

Climate Change & Kyoto

Science and Health Background

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CLIMATE CHANGE

Climate change occurs when there is a shift from 'normal patterns' in weather and climate. Short-term abnormal weather or 'variability' is a natural and expected aspect of normal climatic process. When we speak of climate change on a global scale, we are referring to long-term changes in the Earth's climate system as a whole. The rate and magnitude of climate changes over the long term can have many implications for natural ecosystems and human health.

The planet's natural 'greenhouse effect' regulates the Earth's temperature on earth. Human activities have the potential to disrupt this system because we are increasing the concentration of heat-trapping gases in the atmosphere. By increasing the amount of these gases, we are intensifying the greenhouse effect and global warming. Greenhouse gases can include, but are not limited to: carbon dioxide (CO₂), methane (CH₄), nitrogen oxides (NO_x), ozone (O₃), halocarbons (CFCs, HFCs), and sulphur oxides (SO_x).

It is the human-induced greenhouse effect that is cause for concern. It has the potential to warm the planet at a rate that has never been experienced in human history. The international scientific consensus is that our world is getting warmer as a result of 150 years of intense industrial activities¹. Although the planet does experience warming and cooling cycles, abundant data demonstrate that the long-term trend is towards net global warming.

Did you know....

...the 1980s and 1990s are the warmest decades on record?

...the 10 warmest years in global meteorological history have all occurred in the past 15 years?

...the 20th century has been the warmest globally in the last 600 years?

➤ Environment
Canada (2002)

Climate change is more than a warming trend. Increasing temperatures will lead to many weather-related changes in wind patterns, precipitation, and the types and frequency of extreme weather events. Climate change may also affect, and be affected by, existing climate cycles such as El Nino². Such climate change could have far-reaching and unpredictable environmental, social and economic consequences.

Addressing climate change will require a two-pronged approach of mitigation and adaptation. Mitigation means reducing the amount of human-made greenhouse gases in the atmosphere. The Kyoto Protocol is an example of a mitigation approach. Adaptation means making adjustments and decisions that reduce our vulnerability to climate change impacts. A combination of mitigation and adaptation will be necessary to slow down the rate of climate change and build our adaptive capacity to changes in the climate system that have already been set in motion.

¹ International Panel on Climate Change, Working Group I. 2001. *Climate Change 2001: The Scientific Basis*. Cambridge: Cambridge University Press

² Francis, D., and Hengeveld, H. 1998. *Extreme Weather and Climate Change*. CCD- 98-01. Downsview: Environment Canada.

THE KYOTO PROTOCOL

The Kyoto Protocol is an international agreement signed by more than 180 countries at Kyoto, Japan, in December 1997. The goal of the Kyoto Protocol is international cooperation towards the reduction of greenhouse gas emissions. If the Kyoto Protocol is ratified by at least 55 countries, it will commit the ratifying industrialized nations to reduce their greenhouse gas emissions on average 5% below 1990 levels. Canada will be expected to reduce its greenhouse gas emissions to 6% below 1990 levels between the years 2008 and 2012.

As Canada draws closer towards the ratification of Kyoto, there has been some media controversy surrounding the issue. Much of this controversy is due to the reported high costs of implementing Kyoto that only publicize worst-case scenarios. Such reports have been criticized for being biased, exaggerating their figures, and using questionable research methods³. Not surprisingly, these reports are being released by sectors and groups that have vested interests in greenhouse gas-intensive industries⁴.

In May 2002, the Government of Canada had recently released A *Discussion Paper on Canada's Contribution to Addressing Climate Change* – the most comprehensive cost-benefit Canadian analysis of Kyoto to be released in May 2002. The paper discussed four policy options based on several modelling scenarios. Preliminary results clearly indicate that the costs of Kyoto are far below the exceedingly high costs reported in industry statements⁵.

In order to meet reduction targets, Canada will have to become more energy efficient and less polluting as a whole. No region, sector or industry will be expected to bear an unreasonable burden. The Government of Canada is currently negotiating international economic agreements that will help define Canada's international and domestic emissions reduction framework.

Critics also argue that Kyoto will not 'fix' climate change. However, Kyoto is a very important and achievable first step towards slowing down the rate of man-made climate change. Perhaps the most important aspect of Kyoto that has not received much attention is the social, environmental and economic benefits that will arise from reduced greenhouse gas emissions. The costs of air pollution and respiratory disease already cost the Canadian health care system billions of dollars annually. Reduced greenhouse gas emissions can also result in savings from improvements in energy-efficiency and reduced environmental impacts.

Costing Kyoto

Based on the extensive work of the Analysis and Modelling Group (AMG) in 2000, the costs of Kyoto to Canada's economy is estimated to be 0 to 2 percent of GDP by 2012. Considering that Canada's GDP is expected to be 31% greater in 2012 without GHG reducing activities, the costs of Kyoto could mean an economy that is 29% to 30% greater in 2012.

- Government of Canada: A *Discussion Paper on Canada's Contribution to Addressing Climate Change*, 2002

³ Robinson, John. 2002. "The high cost of Kyoto is pure gas". *Globe and Mail*, April 9, 2002.

⁴ Canadian Exporters and Manufacturers. 2002. *Pain Without Gain: Canada and the Kyoto Protocol*. Ottawa: CME

⁵ Environment Canada. 2002. "The Costs of Kyoto: What we Know". News Release. March 4, 2002.
http://www.ec.gc.ca/minister/speeches/2002/020318_t_e.htm

CLIMATE CHANGE, AIR QUALITY & HUMAN HEALTH

The combustion of fossil fuel from vehicles and industrial sources is the largest contributor to both air pollution and climate change. Aside from carbon dioxide (CO₂), fossil fuels combustion produce the bulk of air pollutants, including: ozone (O₃), nitrogen oxides (NO_x), sulphur oxides (SO₂), acid aerosols, particulate matter (PM₁₀), carbon monoxide (CO), and lead. Reductions in fossil fuels (gasoline, diesel, coal) combustion would provide health benefits for the Canadian population by reducing air pollution's main sources.

Air pollution already contributes to respiratory and cardiovascular illnesses. Long-term exposure to air pollutants has been linked to lung cancer and premature deaths. Even short-term exposure has been shown to increase mortality and morbidity⁶. Children, the elderly and those individuals who already suffer from respiratory illness are the most vulnerable to the effects of air pollution. Respiratory illness already costs Canada's health care system billions of dollars in direct and indirect costs.

Climate change is expected to increase the number of high-temperature and high-humidity days that can magnify the existing health effects of air pollution. For example, smog is especially bad in hot, humid weather. Smog is a chemical reaction that forms when ground-level ozone, tiny airborne particles and other pollutants react to sunlight. While ozone gas in the stratosphere protects us from the sun's harmful UV rays, ground-level ozone can aggravate cardiovascular and respiratory diseases and can even result in death.

Existing Air Pollution & Health impacts

Recent studies indicate that 8% of all non-traumatic mortality in Canada is attributable to air pollution

Health Canada studies have estimated that in 11 major Canadian cities, air pollution is responsible for up to 5000 premature deaths annually.

- Burnett et al. (1998)

Another link between these two problems is the link between increasing temperatures and allergens. Trees and other vegetation that give rise to allergenic pollens grow more profusely in a warmer climate and, when combined with smog and other atmospheric pollutants, magnify the impacts of asthma and other respiratory illnesses. Increases in pollens and mould spores could compound the situation and affect those with cardiovascular disease, respiratory disorders such as asthma, emphysema and chronic bronchitis, and allergy problems.

Other climate change and health concerns include:

- Temperature-related mortality and morbidity;
- possible increase in extreme weather events;
- movement of infectious diseases;
- drought impacts on food and water supply; and
- psycho-social impacts from displaced populations

⁶ Working Group on Public Health and Fossil Fuel Combustion. 1997. "Short-term improvements in public health from global-climate policies on fossil fuel combustion: an interim report". *Lancet*, vol. 350: 1341-1349.

CLIMATE CHANGE & KYOTO – SCIENCE & HEALTH FAQ'S

Why Ratify the Kyoto Protocol?

The Kyoto Protocol is a document signed by more than 180 countries at Kyoto, Japan, in December 1997. If the Kyoto Protocol is ratified by at least 55 countries, it will commit ratifying industrialized nations to cut their greenhouse gas emissions below 1990 levels. Canada will be expected to reduce its greenhouse gas emissions to 6% below 1990 levels between the years 2008 and 2012.

Climate change is expected to have serious consequences on the health of Canadians, our environment, and our economy. Ratifying the Kyoto Protocol would be an important first step to help ensure the reduced build-up of greenhouse gases and the slowing of human-influenced climate change. As an additional bonus, ratifying Kyoto would also help reduce the sources of air pollution that impact human health.

What does Kyoto have to do with human health?

Reducing greenhouse gas emissions is a NO REGRET strategy – it makes sense regardless of climate change. Air pollutants already cost the Canadian health care system billions of dollars in direct costs. The indirect costs from mortality and morbidity (short and long-term disability) are even higher when measured as losses in productivity and work. A Health Canada study reviewing 10 years of data suggests that up to 5,000 Canadians per year die prematurely due to air pollution⁷.

How credible is the science behind climate change and Kyoto?

“There is new and stronger evidence that most of the warming observed over the last 50-years is attributable to human activities.”

➤ IPCC WG I,
*Climate Change
2001: The
Scientific Basis
(2001)*

The scientific basis for Canada's response to climate change is founded upon peer-reviewed findings from the International Panel on Climate Change (IPCC). The IPCC scientific reports were produced by 122 coordinating lead authors, 515 contributing authors, and reviewed by 337 expert and government reviewers from 99 IPCC member countries⁸.

It is generally accepted that the weight of evidence and credible scientific consensus are sufficient to warrant immediate action. Many health and scientific groups have urged the ratification of Kyoto. This includes 1985's Nobel Peace Prize recipient Physicians for Social Responsibility, as well as such groups as the Canadian Association of Physicians for the Environment, the Canadian Institute for Child Health, and the Union of Concerned Scientists.

⁷ Burnett R., Cakmak S., and Brook JR. 1998. “The Effect of the Urban Ambient Air Pollution Mix on Daily Mortality Rates in 11 Canadian Cities,” *Canadian Journal of Public Health* vol. 89:152-156.

⁸ IPCC Working Group I. 2001. (*op. cit.*)

Won't Kyoto hurt the economy?

The recent reports on the high economic and employment costs of Kyoto have been criticized for exaggerating and using biased methods for their estimates. For example, one report does not list an author and its methods are not peer-reviewed⁹. These reports are worst-case scenarios that assume Canada would be the only country to act on Kyoto. Much of the criticism surrounding Kyoto has come from vested interests in sectors and activities that contribute to Canada's greenhouse emissions. However, federal studies clearly demonstrate that the costs of Kyoto would be significantly less than what industry estimates would suggest.

An April 2002 report by the Tellus Institute indicates that even reducing CO₂ emissions by half of Canada's Kyoto target will result in cumulative net economic savings of \$4 billion by 2012¹⁰. In May 2002, the Government of Canada plans to release its most comprehensive cost-benefit analysis of Kyoto to date. Remember that Kyoto will also result in economic BENEFITS from improved fuel efficiency, enhanced environmental quality, reduced health-care costs, and technological innovations¹¹.

The City of Toronto has cut its CO₂ emissions by over 67% from 1990 levels – that is a reduction of 225,000 tonnes of CO₂, equal to about half the City's energy-related emissions.

This reduction has saved the City \$17.5 million – over \$2.7 million annually – in cumulative energy and maintenance costs.

- City of Toronto, Toronto Atmospheric Fund (2002)

How can climate change affect my health?

Climate change is expected to increase the number of high-temperature and high-humidity days that can magnify the existing health effects of air pollution – like smog. Children and the elderly are the most vulnerable, at-risk groups to air pollution and temperature extremes. Numerous studies have already shown how air pollutants such as ground-level ozone (O₃), particulate matter (PM), sulphur oxides (SO_x) and nitrogen oxides (NO_x) are contributing factors to cardiovascular and respiratory illnesses. Even short-term exposures can result in increased hospital admissions¹². Long-term exposure to air pollution also increases the risk of dying from lung cancer and heart disease.

Climate change will likely affect other areas of human health. Climate change can influence drought conditions and affect food production and water supplies. Infectious water- and air-borne disease vectors may also change with shifting climatic conditions. Finally, climate change is also expected to influence the frequency and intensity of extreme weather events. Health infrastructure and emergency services may become exceedingly burdened during extreme weather events.

⁹ Suzuki, David. 2002. "The sky is falling! The sky is falling!" *Science Matters*. Vancouver: David Suzuki Foundation.

¹⁰ Bailie, A., Bernow, S., Dougherty, W., Runkle, B., and Goldberg, M. 2002. *The Bottom Line on Kyoto: Economic Benefits of Canadian Action*. Boston: The Tellus Institute.

¹¹ Bailie et al. 2002. (*op. cit.*)

¹² Canadian Institute for Health Information et al. 2001. (*op. cit.*)

Where can I find reliable sources of information about climate change and related health issues?

Government of Canada's Climate Change Web Site
www.climatechange.gc.ca

Environment Canada
www.ec.gc.ca

Natural Resources Canada
www.nrcan-mcan.gc.ca

Health Canada's Climate Change and Health Office
www.hc-sc.gc.ca/hecs-sesc/hecs/climate

US Environmental Protection Agency (EPA)
www.epa.gov

International Panel on Climate Change (IPCC)
www.ipcc.ch

United Nations Framework Convention on Climate Change
<http://unfccc.int/index.html>

Union of Concerned Scientists
www.ucsusa.org

UN's World Health Organization (WHO)
http://www.who.int/peh/climate/climate_and_health.htm

Canadian Association of Physicians for the Environment (CAPE)
www.cape.ca/climate

Canadian Institute for Child Health (CIHC)
www.cihc.ca

Canadian Public Health Association
www.cpha.ca

Physicians for Social Responsibility (PSR)
www.psr.org

Canadian Lung Association
www.lung.ca

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