

Brief to the House of Commons Standing Committee on Finance by the
Canadian Meteorological and Oceanographic Society (CMOS)

Executive Summary of Recommendations.

- 1. CMOS recommends the introduction of financial incentives to reduce net greenhouse gas emissions rapidly. These measures will complement the present incentives to reduce emissions by 2020 and 2050, and will encourage other nations to rapidly limit their own emissions.**
- 2. CMOS recommends that the Federal Government invest funds in the provision of science-based climate information, in order to ensure prosperity and a sustainable future for Canadians from an economic, social and environmental perspective.**
- 3. CMOS recommends the renewal of financial support for research into meteorology, oceanography, climate and ice science, especially in Canada's North, through independent, peer-reviewed projects.**

Recommendation 1 – Financial Incentives to Reduce Emissions.

The scientific evidence today indicates overwhelmingly that allowing the emission of greenhouse gases from human activities to continue unchecked constitutes a significant threat to the well-being and continued development of society. Since the signing of the Kyoto Protocol, global emissions have increased. In Canada, they are now 33% higher than our Kyoto target.

The Synthesis Report from the Climate Change Conference that took place in Copenhagen in March 2009 states that a temperature rise of 2°C will be difficult for contemporary societies to cope with and is likely to cause major societal and environmental disruptions through the rest of this century and beyond. Considerable support has developed, including by the G8 nations, for containing the rise in global temperature to a maximum of 2°C above pre-industrial levels. Beyond the 2°C limit, often referred to as the “2°C guardrail”, impacts will become very severe and many impacts will be irreversible.

The Intergovernmental Panel on Climate Change (IPCC) 2007 Report predicts a likely increase of global average temperature of about 1.2°C in years 2090 to 2100 compared to the year 1900, even if greenhouse gas emissions are zero after the year 2000. Global temperatures would be about 0.5°C higher without the human-generated aerosols and dust that presently cool the planet. The rate of future injection of dust and aerosols is expected to decrease as we move to a low-carbon world. Removing the cooling of aerosol and dust leaves the world very close to the 2°C guardrail. These numbers show that rapid reductions of greenhouse emissions are needed for this guardrail to be respected.

Though Canadian emissions represent only a small fraction of global emissions, it is important for a rich and developed nation such as Canada to lead by example. Only by showing leadership in addressing the problem at home will we be able to secure the

engagements of developing countries such as India and China. In addition, restrictions on our trade with other nations are a likely outcome if we do not respect international goals to reduce greenhouse gas emissions. We commend the federal government for its commitment to a “20% reduction in greenhouse gas emissions from 2006 levels by 2020, and a 60 to 70% reduction from the 2006 level by 2050¹”, however, more immediate actions are required.

Many of the greenhouse-gas-reducing projects are cost-effective and will provide a needed springboard for Canadian industry to lead the way to new climate-related global ventures generating new Canadian wealth and jobs. These greenhouse-gas reducing projects will help Canada achieve the objectives proposed in the 2007 federal document: *Mobilizing Science and Technology to Canada’s Advantage*.

CMOS recommends the introduction of financial incentives to reduce net greenhouse gas emissions rapidly. These measures will complement the present incentives to reduce emissions by 2020 and 2050, and will encourage other nations to rapidly limit their own emissions.

Recommendation 2 – Invest in Science-Based Climate Information

In order to ensure prosperity and a sustainable future for Canadians from an economic, social and environmental perspective, CMOS recommends that the Federal Government invest funds in the provision of science-based climate information. Canadians require such information to understand, anticipate and respond to climate, climate change, and climate variability.

Changes in climate affect important sectors of our economy, including agriculture, fisheries, forestry, energy, transport, and tourism:

- Climate is a key parameter in growing food. It controls the soil moisture level, the amount of sunlight plants receive and the conditions to which plants are subjected to on a daily basis.
- Ocean acidification threatens our marine resources. Acidification is progressing most rapidly in Canadian Arctic waters.
- For the oil and gas sector, climate variability and change threaten key infrastructures. In the Arctic, higher temperatures melt permafrost, thus threatening the foundations of roads, pipelines and electrical transmission towers. In coastal regions, storms can endanger offshore oil and gas rigs and related infrastructure. Likewise, climate conditions affect the amount of water available to hydroelectric power.
- The mountain pine beetle has expanded its range in Canada, destroying millions of acres of forests. It is recognized that climate warming has played a determining role in the infestation.

¹ A Climate Change Plan for the Purpose of the Kyoto Protocol Implementation Act 2009, page 3

Climate also plays a role in the social well being of Canadians:

- Studies indicate that climate warming will impact severely Canadians living in the North, where temperature rise is expected to be most rapid.
- Fundamental determinants of health, such as air quality, water availability, food and disease, are affected by climate.
- Weather extremes, such as droughts, wildfires and floods, are exacerbated by climate change and are very likely to increase in frequency and intensity.

The provision of climate information will enable Canadian citizens and Canadian industry not only to adapt so that negative impacts can be reduced, but also to recognize new opportunities:

- Knowledge of climate change helps farmers plan their crops. If water is projected to be scarce, for example, they can choose drought-resistant plants.
- Climate change impacts fisheries rapidly, and often mysteriously, through global changes in the ocean and wind patterns. Coordinated research among these disciplines will provide new insight.
- Understanding how climate is changing now, how it will change in the future and the consequences of those changes on energy demand will benefit a large sector of our economy.
- Climate change may soon open the Arctic to shipping, impacting Canadian sovereignty.

Weather and climate information, including prediction, have many similarities: both provide information on the way the atmosphere is behaving. But where weather information focuses on the short-term (minutes to months), climate focuses on long-term conditions (seasons to decades). Climate prediction requires an understanding of the interactions among atmosphere, ocean, ice and snow cover, and the land surface.

The last few decades have seen a remarkable progress in understanding the climate system. Continuing advances in **inter-seasonal** to **multi-decadal** prediction make possible the provision of pertinent, tailored climate information to the user communities.

Investing in the provision of climate information will require the Federal Government to enhance the development and sustainability of

- Atmospheric and oceanographic observation and monitoring,
- Research and modelling, and
- Adaptation and application programs.

The first two elements, observation and monitoring, research and modelling, already exist in Canada, but concerns have been raised. For example, Canada's climate monitoring north of the 56th parallel is sparse and does not meet the minimal guidelines set by the World Meteorological Organization. In addition, research and modelling activities, particularly in the academic sector, are at risk of being compromised severely by a lack of funding.

It is of primary importance that the federal budget include measures to ensure the integrity of the observing network, its expansion in the North, and an increased support to ocean, atmospheric and terrestrial climate research in federal laboratories and universities. Core

government department programs in oceanography, meteorology, climate and ice sciences must be synchronized with academic research programs. This ensures that government-funded research is used to carry out government of Canada mandates.

The establishment of climate adaption and application programs would require new investments and impetus. It will bridge the gap between the climate information developed by scientists and the practical needs of the public and of users in climate-sensitive sectors. It will also provide the public with much needed scientific education on climate issues. Several provincial governments and the private sector have already invested in programs of this nature (e.g., Ouranos in Quebec, and the Pacific Institute for Climate Solutions in British Columbia). The involvement of the federal government will bring synergy and completeness to these efforts.

CMOS recommends that the Federal Government invest additional funds in the provision of science-based climate information, in order to ensure prosperity and a sustainable future for Canadians from an economic, social and environmental perspective.

Recommendation 3 - Renew Financial Support for Research

Recent federal stimulus measures have targeted investment in infrastructure. CMOS believes such measures to be ineffective in the long term if not coupled with corresponding investment in the education of people, in knowledge and innovation. The long term prosperity of our country depends on our ability to develop into a knowledge-based society and it is important to look beyond the customary approach to innovation that focuses solely on technology-based solutions.

Previous economic crises have demonstrated that companies and nations that maintain and increase their investments in research and development during bad times emerge stronger and more competitive when the recovery begins. Canada must seize this opportunity to transform its economy.

The soundest basis for ensuring that research money is well spent is to provide continuing funds to the granting councils who can assess research proposals on their scientific merit as judged by anonymous peers in the research community. Proposals are ranked by relevance to Canadian and international society, as well as by excellence of the proponents and the innovation of the research. These criteria provide a proper balance to maximize benefit.

Three Canadian funding agencies offer examples of how these projects could be funded. The **Canadian Foundation for Climate and Atmospheric Sciences (CFCAS)** and the **Natural Science and Engineering Research Council (NSERC)** support research into oceanography, meteorology, ice and climate change. The Canadian program within the **International Polar Year Program (IPY)** provided scientists from all sectors with the funding they needed to achieve the goals of this intensive study year. IPY also connected academics with northern communities. These programs also provide funds that educate the next generation of Canadian scientists.

CFCAS, since its establishment in 2000-2001, has supported more than 150 projects, as well as two major initiatives and 24 networks of research among Canadian academics. The main themes of CFCAS are air quality, Arctic, northern and cryospheric science, climate change and its impacts on the physical environment such as water resources, and finally weather prediction and severe weather. One project is presently developing new techniques to determine the future of glaciers in western Canada. Other projects are concentrating on urban weather, ocean currents, Arctic and Atlantic storms, ice, marine life in the Arctic, impacts of aerosols on climate and improved weather prediction. CFCAS funding is especially needed to support coordinated, large scale networks across many universities. Unless renewed, funding for CFCAS will end in 2010.

International Polar Year (IPY) 2007-2008 was the largest-ever international program of scientific research focused on the Arctic and Antarctic regions. Thousands of scientists and researchers from more than 60 nations around the globe participated in IPY during the 24-month period beginning March 2007. The Government of Canada provided specific funding for this program, mainly through grants to Canadian researchers. IPY developed a more complete scientific understanding of the Canadian North, which can be applied to address issues related to our environment and the well-being of our communities. IPY is a good example of a peer-reviewed, independent funding program for scientists in the private sector, government and universities.

The Natural Science and Engineering Research Council (NSERC) provides research funds to university scientists and engineers for innovative science in all disciplines. The Council has a reputation of funding excellent projects that yield significant benefit for Canadians. This Council requires continuing strong funding to continue its mandate.

CMOS recommends the renewal of financial support for research into meteorology, oceanography, climate and ice science, especially in Canada's North, through independent, peer-reviewed projects.

About CMOS

The Canadian Meteorological and Oceanographic Society (CMOS) is the national society of individuals and organizations dedicated to advancing atmospheric and oceanic sciences and related environmental disciplines in Canada. The Society is the main non-governmental organization serving the interests of meteorologists, climatologists, oceanographers, limnologists, hydrologists and cryospheric scientists in Canada. The Society comprises some 1000 members, including scientists, academics, students, corporations, institutions and others who are involved in education, communications, the private sector and government. Membership is open to all who share an interest in atmospheric and oceanic sciences, their related sciences and applications. CMOS executive and members are available to provide additional insight on any of these recommendations.

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