



## **Canada lags U.S. in fighting climate change**

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Some American jurisdictions are far ahead of Canadian ones in adopting measures to reduce carbon dioxide and aerosol emissions that bring about climate change, climate expert James P. Bruce told a meeting of the Group of 78.

Aimed particularly at the energy and transportation sectors, U.S. measures in a number of States include renewable content standards, and emission performance guidelines for electricity (including "green power" quotas). At the national level they include advanced vehicle initiatives to replace the gas guzzlers, and appliance and building standards. Measures undertaken in other industrialized countries include investment tax credits for "green" capital stock replacement, agreements with vehicle makers to improve efficiency, and greater support of public transport.

Under the Kyoto protocol, Canada agreed to reduce carbon dioxide emissions to 6 percent below the 1990 levels by 2010. But even if all countries meet their Kyoto obligations, Mr. Bruce said, the doubling of atmospheric carbon dioxide will be delayed by only a decade or two. In Canada, we will have to take steps to adapt to rising sea levels, water shortages in southern areas, warmer average temperatures in most parts of Canada but lower temperatures in Labrador, and inevitable boundary water disputes with the United States.

Starting as a weather forecaster, Jim Bruce in his early years established the flood warning system for Ontario and, with R.H. Clark, brought out a widely used textbook, *Introduction to Hydrometeorology*. He has headed both the Environmental Management Service and the Atmospheric Environment Service of Environment Canada and held top posts with the World Meteorological Organization in Geneva.

Now a Senior Associate of Global Change Strategies International, Inc., Mr. Bruce noted that climate has always affected resources and human activities, but only in the last couple of centuries have human activities changed the climate. Starting with the industrial revolution in the 19<sup>th</sup> century, carbon dioxide emissions began increasing, then soared in the 20<sup>th</sup> century, augmenting the natural greenhouse effect of trapping heat in the earth's lower atmosphere.

In the northern hemisphere the mean temperature followed the carbon dioxide pattern - fairly steady for about 900 years to 1900, then a sharp rise. Scientists started turning to

projections of what would happen if emissions of greenhouse gases were not curbed, and so far actual measurements have borne out their forecasts.

What can Canada expect? Projections to 2050 indicate 2-3 degrees Celsius warmer for most of the country (a little less on the West Coast), but about 4-5 degrees in the interior and northwest, and a cooling off in Labrador. This is similar to the pattern that has been observed to date.

The greatest warming in Canada will be in the spring, a little less in winter; the least warming will be generally in the autumn and summer.

Precipitation projections to 2050 indicate an increase all over Canada in winter. Summer would bring a decrease in much of southern Canada, and an increase in the north. Once again, observed data already indicate this trend.

Mr. Bruce said many models suggest more El-Nino-like conditions will occur with increased greenhouse forcing. This is still under debate in scientific circles, he added. If it proves correct, there will be less rainfall in southern Canada, with lower water flows and supply.

Melting ice fields worldwide will affect water flows and levels in B.C. and the Prairies, while projections of a rise in sea level increases the probability of flooding and erosion in coastal areas. Melting recorded so far includes a 14-percent reduction since 1978 in year-round Arctic Sea ice; a thinning by a metre a year in the south and east Greenland Ice Sheet; a retreat of 13 kilometres since 1982 of the Columbia Ice Field in the Rockies; a decrease in the number of glaciers in Glacier National Park in the Rockies from 150 in 1850 to 50 today, with a projection of zero in 2030; and finally, the loss of 1,914 square kilometres in 1998-99 from the Larsen B. Ice Shelf in Antarctica.

Climate extremes - storms, and flood and drought disasters - have been increasing worldwide, with the frequency of very damaging events increasing about two or three times more rapidly than earthquakes. Weather-related disasters bring in their wake rising costs to victims, governments, and insurers.

While countries like the United States, Canada, Japan and the countries of Europe and former U.S.S.R. remain the greatest sources of carbon dioxide emissions per capita of population, they are expected to be overtaken in a few decades in overall volume of emissions by the much more populous developing countries.

Mr. Bruce pointed out that measures to prevent climate deterioration and its heavy human and economic costs could themselves add to economic activity and employment, reduce local air pollution and lower fuel costs to consumers through greater energy efficiency.