

## Climate Change & Human Health

### Position paper and resolution adopted by the Ontario Public Health Association (OPHA)

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## **Resolution**

**WHEREAS**, scientists worldwide have documented a shift in the global climate over the last century whose change is unprecedented;

**WHEREAS**, most scientists believe that this change is due, in most part, to human activities that result in the release of greenhouse gases such as carbon dioxide;

**WHEREAS**, global climate change is expected to result in a significant number of heat-related deaths in both developed and developing countries as heat waves become more frequent and more severe;

**WHEREAS**, climate change is expected to increase morbidity and mortality by decreasing air quality in areas currently experiencing air pollution problems;

**WHEREAS**, climate change is expected to significantly increase deaths, disease and injury by increasing the frequency and magnitude of extreme weather events such as tornados, hurricanes, snowstorms, floods and cyclones;

**WHEREAS**, climate change is expected to affect the range, intensity and seasonality of many diseases including insect-borne diseases;

**WHEREAS**, climate change is expected to alter regional temperatures, rainfall and soil moisture, all of which could impair the growth of many crops in many regions of the world;

**WHEREAS**, the following sectors are most significant sources of greenhouse gas emissions in Canada - transportation (25% in 1998), oil and gas (18%), electricity (17%), industry (15%), buildings (10%), and agriculture and forestry (10%);

**THEREFORE BE IT RESOLVED THAT** the OPHA advocate for Federal, Provincial and Municipal policies that:

1. Encourage compact urban form, public transit, and alternate modes of transportation with integrated planning strategies;
2. Encourage the movement of freight by rail rather than roads;
3. Improve energy efficiency standards for vehicles, appliances, homes and commercial buildings & encourage retrofits of existing buildings;
4. Support the phase-out of coal-fired generating stations;
5. Promote development and utilization of renewable energies, renewable fuels, and co-generation;
6. Use emissions trading and the tax system to reward technologies and/or practices that reduce greenhouse gas emissions from industry, agriculture and forestry; and
7. Mitigate the impacts of climate change.

## **Position Paper Executive Summary**

Scientists worldwide have documented a shift in the global climate over the last century that is unprecedented for its pace of change. Most scientists believe that this change is due, in most part, to human activities that result in the release of greenhouse gases such as carbon dioxide and methane.

Global climate change is expected to result in a significant number of heat-related deaths in both developed and developing countries as heat waves become more frequent and more severe. It is expected to increase morbidity and mortality by decreasing air quality in areas currently experiencing air pollution problems. It is expected to significantly increase deaths, disease and injury by increasing the frequency and magnitude of extreme weather events such as tornados, hurricanes, snowstorms, floods and cyclones. It is also expected to affect the range, intensity and seasonality of many diseases including insect-borne diseases.

Climate change is expected to alter regional temperatures, rainfall and soil moisture, all of which could impair the growth of many crops in many regions of the world. Populations of fish and other wildlife are expected to be affected as well by changes in water temperature, ocean currents, air temperature, rainfall and/or shifts in vegetation growth. These changes are expected to produce short-falls in food supplies in many parts of the world.

Climate change is a social justice issue. The impacts of climate change are expected to be experienced most harshly in poorer areas of the world, while the heaviest emitters of greenhouse gases are those who live in richer areas of the world.

Canada is the ninth largest emitter nation in the world and among the highest emitters per capita. The most significant sources of greenhouse gases in Canada are the transportation sector (25% in 1998), the oil and gas industry (18%), electricity generation (17%), the industrial sector (15%), buildings (10%), and agriculture and forestry (10%).

Therefore, the OPHA will advocate for Federal, Provincial and Municipal policies that: Reduce emissions of greenhouse gases to retard climate; and Mitigate the impacts of climate change on human health.

## 1. Climate Change is Happening

Scientists worldwide have documented a shift in the global climate over the last century that is unprecedented for its pace of change. The Intergovernmental Panel on Climate Change (IPCC), jointly established by the United Nations Environment Programme and the World Meteorological Organisation, has concluded that:

- The global average air temperatures have increased by 0.4 to 0.8 degrees C over the 20<sup>th</sup> century; [This may sound minor but it is not; During the ice age, for example, the global average air temperature was only 5 degree C lower than current global air temperatures (Env Can, 1998).]
- Increases in temperatures in the northern hemisphere in the 20<sup>th</sup> century are likely to have been the largest of any century during the past 1,000 years;
- Ocean temperatures have increased by 0.05 degrees C since the 1950s;
- Summer sea ice over the Arctic has shrunk by 10 to 15% over the 20<sup>th</sup> century;
- There has been a 2 to 4% increase in the frequency of heavy precipitation events in the mid- and high latitudes of the northern hemisphere over the latter half of the 20<sup>th</sup> century;
- Warm episodes of the El Nino-Southern Oscillation have been more frequent, persistent and intense since the mid-1970s;
- Over the 20<sup>th</sup> century, there were relatively small increases in global land areas experiencing severe drought or severe wetness (IPCC, 2001a).

## 2. Humans are Contributing to Climate Change

Most scientists believe that this change in climate is due, in most part, to human activities. In its third assessment report, the IPCC concluded that:

“Most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations;” and

“Emissions of carbon dioxide (CO<sub>2</sub>) due to fossil fuel burning are virtually certain to be the dominant influence on the trends in atmospheric CO<sub>2</sub> concentrations during the 21<sup>st</sup> century” (IPCC, 2001b).

When the U.S. National Research Council (NRC) examined the science on climate change in response to a request from the White House, it concluded that:

“The IPCC’s conclusion that most of the observed warming of the last 50 years is likely to have been due to the increase in greenhouse gas concentrations accurately reflects the thinking of the scientific community on the issue” (NRC, 2001).

## 3. Environmental Impacts Expected

It has been projected that global climate change will increase the temperature of air and water around the world, melt glaciers, increase sea levels, increase the number and

intensity of extreme weather events that result in heat waves, droughts, flooding and soil erosion (IPCC, 2001a). In Canada, global climate change is expected to:

- ❑ Move the treeline significantly northward during this century;
- ❑ Increase the number and severity of forest fires;
- ❑ Affect the abundance of fish species by changing water temperatures and circulation patterns;
- ❑ Melt permafrost in the far north;
- ❑ Decrease water levels in the Great Lakes by more than a metre and move the shoreline of Lake St. Clair and Lake Erie up to six kilometres offshore;
- ❑ Increase droughts in the prairies; and
- ❑ Increase the frequency and intensity of heat waves (Canada, 2002).

It is the rate and magnitude of these changes that are the cause for concern. Scientists worry that biological organisms, ecosystems, and human societies will not be able to adapt to the changes because of the speed at which they are occurring.

#### **4. More Heat Waves Expected**

Global climate change is expected to result in a significant number of heat-related deaths in both developed and developing countries as heat waves become more frequent and more severe (IPCC, 2001). Analyses from around the world indicate that overall death rates rise during heat waves, particularly when temperatures rise above those to which the population has adapted (Smoyer, 1999; McGeehin, 2001).

A study conducted by Kalkstein and Smoyer indicated that several large cities in Canada (i.e. those that currently experience hot, humid air masses during the summer season) could be very negatively impacted by the increased temperatures expected with climate change. For example, it was estimated that, with a doubling of CO<sub>2</sub> in the earth's atmosphere, heat-related death rates could increase to between 9.63 and 33.65 per 100,000 in the Toronto area (Kalkstein and Smoyer, 1993). With these rates, a city with Toronto's current population, could experience between 239 and 835 premature deaths each year from heat alone (Chiotti et al, 2002).

#### **5. More Air Pollution Expected**

Climate change is expected to increase morbidity and mortality by decreasing air quality in areas currently experiencing air pollution problems (IPCC, 2001c). Increased temperatures are expected to increase the average and peak levels of ground-level ozone in the air by both, enhancing the chemical reactions that give rise to ozone, and by increasing the release of volatile organic compounds from natural sources (IPCC, 2001; Bernard, 2001; Mills, 1999).

In urban environments, high humidity and low wind speeds are expected to increase the concentration of air pollutants such as fine particulate matter that will stay in the air longer in high humidity (Bernard, 2001). Increased temperatures could also encourage

greater use of electricity for air conditioning, which could in turn result in a greater release of pollutants into the atmosphere.

Kalkstein and Smoyer have predicted that, with a doubling of CO<sub>2</sub> concentration in the atmosphere, central Canada could experience a five-fold increase in offensive air masses that bring smog episodes, high temperatures and high humidity. This means that smog episodes could increase in frequency from 4.7% of summer days to 23.3% of summer days in Ontario (Chiotti et al., 2002). This increase in smog episodes is expected to significantly increase the number of air pollution-related mortality and morbidity rates. These impacts are expected to be borne most heavily by young children, the elderly and those with pre-existing conditions.

## **6. More Extreme Weather Events Predicted**

Global climate change is expected to significantly increase deaths, disease and injury by increasing the frequency and magnitude of extreme weather events such as tornados, hurricanes, snowstorms, floods and cyclones (IPCC, 2001). Extreme weather events can be costly to human health. Between 1972 and 1996, on average, about 123,000 people a year around the world were killed by natural disasters (IPCC, 2001). Populations in developing countries are much more affected by extreme weather events because they do not have the social infrastructures needed to mitigate their impacts or to respond to them when they occur (IPCC, 2001).

The costs of extreme weather events have increased rapidly in recent decades in both developed and developing countries (IPCC, 2001). The yearly economic losses from large events have increased 10 fold from \$4 billion in U.S. funds in the 1950s to \$40 billion in U.S. funds in the 1990s (IPCC, 2001). While these cost increases are influenced by socio-economic factors such as population growth and urbanization in vulnerable areas, they also correspond to, and can be used as indicators of, observed increases in extreme weather events such as flooding and droughts (IPCC, 2001).

## **7. More Insect-borne Diseases Expected**

Climate change is expected to affect the range, intensity and seasonality of many diseases. There are concerns, for example, that insect-borne diseases such as malaria, dengue fever and lyme disease could spread in range and intensity with climate change (McMichael 1996; IPCC, 2001). While insect-borne diseases will likely have a disproportionate effect on populations in tropical climates, populations in northern climates will not be immune. Environment Canada projects that insect-borne diseases such as malaria, dengue fever, yellow fever and viral encephalitis could move into Ontario as temperatures and humidity increase (Mortsch and Mills, 1996). West Nile virus is an example of an insect-borne disease that, once introduced to New York in 1999, has extended its range northward and westward due, in part, to the milder winters and longer summers being experienced in North America (TPH, 2001).

While the range of insect-borne diseases are highly dependent upon climatic conditions such as temperature, rainfall and humidity, they are also dependent upon living conditions, building materials, and social infrastructure. In wealthy nations such as Canada, it is expected that the impacts of these diseases can be minimized with a public investment in disease surveillance, education, habitat reduction and mosquito control (Gubler, 2001; TPH, 2001).

## **8. Food Supplies Could Be Threatened**

Global climate change is expected to alter regional temperatures, rainfall and soil moisture, all of which could impair the growth of many crops in many regions of the world (IPCC, 2001). In Canada, climate change is expected to have a net negative effect on agriculture because, while temperatures will be higher, the growing season will also be dryer (Env Can, 1997). Agricultural output could also be affected by extreme weather events and altered patterns of plant diseases and infestations.

Climate change is also expected to change water temperatures in oceans, which could influence ocean currents and nutrient upwelling. These changes could alter the distribution, migration and productivity of fish species upon which humans are dependent for food supplies (McMichael, 1996; IPCC, 2001).

One analysis predicts that an extra 40 to 300 million people worldwide could be at risk of hunger by the year 2060 because of the impact of climate change. This number is in addition to the 640 million who are expected to be at risk in the absence of climate change (McMichael, 1996).

## **9. Climate Change is a Social Justice Issue**

There are also social justice aspects to the climate change issue. While there are great uncertainties related to the extent and severity of the predicted health impacts, there is a growing consensus that many of the anticipated adverse effects will be greater in poorer regions of the world that lack food supplies and/or well developed public health infrastructures with which to respond to the changes (IPCC, 2001; NRC, 2001). On the other hand, it is clearly understood that those living in the wealthiest nations, particularly those who live in North America, are the greatest emitters of the greenhouse gases that are contributing to this shift in climate.

Canada, with 0.5% of the world's population, is responsible for an estimated 2% of the net global greenhouse gas emissions (Canada, 2002). Canada is the ninth largest emitter nation in the world and among the highest emitters per capita (Canada, 2002). While to some extent, this pattern of energy use reflects the size of the country and its climate; it also reflects the inefficient use of energy in a country that has developed in an era of cheap and abundant energy.

The sectors that contribute most to climate change in Canada are:

- The transportation sector -- about 25% of GHG emissions in 1998;
- The oil and gas sector -- about 18% of GHG emissions;
- The electricity sector -- about 17% of GHG emissions;
- Industry responsible for about 15%;
- Buildings responsible for about 10%; and
- Agriculture and forestry responsible for about 10% (Canada, 2000).

## **10. Huge Reductions Required**

In 1996, the IPCC indicated that greenhouse gas (GHG) emissions would need to be reduced by 50% of 1990 levels in order to stabilize concentrations in the atmosphere and retard global climate change. In the third assessment report published in 2001, the IPCC concluded that GHG emissions may need to be reduced to a small fraction of current levels in order to stabilize atmospheric concentrations of CO<sub>2</sub> and retard global climate change (IPCC, 2001b). Under the Kyoto Protocol, Canada is committed to cutting its greenhouse gas emissions by 6% below 1990 levels between 2008 and 2012.

## **11. Recommendations to the Federal Government**

**The following actions could be taken by the federal government to address climate change:**

- Implement the Kyoto Protocol recognizing that it is only the first step towards the 60 to 80% reduction in greenhouse gases that will be required to retard global climate change;
- Improve fuel efficiency standards for vehicles;
- Provide municipalities with stable, long-term funding for public transit;
- Establish policies that encourage the movement of freight by rail rather than by road;
- Establish regulations to encourage the phase out of coal-fired power plants in Canada by 2012;
- Establish a schedule of ambitious and increasing renewable energy targets (e.g. 10% by 2010) to guide the development of energy policies, environmental regulations, and budgetary commitments at the federal level for the coming years;
- Provide financial support to renewable energies and fuels that is equal to that traditionally provided to conventional energy sources; and
- Establish a GHG emissions trading framework and tax policies that reward industry, agriculture and forestry for innovative technologies and/or practices that reduce greenhouse gas emissions.

## **12. Recommendations to the Province**

**The following actions could be taken by the province to address climate change:**



- Establish land-use planning policies that encourage compact urban form, the use of public transit, re-development of brown fields, the preservation of green-space, and the protection of ground water;
- Establish long-term sustainable funding to maintain and enhance public transit;
- Establish policies that encourage the movement of freight by rail, not road;
- Phase-out coal-fired power plants by 2007;
- Instruct the OEB to establish a shared savings mechanism that rewards utilities for investing in energy efficiency programs that effectively reduce electricity consumption and their customers' bills;
- Move immediately to revise the Ontario Building Code to incorporate the most advanced science with respect to renewable energies, co-generation and energy efficiency, and as a minimum, require that all new buildings meet the R-2000 standard;
- Establish programs to encourage energy efficiency retrofits in existing buildings; and
- Establish a schedule of increasing Renewable Portfolio Standards (RPS) (e.g. 10% by 2010) that encourages the development of renewable energies.

### **13. Recommendations to Municipalities**

#### **Municipalities can take the following actions to address climate change:**

- Develop Official Plans and strategic policies that encourage compact urban form, the use of public transit and alternate modes of transportation, the redevelopment of brownfields, mixed land uses that allow people to work and live in the same community, and regard for the impact of land-use policy on emissions of greenhouse gases;
- Establish ambitious energy efficiency programs that include specific targets and timelines for their corporate operations and ensure that financial savings are re-invested in energy efficiency projects and/or used to support purchasing policies that favour renewable energies and low emission generators;
- Develop and implement corporate purchasing policies that favour renewable energies and low-emission electrical generation; and
- Establish programs to encourage large organizations within their communities to establish ambitious energy efficiency programs;
- Encourage large organizations within their communities to adopt purchasing policies that favour renewable energies and low emission generators;
- Establish social marketing programs to encourage energy conservation and alternative modes of transportation among individuals in their communities;
- Establish policies that encourage community gardens, local food growers and the expansion of green space and urban forests;
- Implement policies that decrease the "urban heat island" effect with policies such as city-wide tree planting for buildings and parking lots; and
- Establish programs to mitigate the health impact of extreme weather events such as Heat Alert Programs.

## 14. Recommendations for the OPHA

**There are four ways in which the OPHA can be active on the issues of climate change:**

- The OPHA should continue to share with public health units: Information on climate change and its potential health impacts; and Information on the policies and programs that can be adopted to retard climate change or mitigate its health impacts;
- The OPHA should cooperate with, and form partnerships where appropriate, with other organizations that are doing research on the policies and programs needed to retard climate change and/or mitigate its impacts on human health;
- The OPHA should seek opportunities to raise public awareness about the health impacts potentially associated with climate change; and
- The OPHA should bring this resolution forward to the CPHA to address federal issues.

**Note:** The background material for this resolution has been adapted from the Climate Change section of the OPHA report, “Beyond Coal: Power, Public Health and the Environment”, that was published in November 2002.

### **Regarding resolutions, position papers and motions:**

**Status:** Policy statements (resolutions, position papers and motions) are categorized as:

**Active, if:**

1. The activities outlined in the policy statement's implementation plan have not yet been completed; or
2. The policy statement addresses an issue that is currently relevant to public health in Ontario.

**Archived, if:**

1. The activities outlined in the policy statement's implementation plan have been completed; or
2. The policy statement addresses an issue that is not currently relevant to public health in Ontario or is not based upon the most current evidence. The statement remains the position of the OPHA until a new statement is adopted that effectively reverses or essentially negates all or major elements of an earlier statement. In this instance, the former supersedes the latter

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