliances.
- Low-impact **renewable energy** means meeting energy needs with sources that have little impact on the Earth. Wind, solar or geothermal power, for example, can replace high-impact, non-renewable sources such as coal and oil. You tap into renewable energy when solar panels heat your home or school.

As individuals, there is a lot we can do to reduce our emissions. It is also essential that we see action by our federal government. In a recent poll, 71 percent of Canadians believe the country needs to take the lead globally on the fight against climate change and 76 believe the country needs to be doing more on the issue as a whole.

Although Canadians are ready to act, Canada still lags behind many developed countries in its response to climate change. Canada's greenhouse gas emissions have continued to climb even as those of other developed countries have fallen, and despite Canada's legal obligations under the current global agreement on climate change (the Kyoto Protocol). Between 1990 and 2005, many developed countries worked to decrease their greenhouse gas emissions, but Canada let its emissions increase by 25.3%. Now, between 1990 and 2019, emissions have increased by 21.4%. Emissions in 2019 were 1.1% lower than the 2005 emissions.

Canada could help lead the way in the world's

response to climate change. It has the wealth, skills, technology and renewable resources to emerge as a leader in clean energy technologies.

Despite our potential, Canada recently ranked 54th of 57 countries for its performance in tackling climate change. Canada ranked ahead of only Iran, Saudi Arabia, and the United States. At the 2008 United Nations Climate Change Conference held in Poland, Canada was one of four countries singled out for refusing to set future emissions targets that reflect what the science is telling us. The following year at COP 15 — the United Nations Climate Change Conference held in Copenhagen in December 2009 — Canada was given the Fossil of the Year Award. In a mock awards ceremony, environmental groups recognized Canada as the “Colossal Fossil.” As they explained, “Fossil of the Year goes to CANADA, for bringing a totally unacceptable position into Copenhagen and refusing to strengthen it one bit. Canada’s 2020 emissions target is among the worst in the industrialized world.” Canada's target for 2020 is equivalent to just 3% below the 1990 level. To look at Canada and other countries climate action visit: <https://climateactiontracker.org/countries/canada/>.

Preventing the worst impacts of climate change depends on governments implementing policies and measures to reduce greenhouse gas pollution. Canada needs a climate change plan that cuts greenhouse gas emissions from all major sources. Policy experts say that the federal government must:

- Set science-based emissions targets for the short, medium and long-term to help keep warming below 2°C since 1850.
- Put a strong price on greenhouse gas emissions to encourage more innovation and fewer emissions in all sectors of the economy, especially large industries. The price for emissions can take the form of a cap-and-trade system or a tax on emissions.
- Put in place similar policies for other kinds of emissions, vehicles, buildings, waste, and agriculture, for example, to remove the most polluting products and practices from the market. Regulations can direct automakers to improve the fuel efficiency of the cars they make, for

example.

- Invest in infrastructure, such as mass transit, that can reduce the use of fossil fuels. On energy-efficient, high-speed bullet trains, for example, like those in Asia and Europe, train rides can be as fast as air travel but without the long waits or the high emissions.

Climate Change on the World Stage

Previously, global emissions were set to peak by 2015 and drop off drastically in order to avoid dangerous climate change, the decisions and commitments that countries make now are critical. In December 2009, Canada participated in COP 15, the United Nations Climate Change Conference in Copenhagen, which was organized by the UNFCCC.

Most recently, The Paris Agreement was adopted by 196 Parties at COP 21 in Paris, on December 12th, 2015, and entered into force on November 4th, 2016. This agreement is a legally binding international treaty on climate change with the goal to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. For more information please visit, <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.

What is the UNFCCC?

The UNFCCC, United Nations Framework Convention on Climate Change, entered into force on 21 March 1994. Today, it has near-universal membership. The 197 countries that have ratified the Convention are called Parties to the Convention. Preventing "dangerous" human interference with the climate system is the ultimate aim of the UNFCCC.

Many hoped that a new global deal would be reached at COP 15 that would set the world's course of action on climate change. Countries were negotiating what would happen from 2012 onwards, after the first period of the Kyoto Protocol ends. In 2015, the Paris Climate Agreement replaced the Kyoto Protocol.

During COP 15 in Copenhagen, after two weeks of meetings and many hours of negotiations, countries did not reach a binding deal. Many countries,

including Canada, did sign on to the Copenhagen Accord. Some countries refused to support the Copenhagen Accord because they saw it as too weak. The Copenhagen Accord does not lock in legally binding emissions targets for industrialized countries. It also does not set a timeline to reach a final agreement.

Yvo de Boer, Executive Secretary of the UNFCCC, explains that what we need is agreement on four "political essentials":

1. How much are industrialized countries willing to reduce their emissions of greenhouse gases?
2. How much are major developing countries such as China and India willing to limit the growth of their emissions?
3. How much financial support will industrialized countries provide to developing countries to help them reduce their emissions and adapt to the impacts of climate change?
4. How will that financing be managed?

These are big questions. To reduce global greenhouse gas emissions so that global warming does not exceed 2°C, all countries must make significant efforts. Developed countries will need to cut their emissions deeply and quickly in order to enough leave "atmospheric space" for poorer countries to develop enough. Developed countries have created most of the increased greenhouse gas emissions concentrations to date, and we continue to emit far more per person than developing countries. For example, Canada's emissions per person are still three times higher than China's and more than ten times higher than India's.

Besides being more responsible for the problem, the people in developed countries such as Canada are also much more able to deal with the costs and other challenges associated with reducing emissions.

The world's poorest people have contributed little to global greenhouse gas pollution, but for reasons of geography and of poverty, they are most vulnerable to the effects of climate change. Under the UNFCCC, Canadians have an obligation to help developing countries adapt to climate change. Helping with adaptation means supporting people in developing

countries in a number of ways. For example:

- reduce emissions through advances in energy efficiency and renewable energy
- train farmers in techniques to deal with drought
- improve public health care
- invest in malaria prevention as the disease spreads
- build infrastructure strong enough to withstand more violent storms

The *polluter-pays principle* also obliges Canadians to provide this kind of support. This international principle, upheld since 1972 by the Organization for Economic Cooperation and Development (OECD), maintains that "the polluter should bear the expenses of carrying out pollution prevention measures or paying for damage caused by pollution."

Today's decisions about climate change will impact this planet and its inhabitants for a long time to come. There are many actions we can take as individuals, as communities, and as nations. How will you respond? How do you want the people in your community to respond? How do you want your country to respond? Now is the time to make your voice heard!