

Taking Our Breath Away

The Health Effects of Air Pollution and Climate Change

Every day around the world we burn vast amounts of gasoline, oil, coal and natural gas. These important sources of energy power vehicles, manufacture goods and provide electricity. But burning these fossil fuels creates unwanted byproducts – greenhouse gases – which lead to warming in the lower atmosphere, and air pollution, which can make people sick. These are two separate, but related problems, with a common source. Both are likely to further erode human health in the coming century, air pollution at a regional level, and global warming on a worldwide scale.

The first threat, air pollution, is already taking a toll in and around our cities. Epidemiological analyses indicate that as many as 8 per cent of all non-accidental deaths in the country are related to air pollution. In other words, up to 16,000 premature deaths per year in Canada can be attributed to air pollutants. Tens of thousands more suffer from respiratory ailments associated with pollutants in the air, resulting in increased hospital visits and frequent reduced-activity days.

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The second and perhaps even greater threat is due to human-induced climate change. Evidence is now overwhelming that increased concentrations of greenhouse gases emitted primarily from fossil fuel combustion are altering the lower atmosphere, increasing global warming and leading to climate change. The first eight months of 1998 illustrate many of the symptoms of a changing climate, from severe heat waves around the globe, to record rainfalls, floods and droughts.



The number of deaths will likely increase in the future as air pollution worsens due to increased fossil fuel use and global warming.

Extreme weather events like these are expected to become more frequent as the climate changes. Moreover, as global warming intensifies, air pollution is likely to worsen because heat and sunlight are critical factors in the production of smog.

Canada has committed to reducing greenhouse gas emissions to six per cent below 1990 levels by 2012, but little has been done towards this goal. For Canada and the world to tackle the twin challenges of climate change and air pollution will require strong public policy aimed at significantly reducing both greenhouse gas and air pollutant emissions. The only way to effectively reduce these emissions is by substantially reducing the consumption of fossil fuels.

Although climate change and air pollution are often discussed separately, their common origin (fossil fuel combustion), their combined effects on human health, and the fact that climate change may make air pollution worse has not been widely studied in Canada. As part of a continuing David Suzuki Foundation series devoted to finding solutions to climate change, *Taking Our Breath Away* examines these issues and some of the actions necessary to reduce the threat to us, our children, and the generations that will follow.

A warmer planet

Today the earth is a warmer place than it was just over a century ago. For example, 10 of the 11 hottest years on record have occurred in the last two decades. In Canada, the average temperature for the first six months of 1998 was 2.7 degrees C above normal, and in some areas of the Northwest Territories, 5 degrees C above normal. In fact, the first eight months of 1998 have been the

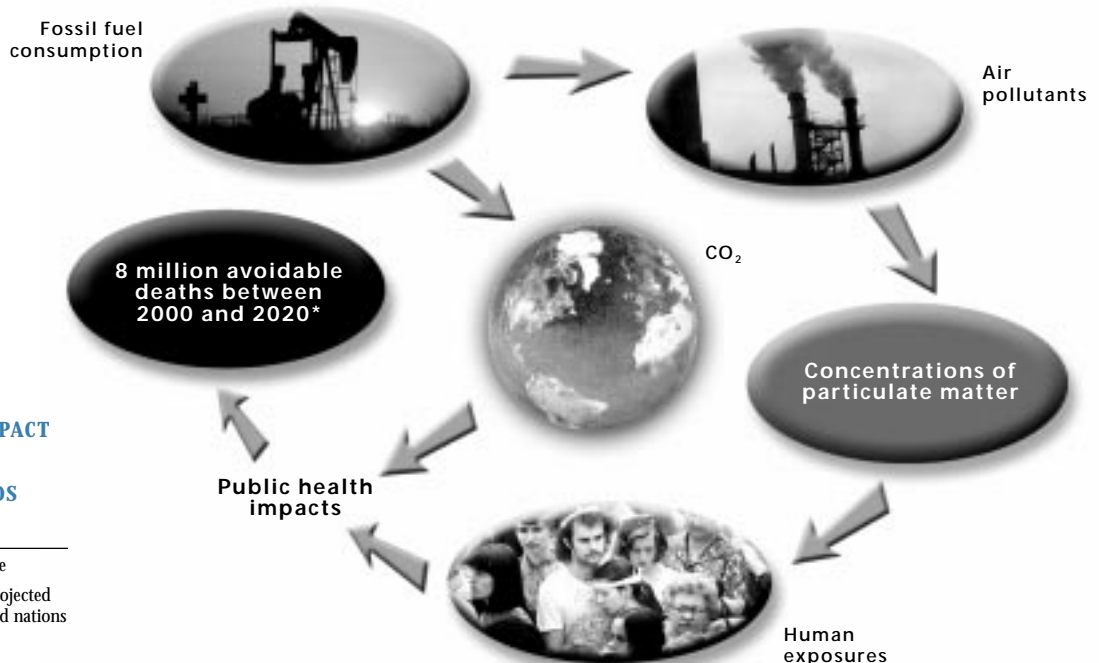


FIGURE 1. GLOBAL IMPACT ON PUBLIC HEALTH FROM CURRENT TRENDS IN FOSSIL FUEL USE

SOURCE: World Resources Institute
 *Assumes an 18 per cent cut in projected levels of fossil fuel use in developed nations by 2020 and a 10 per cent cut in developing nations

hottest ever recorded and climatologists now say they have probably been the hottest of the last 600 years.

Scientists have concluded that this global warming is caused by the increased concentration of greenhouse gases in the atmosphere. The resulting effect on worldwide temperatures is unprecedented. Temperature increases in the Arctic are now so pronounced that spring is arriving a week earlier than it did only a decade ago. Drought, forest fires, severe storms, melting polar ice caps and the retreat of alpine glaciers all offer further persuasive observational evidence that the climate is changing. In sum, there is an overwhelming body of scientific evidence that human activities are changing the global climate. This is in the summarized consensus report by the 1995 Intergovernmental Panel on Climate Change, a study conducted by more than 2,500 experts. There is no convincing scientific evidence to dispute these findings.

Climate change and human health

The earth's climate is not just getting hotter, it's becoming more unstable and less predictable. That means more frequent extreme weather events and other changes that may have many adverse health effects, both direct and indirect. The primary direct effect is excessively hot weather, such as more frequent extreme heat waves. This year, unprecedented heat waves struck North America, Europe, India and China, resulting in thousands of deaths, as well as numerous fires and destruction of property.

Increased flooding is another effect of climate change as traditional rainfall patterns are altered, making some areas warmer and drier and others warmer and wetter. China, for example, was hit with massive flooding this summer, affecting 240 million people, driving 12 million from their homes, killing more than 3,000, and causing an estimated \$40 billion in damages. Bangladesh and India also suffered from record flooding, with similar devastating results. In Canada, recent flooding along the Saguenay and Red Rivers showed the kinds of damage and human suffering climate change could bring in Canada. At the opposite extreme, more frequent droughts could cause crops to wither and create food shortages.

Warmer weather will also accelerate the melting of polar and alpine glaciers. Along with thermal expansion caused by increased water temperatures, this could raise sea-levels by a half-metre in the next 50 years. The resulting warm water and shifting tidal zones may reduce the world's already-depleted fish stocks and inundate agricultural land. Further, as the oceans rise, those living in low-lying areas would be forced to migrate as environmental refugees to safer regions. It is predicted that 140 million people in Bangladesh and China alone could be forced from their homes and their lands.

A warmer climate may also have indirect health effects such as extending the range and abundance of insects like mosquitoes, which carry potentially fatal

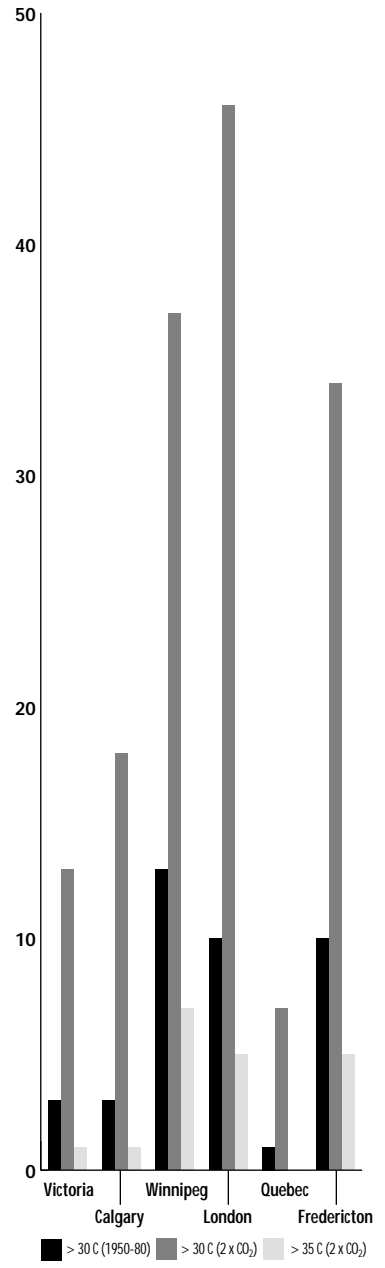


FIGURE 2. NUMBER OF DAYS ABOVE 30°C IN CANADIAN CITIES, CURRENT AND UNDER 2xCO₂ SCENARIO

SOURCE: H. Hengeveld, Environment Canada

diseases such as malaria, dengue and several kinds of viral encephalitis. This means that Canadians could be exposed to the risk of contracting many diseases currently confined to warmer areas. In warm regions, diseases like malaria are already spreading in range and infection rate. Currently about 250 million people are infected with malaria every year, and about 2 million die. In the past two years the number of Canadians contracting malaria in foreign countries has doubled to 750, and in 1998 a woman in Toronto contracted malaria from a local mosquito, the first such case in modern times. Rodents such as deer mice, which can carry the hanta virus, and bats, can carry rabies, will likely become more abundant if the climate continues to warm.

Pollution, health and the climate change connection

In addition to changing the climate, the reliance on fossil fuels as our primary energy source is also damaging the health of thousands of Canadians and consuming health care dollars today. Fossil fuel combustion results in the creation of many pollutants, including carbon monoxide, oxides of nitrogen, ozone, sulphur dioxide, volatile organic compounds, and small airborne particulates. Scientific data show that these air pollutants, particularly in combination, contribute to a wide range of health effects including impaired lung function, shortness of breath, wheezing, asthma attacks and premature death. This air pollution is likely to worsen as the earth's atmosphere warms because the photochemical reaction that produces ground level pollutants like ozone is enhanced as temperature and ultraviolet radiation (sunlight) increase. In other words, more hot weather due to climate change could mean more frequent and severe smog episodes.

Epidemiological studies show that individual air pollutants are associated with specific increases in respiratory illness, hospitalization and premature death. The impacts of particulates, oxides of nitrogen, ozone, sulphur dioxide and other pollutants have all been analyzed, and significant associations with adverse health effects have been found at pollutant levels currently existing in densely-populated areas of Canada.

Perhaps more importantly, studies indicate that there is no "threshold" for health effects for many air pollutants. In other words, although governments may set "desirable" standards, there are no "safe" levels. Further, medical studies have found that the cumulative effects of these pollutants may contribute to greater damage than short term exposures to high pollution levels, which are already known to have significant health effects. Across Canada, it is estimated that eight per cent of all non-traumatic deaths, approximately 16,000 per year, are attributable to air pollution.

Those most vulnerable to air pollution are children, the elderly and people with existing illness, especially heart and lung diseases. Between 1980 and 1990,



Hospitalization of young children in Canada for asthma increased by 28 per cent among boys and 18 per cent among girls between 1980-81 and 1989-90.



for example, hospitalization of young children in Canada for asthma increased by 28 per cent among boys and 18 per cent among girls. But even children without asthma are at risk from air pollution. In Ontario, the number of infants admitted to hospital for pneumonia, bronchiolitis and bronchitis in the summer months increases by 20 per cent when ozone and sulphate levels increase.

Forecasts indicate that unless steps are taken to reduce fossil fuel consumption, Greater Vancouver, for example, will see a 60 per cent increase in particulate emissions over the next 25 years, with corresponding increases in respiratory illness, hospitalizations and health care costs. Other pollutants show similar trends.

On the other hand, reducing fossil fuel consumption will reduce air pollution, improving the health of Canadians and saving money. A 1996 Ontario government report calculated that reducing key pollutants by 45 per cent would dramatically decrease hospital admissions and other health costs, resulting in a savings of about \$1 billion annually. And studies in Greater Vancouver have found that more than 2,700 premature deaths and 33,000 emergency room visits over 30 years could be avoided with a 25 per cent reduction in particulate matter.

Globally, it is estimated that by 2020, 700,000 premature deaths a year from particulate exposure could be prevented if moderate greenhouse gas emission reduction policies were implemented. The majority, 563,000 prevented deaths, would be in developing countries, while the other 140,000 would be in developed nations such as Canada. A 1997 World Bank report concluded that in China alone, if there is no change in fossil fuel consumption rates, related health care costs are expected to leap from \$32 billion to \$390 billion in the next 22 years. That includes 600,000 premature deaths, 5.5 million cases of chronic bronchitis, 5 billion restricted-activity days and 20 million cases of respiratory illness annually.

The need for change

Empirical medical evidence clearly supports action to reduce emissions that are causing air pollution and climate change. Further, independent studies show that while reducing fossil fuel consumption will affect some sectors of the economy, overall it will have positive economic effects. Meanwhile, continuing with business as usual has been shown to be very costly, both in terms of lost lives and damaged health, as well as in financial costs.

However, because of government and industry policies and inaction, Canada is consuming more gas, oil and coal than ever – using as much energy per year as the entire continent of Africa. In fact, Canada is the second highest per capita emitter of greenhouse gases in the world and our emissions are growing by 1.5 per cent every year. Last year, at the United Nations climate change conference in Kyoto, Japan, Canada committed to cutting those emissions to six per cent below 1990 levels by the year 2012. But we have a long way to go before

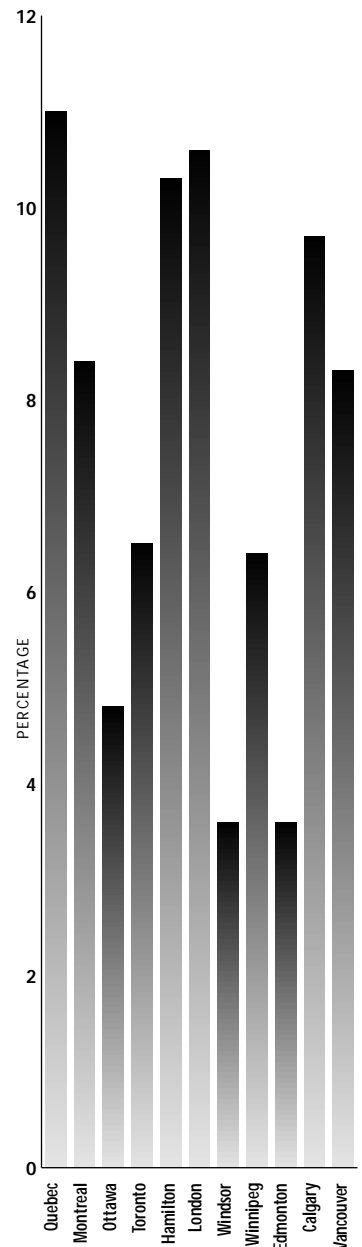


FIGURE 3. INCREASE IN MORTALITY ON HIGH AIR POLLUTION DAYS

meeting even that modest goal, and much further to meet the 60-80 per cent reductions scientists say is necessary to minimize the likelihood of irreversible climate change. Unfortunately, the Canadian government has failed to take action. Moreover, by proposing unrestricted international emissions trading, the federal government is also missing an opportunity to improve the health of Canadians.

Once considered an international leader in environmental diplomacy, Canada is now putting its reputation at risk and failing to do its part towards global atmospheric stability. To meet international obligations, Canada must take immediate steps to reduce fossil fuel consumption and the resulting greenhouse gas and pollutant emissions. These reductions are necessary to avoid the serious environmental, economic and health consequences of climate change, as well as reduce the existing, widespread health effects of air pollution. Practical and effective solutions do exist. What is missing is the political will to implement them.

Conclusion

In order to minimize the threat of climate change and to reduce present day health effects, Canada must act now to curb emissions of pollutants and greenhouse gases. This will not be possible in any meaningful way without a reduction in fossil fuel use and shifts to cleaner energy sources.

Political efforts to delay or sidetrack these necessary changes will not alter what scientific and medical communities predict may happen if present levels and trends in emissions continue. More people would suffer from respiratory illness and premature death, more of our communities would face the difficulties and damage caused by severe weather episodes, more Canadians would face substantial alterations of the lands and waters that determine their economic livelihoods, and more humans throughout the world would face new and substantial health risks associated with the altered climate.

The medical and scientific evidence shows that our society is facing serious, tangible threats. Denial or delay will only serve to waste valuable time and resources. Action is required and required now.

“If the performance of the government of Canada does not improve, the environment and the health of Canadians will be damaged.”

Brian Emmett, Federal Commissioner of the Environment and Sustainable Development, May 1998



Economists estimated that the health benefits due to improving the ambient air quality in Canada amount to \$8 billion over 20 years.

DR. JOHN LAST is Professor of Epidemiology and Community Medicine at the University of Ottawa. DR. DAVID PENGELLY is Associate Clinical Professor in the Department of Medicine at McMaster University and Associate Professor of Medicine at the University of Toronto.

DR. KONIA TROUTON is a family physician and medical epidemiologist with Health Canada's Bureau of Reproductive and Child Health in Ottawa.

David Suzuki Foundation

Finding solutions

2211 West 4th Ave., Suite 219
Vancouver, B.C., Canada V6K 4S2
Tel: (604) 732-4228
Fax: (604) 732-0752
email: solutions@davidsuzuki.org
www.davidsuzuki.org