



HOUSE OF COMMONS
CANADA

**REPORT OF THE STANDING
COMMITTEE ON ENVIRONMENT**



OUR PLANET ... OUR FUTURE

Including a compendium of Reports of the
Standing Committee on Environment with Index

June 1993

The Honourable David MacDonald, P.C., M.P.
Chairperson

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Environment

Environnement



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*Minutes of Proceedings and Evidence of the Standing
Committee on*

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Environment

Environnement

RESPECTING:

Pursuant to Standing Order 108(2), consideration of the
environment and the future

INCLUDING:

Eighth Report to the House:
Our Planet. . . Our Future

CONCERNANT:

Conformément à l'article 108(2) du Règlement, une étude
sur l'environnement et l'avenir

Y COMPRIS:

Le Huitième Rapport à la Chambre :
Notre planète. . . notre avenir

Third Session of the Thirty-fourth Parliament,
1991-92-93

Troisième session de la trente-quatrième législature,
1991-1992-1993

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The Standing Committee on Environment has the

honour to present its

EIGHTH REPORT

PREFACE

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PREFACE

In response to the urgent environmental crisis facing the earth, Canada's first Parliamentary committee dedicated to environmental issues was struck during the 34th Parliament. The House of Commons Standing Committee on Environment held its first meeting in April 1989, at which time the Honourable David MacDonald, M.P., P.C. was elected Chairperson. Since then, the Members of this Committee have worked to develop and apply the concept of sustainable development, to stimulate the dissemination of vital information on environmental issues, and to guide the Government of Canada with recommendations directed at improved environmental performance in Canada as well as enhanced international leadership.

This volume contains the text of each of the Committee's major reports and the Government's responses to them. It is intended to provide a record of the Environment Committee in this Parliament — to make available to members of the public, as well as public and private sector policy-makers and Parliamentarians, the materials the Committee has gathered and produced in the more than four years of its life. The information we have compiled in areas of climate change, ozone depletion, acid rain, federal-provincial issues, and emerging international obligations, is virtually all as current today as it was when our reports were issued. Our recommendations, some of which have been acted upon, remain important guides for government action. In order to make all of this information available in one text, the Appendices of the reports, including witness lists, have not been included. Also, the compilation is available in both official languages, but they have been bound separately.

In addition to compiling the reports of the Committee in this Parliament, we have added a brief new report. This report contains the results of two round-table sessions, convened in May 1993, on the future of the environment. At these two sessions, the Environment Committee sought the advice of five distinguished environmentalists: The Honourable John Fraser, Speaker of the House of Commons; Maurice Strong, Secretary General of the Earth Summit and now Chairman and Chief Executive Officer of Ontario Hydro; Jim MacNeill, Secretary General of the Brundtland Commission, Senior Advisor to the Secretary General of the Earth Summit, and Senior Fellow at the Institute for Research on Public Policy; Arthur Campeau, Ambassador for Environment and Sustainable Development; and Alan Emery, Director of the Canadian Museum of Nature. It is the hope of the Members that this brief report will provide some useful suggestions to our successors in the next Parliament, as well as to other Canadians working in sustainable development, as to the next crucial issues which will need to be tackled.

Our round-table sessions, which were extremely useful for Members, also provided a certain symmetry to the work of this Committee. When we embarked on our course in 1989, we began with three briefings on major issues affecting the environment, hearing from Jim MacNeill, Senior Fellow at the Institute for Research on Public Policy, Dr. Peter Pearce of the Faculty of Forestry at the University of British Columbia and Dr. Kenneth Hare, Chancellor at Trent University. Their testimony formed the substantive foundation for our work, and helped us identify the primary areas in which the Committee's work could contribute to the transition to sustainable development.

During its more than four years, the Committee's work included hearings on Environment Canada's Estimates, as well as Order-in-Council appointments. At various times, three Environment Ministers appeared: Lucien Bouchard, Robert de Cotret and Jean Charest. We

considered the *Canadian Environmental Assessment Act* and Bill C-22 which amended it, and met on the *James Bay Northern Quebec Agreement*. In October 1989 the Committee travelled to Washington to discuss acid rain with a number of United States Congressmen, and three Members attended the International Conference on Pollution of the Seas, in Copenhagen, Denmark. Several Members of the Committee participated in the Second World Climate Conference in Geneva in November 1990, as part of the official Canadian delegation. In May 1991, five Members travelled to Quebec City to discuss the clean-up of the St. Lawrence Basin and the Great Lakes with four Congressional colleagues from the U.S.A. Five Members travelled to Vancouver in March 1990 for the Globe 90 Conference, an environmental industry trade fair, and several Members attended Globe 92.

Aside from the Committee's major studies, we also considered the following environmental issues and programs: development in the Arctic National Wildlife Refuge in Alaska; transboundary toxic air pollution; old growth forests; the Greening the Hill program; Newfoundland's off-shore fishery; environment and economy; the environmental assessment review process; the United Nations Development Program's *Human Development Report*; and Canada's Green Plan. The Committee had meetings with representatives and officials of other governments, including the United States, Australia, Norway, the Netherlands, Sweden and the United Nations.

The Committee launched its first major study, on global warming and climate change, in October 1989. After more than 120 meetings, we produced three reports in the series *Our Changing Atmosphere*: the first, *Deadly Releases: CFCs* was tabled in June 1990; our interim report on global warming, *No Time to Lose: The Challenge of Global Warming*, was released in October 1990; and in March 1991 our final report on global warming — *Out of Balance: The Risks of Irreversible Climate Change* — was tabled in the House of Commons. These reports were the product of extensive hearings, and resulted in the most comprehensive study of these issues by elected officials to date. Evidence on global warming was taken from more than 100 witnesses, and over 100 written submissions were received.

In September 1991, the Committee commenced its timely study of Canada's constitutional division of powers over the environment, which resulted in the report entitled *Environment and the Constitution*, which was presented to the Special Joint Committee on a Renewed Canada in February 1992, and which was tabled in its final form in March 1992. The Report's 15 recommendations were not only addressed to the Government of Canada's package of constitutional proposals, *Shaping Canada's Future Together*, but also to Canada's continuing division of powers, and they remain relevant and compelling as guides for improving Canada's framework for governing in the area of the environment.

In April 1992, a one-day forum on ozone depletion was held, of which a video was produced for distribution, and in June 1992 a report, *Ozone Depletion: Acting Responsibly*, was released. Also in June 1992, the Subcommittee on Acid Rain travelled to Washington, D.C., and the resulting report, entitled *From Words to Action*, was tabled in the House in December 1992.

The Committee began its preparations for the United Nations Conference on Environment and Development (UNCED) in December 1990, with meetings on the preparatory work being done in the development and environment communities in Canada. Further sessions in May and November 1991 were held to review the state of voluntary sector and government preparations with Canadian officials and the Task Force on UNCED. In June 1992, most of the Members of the Committee attended UNCED at Rio de Janeiro, Brazil, and they contributed in an active and significant way to the work done there. Wishing to continue that work, the Committee began a study in November 1992 of the UNCED Conventions and Canada's follow-up to Rio. The resulting

report, *A Global Partnership: Canada and the Conventions of the United Nations Conference on Environment and Development*, was tabled in April 1993. Its 23 recommendations set out the actions which the Committee views as essential in order for Canada to fulfil its obligations under the Conventions signed at Rio.

Finally, we would like to express our gratitude to the many individuals and services for their support and dedication throughout the Parliament; to our Clerks, Research Officers, interpreters, translators, Publications Service of the House, our witnesses and readers, we say thank you. It has been an honour and a privilege for us to participate in this rewarding effort. The vision and commitment of all Committee Members has enabled us to work with a collegial and cooperative spirit rarely experienced in Parliament. The non-partisan tone of our proceedings is reflected in the content of this volume. We hope that in the next Parliament this same spirit will prevail so as to ensure the ultimate success of the move to sustainable development.

ROUND TABLE — HIGHLIGHTS

This short summary lists some of the insights of the five Canadians who addressed this Committee — John Fraser, Maurice Strong, Jim MacNeill, Arthur Campeau, and Alan Emery — providing their views as to the crucial environmental issues which will face our successors in the 35th Parliament, and indeed, all Canadians. We have briefly identified each key issue which these witnesses highlighted. We share and support these ideas.

- **We cannot survive our present course.**

Maurice Strong:

I believe that if we continue on our present course, life as we know it will not survive the 21st century. Indeed our grandchildren, even in this blessed nation, will be experiencing a very severely deteriorated quality of life if we continue on our present course. (65:35)

- **Humankind has the responsibility and probably the ability to save the globe.**

John Fraser:

The unprecedented responsibility of the human family today is to protect and restore the biosphere and to provide for the basic needs of all the peoples of this earth. (65:5)

Alan Emery:

It is no longer nature itself that is managing the biosphere, it is we, a single species, who are managing it. (67:22).

- **Our security is at stake, and we have not recognized it yet.**

Maurice Strong:

Our security, I would contend, Mr. Chairman, is at stake more today in the dangers we face to life on earth itself than it has ever been from any of the other traditional military threats we have faced. We have to respond in the same manner. There is no question that the resources are available if our priorities are reordered to make them available. (65:12)

Arthur Campeau:

My concern was our apparent inability as a species properly to internalize, to understand the significance of the incremental changes that our scientists are recording that are as plain as those other threats to our security that our senses do allow us to perceive. Our species, as a species, does not yet appear to have evolved the ability to internalize this information and to act with the kind of gravity and urgency that it requires. (65:45)

- **Although our scientific understanding is incomplete, there are some unexpected and crucial warning bells sounding, such as reduced biodiversity, coral bleaching and disappearing amphibian populations.**

Alan Emery:

At this point science is so poorly informed that we can't even tell for sure, within a factor of 10, how many species there are, let alone what they do. We can describe the ecology and behaviour of maybe 1% of the species on this planet. We can give you a name for 5%. (. . .) We don't really have good predictive models. Even our best models, the resource management models for single species, fisheries for instance, are really relatively unreliable. (67:18)

The rate of loss of species today is approximately the equivalent of what it was during the time when the dinosaurs vanished from the face of the earth. (67:21)

- **What we need is a revolution in our thinking.**

John Fraser:

Of course the revolution required of us all is a revolution in our thinking. To change our thinking we must embark on a journey of collective learning, and to do this by education in its broadest sense. (65:6)

Alan Emery:

I submit to you that the decision-makers of tomorrow are the children of today (. . .) You have to teach them the values of the biosphere. You have to present them with correct attitudes. (. . .) The more of an effect that we have on our kids, the more of an effect we will have on the future of the planet. (67:32)

- **Canadians have a special responsibility to the world.**

Maurice Strong:

There's another sense in which Canadians cannot absolve themselves from a special responsibility, I would contend, because we occupy one of the largest pieces of the world environment. Canadians individually, with our modest population in relation to the size of our country, really have stewardship on a per capita basis of more of the world's environment than almost any other people. (65:26)

- **A major reordering of our economy is necessary.**

Maurice Strong:

We simply cannot survive the pathway we are on. And we are not going to change it by little shifts in development assistance policy, or even environment policy. We're only going to do it through fundamental economic change. (65:44)

There are literally billions of dollars now at work in our economy and in government budgets that are *de facto* subsidizing activities that are environmentally unsound and unsustainable. In fact, a portion of the moneys being misallocated towards unsustainable practices would finance Agenda 21. (65:38)

Arthur Campeau:

Yes, there will be sectors that will be impacted on. The challenge for us is to identify those sectors and design the kinds of programs to retrain, to ensure that these men and women who are an important part of our society, who must be part of the efforts, are afforded the opportunity of making a meaningful and lasting contribution to the development of this economy. (65:27)

Jim MacNeill:

Consumption is now growing at a very rapid rate. Mainly in the North, unfortunately, we could increase our productivity without increasing the consumption of resources, but we're not doing that. (67:15)

- **Canada must fulfil its international obligations.**

Jim MacNeill identified the following concrete steps that must be taken in the transition to sustainable development:

- the UNCED Conventions need to be strengthened: targets and timetables should be added to the *Convention on Climate Change*; and international measures to strengthen the *Biodiversity Convention* should also be pursued; (67:11)
- domestically, we need a program, involving the provinces, which sets out clearly and precisely how we will achieve stabilization of carbon dioxide emissions at 1990 levels by the year 2000; (67:12)
- we should become the first of the nations in the world to achieve the Brundtland Commission's target of protecting 12% of our surface; (67:12)
- there is a need to quick start Agenda 21, domestically and in developing countries. (67:13), in particular by developing a national Agenda 21, a task which could be delegated to the National Round Table on Environment and the Economy; (67:13) and
- we should evaluate the way we raise and spend money: in particular, "our current systems of incentives". (67:14)

Referring to the Committee's report on UNCED and Canada's follow-up, *A Global Partnership*, Maurice Strong told the Committee:

If this government were to follow your recommendations, there is no question that Canada would clearly continue to be up front in its leadership in respect of the issues dealt with by the Earth Summit. (65:7)

There is also this suggestion from Maurice Strong:

There is no question that the UN will in fact be an instrument for reflecting, coordinating, and indeed fostering the responses of governments and people. (. . .) I think that this instrument can be made to work, but within a United Nations that very, very badly needs a strong refurbishing and revitalization and a recommitment of the nations to it as it approaches its 50th anniversary. (65:40-41)

- **Political and policy reform is necessary to the transition to sustainable development.**

Jim MacNeill:

Although we are in an environmental recession, we are going into another environmental upturn, in another two or three years, depending on the economy, the time could well be ripe for action. (. . .) It would be nice if, before that, you and your colleagues in other parliaments will have figured out ways and means to package these proposals in ways that make them politically attractive. (67:16)

[Can] you and your colleagues in other countries find ways to package these urgently needed reforms in ways that make sense politically, that make them political winners? (67:16)

...We've given very little attention to how we might package some of these proposals in ways that make them appear politically attractive. Some work is going on in that regard at some institutes with which I am familiar in Europe. In Germany there is a debate on how it might be possible gradually to shift the basis of the tax system from its current focus on what I call public goods — ie. income, job creating, investment and savings — to public bads — pollution, resource depletion and certain high-impact products. (67:29)

TOWARDS A SUSTAINABLE FUTURE

THE ENVIRONMENTAL CRISIS

The changes that humankind has wrought on the planet Earth have begun to threaten our own quality of life, the survival of the other species with whom we share the biosphere, and may ultimately threaten our very survival. The Members of the House of Commons Standing Committee on Environment, having devoted themselves to the study of a significant number of major environmental issues during this Parliament, are concerned that Canadians, and others around the world, have not yet sufficiently realized that the way we live and behave affects the natural environment, nor the extent to which we will have to change in order to reverse the devastating trends which have already been set in place.

A. The State of the Earth

Lester B. Brown, president of the Worldwatch Institute, recently mused that anyone who regularly reads the financial papers or business weeklies would conclude that the world is in reasonably good shape and that long-term economic trends are promising.

Yet on the environmental front, the situation could hardly be worse. (. . .) Every major indicator shows a deterioration in natural systems: forests are shrinking, deserts are expanding, croplands are losing topsoil, the stratospheric ozone layer continues to thin, greenhouse gases are accumulating, the number of plant and animal species is diminishing, air pollution has reached health-threatening levels in hundreds of cities, and damage from acid rain can be seen on every continent.¹

Maurice Strong, when asked by the Environment Committee to offer his perception of the world of tomorrow, stated:

I believe that if we continue on our present course, life as we know it will not survive the 21st century. Indeed our grandchildren, even in this blessed nation, will be experiencing a very severely deteriorated quality of life if we continue on our present course. (65:35) Mr. Chairman, the present course we are on is like a cancer headed for terminality. We simply cannot survive the pathway we are on. (65:44)

In a very similar tone, Alan Emery, told the Committee that the biological indicators of the planet are already exhibiting the tell-tale signs of severe ecological mismanagement.

Biodiversity is really a bellwether. It's kind of an index for the overall health of the planet. When it falls, we are accumulating ills; when it rises, we are doing well(. . .) in times of stress biodiversity falls. In extreme situations the mismanagement of biodiversity can cause and has caused major local problems, such as(. . .) the current sub-Saharan agricultural failures, and similar collapses due to over-exploitation(. . .)

³³ Lester R. Brown, "Economics Versus Ecology: Two Contrasting Views of the World", *Ecodecision*, June 1992, p. 19-22.

It is indeed possible that a runaway decline in biodiversity can be started by human activities. (. . .) the rate of loss of species today is approximately the equivalent of what it was during the time when the dinosaurs vanished from the face of the earth. (67:21)

Figure 1

Percent of Tropical Forest Species Likely to be Sentenced to Extinction in Coming Decades *

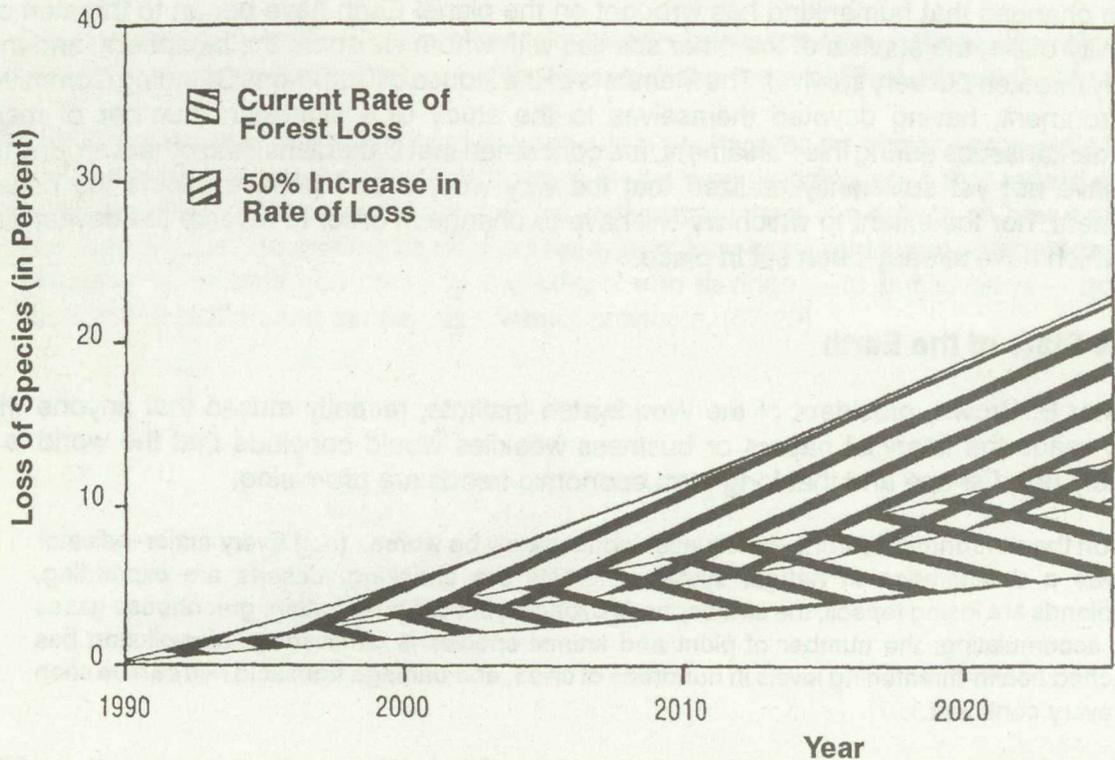


Figure 1: Tropical forests contain at least 50% of the world's species. Known species-area relationships enable one to reasonably estimate species loss. At least 10% of tropical forest species will be lost by 2025 AD at the present rate of forest cutting, more than 20% if cutting is doubled.

The indivisibility of the environment from the economy is underlined by the economic repercussions of the ecological disasters that have struck with increasing intensity around the world in recent years. Jim MacNeill mentioned the famines in Africa, the oil spill off the Shetland Islands, and the collapse of fisheries – all of which have had disastrous economic consequences for those affected by them. He reminded us that the economic loss occasioned by environmental degradation should not surprise us, nor should the link between our economic policies and continued environmental destruction.

Beginning with *Our Common Future*, report after report has established that current fiscal, tax, and sectoral policies are the principal culprits behind the dismal trends. (67:14)

* Figure provided by the Canadian Museum of Nature.

Jim MacNeill pointed out that although most environmental policy recommendations made after the release of the Brundtland Report have made economic sense, they have not been implemented.

B. Over-population

At the Earth Summit, the acrimony between rich and poor nations clearly identified the two overarching problems facing humanity, excessive consumption in the "North" and over-population and deprivation in the "South". In essence all other problems, ozone depletion, climate change, species extinction, desertification, are but symptoms of this greater malaise.

During the past 10,000 years, the world's human population slowly increased in number to approximately 500 million by 1000 A.D. The population doubled by 1800, doubled again during the following century, and is now approaching 6 billion. A cautious medium projection suggests that there will be more than 8 billion people by 2030 and that population stabilization will be eventually achieved at about 10 billion.² A World Bank projection indicates that the plateau level will not be less than 12.4 billion; while Nafis Sadik, Director of the United Nations Population Fund, believes: "the world could be headed toward an eventual total of 14 billion."³ At this point stability will not have been achieved through human enlightenment, but rather by the harsh realities of nature, a population increasingly affected by famine and disease. The scientific advances in medicine and agriculture that enabled this population explosion can not be sustained.

Billions of people are mired in desperate poverty. For these people, concern for the environment takes a very distant back seat to the problem of where the next meal is coming from. People are understandably reluctant to sit still and starve. Martin Holdgate, Director General of the World Conservation Union, said:

Now, as in the past, if populations deplete their environmental resources regularly and over significant areas, they are likely to migrate, and finding a frontier here or a different government there is unlikely to deter them. As an increasing number of people come up against environmental limits, real threats to the peace and stability of nations will arise.⁴

Maurice Strong forewarned the Committee:

Our security (. . .) is at stake more today in the dangers we face to life on earth itself than it has ever been from any of the other traditional military threats we have faced. (65:12)

C. Over-consumption

Many inhabitants of developed nations view the teeming billions of the Third World as an immediate threat to the environment and their way of life. Accordingly, it comes as a great surprise to learn that the populations of the "North" place a far greater burden on the environment. It has been roughly estimated that a Canadian baby over its lifetime will consume 70 times more of the

² Martin Holdgate, "The Environment of Tomorrow", *Environment*, Vol. 33, 1991, p. 14-20 and 40-42.

³ Robert McNamara, "The Population Explosion", *The Futurist*, Nov./Dec. 1992, p. 9-13.

⁴ Martin W. Holdgate (1991).

world's resources than will a child born in Bangladesh.⁵ As witnessed at Rio, the developing world is adamant that the immediate threat is not over-population but rather the failure of rich nations to equitably share the world's resources. On the other hand, it must be realized that if the consumption levels of the "South" were to approach those of the "North", the world's resources would be depleted within but a few decades.

Over the twenty year period of 1970 to 1990, world industrial output grew by nearly 100%, or an average increase of 5% per annum.⁶ In contrast, world population in 1991 was climbing at a rate of 1.7%.⁷ Although our rate of population growth is very serious, the rate at which we are depleting our natural and nonrenewable resources and polluting our environment is even more alarming. The populations of wealthy nations have a negative impact on their environment primarily through their consumption activities and affluent lifestyles. These directly consume natural resources, generate wastes, produce polluting emissions, and occupy valuable land.

The consequences of massive and ever-increasing consumption can clearly be seen in the effect developed countries have on the world's resources. Deposits of minerals and fossil fuels are being drawn down. There is no plan and no sufficient capital investment program to power the industrial economy after the fossil fuels are gone. Pollutants are accumulating; their sinks are overflowing. The chemical composition of the entire global atmosphere is being changed.⁸

D. Economies out of Balance

Ecologists and economists view the state of the world from intellectual frameworks so distinct as to provide little or no common ground. Ecologists think in terms of closed cycles, where all growth processes are limited, confined within the natural parameters of the earth's ecosystem. The ecological view holds that continuing the single-minded pursuit of growth will eventually lead to economic collapse. Only by the restructuring of economic systems in accordance with the biosphere's carrying capacity can world economic health be sustained.

Lester Brown points out, that in stark contrast, economists are: "guided largely by economic theory and indicators, seeing the future more or less as an extrapolation of the recent past."⁹ Further, there is strong faith that scientific advances and new technologies will continually push back the limits to growth. From this point-of-view there is little reason to be concerned about natural constraints on human economic activity. Indeed, it is rare for an economic text to mention the

⁵ David Suzuki, "Mother Earth Must See a Drop in Consumption", *Guelph Mercury*, 5 April 1993, p. A9.

⁶ Donella Meadows *et al.*, *Beyond the Limits*, Chelsea Green Publishing Co., Vermont, 1992, p. 37.

⁷ *Ibid.*, p. 23.

⁸ *Ibid.*, p. 99.

⁹ Brown (1992)

principle of carrying capacity which is so basic to ecology. Unfortunately this view prevails in the worlds of industry and finance, and in national governments and international development agencies.¹⁰

Why are the economic indicators so encouraging? The principal reason is that national accounting systems omit entirely the environmental debts the world is incurring. The result is a disguised form of deficit financing. We are consuming our natural capital at an alarming rate. This problem was most aptly defined when one of the world's few environmentally-minded economists, Herman Daly, remarked: "There is something fundamentally wrong in treating the Earth as if it were a business in liquidation."¹¹

The general failure of governments to honestly integrate environmental considerations into economic decision-making was addressed by Jim MacNeill:

In my view (. . .) [the] environment has for too long been the victim of what I call "Sunday school politics": feel-good rhetoric, plant-a-tree ceremonies, save-the-world environmental agencies established with noble speeches and then marginalized with minimal powers and token budgets (. . .) token programs to promote soil conservation, and afforestation and energy efficiency. This is while the real money goes into traditional incentives that promote the opposite: soil erosion, deforestation, higher levels of fossil fuel production, and consequently, higher levels of air pollution, acid rain and global warming. (67:7)

The classic tale of "environmental Sunday school politics", told by Norman Myers, British environmentalist and senior fellow of the World Wildlife Fund, warrants recounting as it exemplifies the complete dissociation between good environmental intentions and the reality of government actions.

A week in October 1989 began with the leader of a G7 country convening a cabinet meeting on Monday to announce the national intent to confront global warming forthwith. On Tuesday, the treasury announced a set of tax breaks in favour of large-size executive cars. On Wednesday, the Ministry for Transport unveiled a major program to expand the network of motorways. On Thursday, the government slashed the budget of the Energy Research Office. And on Friday, the treasury reduced subsidies for better insulation of buildings.¹²

THE EARTH SUMMIT

A. The Shortcomings

As stated in the Committee's report *A Global Partnership*, the degree to which the *United Nations Conference on Environment and Development* (UNCED) can be considered a success will only be known in time. While apparently a major political success, UNCED failed to recognize and grapple with the linkage between the world's environmental crisis and its dominant model of economic development. Jim MacNeill described the disappointing shortcomings of UNCED:

¹⁰ *Ibid.*

¹¹ *Ibid.*

¹² Norman Myers, "The Question of Linkages in Environment and Development", *BioScience*, Vol. 43, 1993, p. 302-310.

The sad fact is that governments did not commit themselves, individually or collectively, to implement any concrete measures to reduce catastrophic rates of population growth, or to alter certain consumption patterns, say in fossil fuels. Nor did governments agree on any measures to roll back mass poverty, reduce the debt of poor countries — some voluntary announcements were made, but no collective agreement to increase poor-country access to rich-country markets. There is nothing in the conventions on climate change and biodiversity that binds governments to concrete measures, with targets and timetables, to reduce emissions of carbon dioxide and other greenhouse gases or to reduce high rates of deforestation or species loss. (67:10)

So, the sad bottom line is that governments did not agree to implement any measures that would alter the dismal trends that brought them to Rio.

Our leaders left almost nothing unsaid and almost everything undone. (67:11)

B. The Successes

In spite of its many shortcomings, Maurice Strong and Jim MacNeill assured the Committee that UNCED had achieved success on a number of fronts. There is no doubt that as an event Rio was not only historic, it was a political success. It brought together the largest array of world leaders ever assembled at a summit, it brought forth a new generation of industrial leaders, and signalled the arrival of NGOs as a real force in international diplomacy. UNCED generated great publicity and raised the level of public awareness. Most important, however, it was the first time such a large body of world leaders unanimously acknowledged the gravity of the environmental crisis.

Maurice Strong reminded the Committee that agreement was achieved on Agenda 21, the most comprehensive and far-ranging program of specific actions ever agreed on by the international community.

Agenda 21 was in fact agreed to by all the governments in the world, 180 of them, word by word, sentence by sentence, and that gives it a unique political authority. The fact that agreement came at the level of the heads of state really adds to that authority. (65:9)

Maurice Strong contends that, far from being a drag on the economy, the freeing up of resources required to implement Agenda 21 will in fact regenerate, revitalize, world economies. Already a number of countries have undertaken Agenda 21 initiatives. China, for example, has ordered every single ministry and agency to examine its policies and programs in relation to Agenda 21.

In addition, the world governments acted on one of the principal institutional recommendations of UNCED, which was the creation of the United Nations Commission on Sustainable Development. The Commission's main tasks are "... to ensure the effective follow up of the Conference, as well as to enhance international cooperation and rationalise the intergovernmental decision-making capacity for the integration of environmental and development issues and to examine the progress of the implementation of Agenda 21 at the national, regional, and international levels, fully guided by the principles of the Rio Declaration on Environment and Development, in order to achieve sustainable development in all countries."¹³

Canada is represented on the Commission by Arthur Campeau, who was elected as a vice-chairperson, to fill the position allotted to the Western, European, and other countries group. Arthur Campeau told the Committee that Canada, as a member of the Commission, would be pursuing the following priorities:

¹³ UN Document A/C.2/47/L.61, paragraph 2, 1992.

... To ensure the development of national reports and plans, (. . .) ensuring transparency in the Commission's work by involving indigenous, business, and scientific groups, as well as the environmental and development NGOs and all other independent sectors; as well, to provide impetus for the development of new international law; to build cooperation on forest management and the conservation and sustainable development of all types of forests; and to support the work of the UN Conference on High Seas Fishing. (65:18)

Arthur Campeau also described Canada's domestic institutional response to Rio, the establishment of *Projet de société: Planning for a Sustainable Future*. *Projet de société* had its roots in the Canadian preparatory process for UNCED, and now acts as a network of partners within a "multi-stakeholder process" to develop national, sectoral, and community plans for a sustainable future. It is the intention of the *Projet de société* to produce an initial report in June 1993 which will include the following elements: first, a framework for a national sustainability plan that would not be a government plan but would be seen as a statement of the commitment of all Canadians to move toward sustainability. Second, there would be information on the process itself, a process based on voluntary participation, cross-sector consensus-building, and coordination. The document would identify Canadian positions, commitments, and actions that have been taken relative to the goals of the Earth Summit and provide a snapshot of work on sustainability being carried out by national stakeholders and their constituencies, including government, business and NGOs. Arthur Campeau suggested that the *Projet de société* may serve as a valuable model to the Commission on Sustainable Development as the Commission develops its process to monitor the progress of states in achieving the agreements and commitments of UNCED. (65:19-21)

UNCED lead to two international conventions: *The Convention on Biological Diversity* and *The United Nations Framework Convention on Climate Change*, which, respectively, were signed by 162 and 154 nations. (62:22,36) The conventions were weakened by a lack of targets and timetables. The success of the conventions will depend upon the extent to which they are implemented and strengthened. The election of the new Clinton-Gore Administration in the United States has done much to brighten the prospects for strengthening of the conventions. President Clinton and Vice-President Gore announced on Earth Day (April 22, 1993) that the United States will sign the *Convention on Biological Diversity*, and will move to establish climate change targets and timetables. Jim MacNeill encouraged the Canadian Government to fully back and support the United States Government in its new environmental direction.

TOWARD DOMESTIC AND GLOBAL ACTION

A. Immediate Action

The environmental crisis is evident, time appears short; however, clear-cut scientific solutions are not yet obvious. What must be done? According to a 1990 World Bank article on global warming: "When confronted with risks which could be menacing, cumulative and irreversible, uncertainty argues strongly in favour of prudent action and against complacency."¹⁴ As Jim MacNeill stated, the necessary first steps for Canada are clear, action must be taken immediately to put Canada's "truly advanced environmental rhetoric" into practice.

¹⁴ Eric Arrhenius and Thomas Waltz, "The Greenhouse Effect: Implications for Economic Development", Discussion paper no. 78, Washington, D.C., World Bank, 1990.

... If we are to be credible on this (. . .) we simply have to put our own house in order. In Rio we confirmed our commitment (. . .) to stabilize carbon dioxide emissions at 1990 levels by the year 2000. (. . .) we need a domestic program involving the provinces, which sets out clearly and precisely how we will achieve stabilization by 2000, then move beyond it. With only seven years to go until 2000, we've got to move urgently on that program. (67:12)

As soon as a domestic program is established, Canada should collaborate with like-minded nations to tighten the provisions of the two conventions signed at UNCED, by pressing for firm targets and timetables. At Rio, Prime Minister Brian Mulroney announced a number of steps to quick-start the implementation of sustainable development. (62:13) It is essential that the post-Rio momentum on the conventions be maintained and the "quick-start" steps and the Canadian commitments be carried to completion.

B. Official Development Assistance

At Rio, the leaders of the Third World made the plight of their countries, and what they perceived to have caused it, abundantly clear. These leaders argued that the real problem of the global environment is chronic poverty, which has been imposed and aggravated by the economic dominance of developed countries. They contend these countries grew rich by exploiting the raw materials of poorer countries and that rich nations continue to consume more than their fair share of those resources, to control commodity markets in favour of their own terms of trade, and to depress the growth of the Third World by issuing loans that benefit the lender far more than the recipient.¹⁵

Whether or not this view is completely justified, it can not be denied that hundreds of millions of people are mired in hopeless poverty. The desperately impoverished of the world strain the environmental limits and pose a security threat to developed nations. "We ignore the marginalized at our collective peril." (46:13) Obviously it is in our best interests to assist the developing world to the best of our capacity.

Agenda 21, to which all nations agreed, set 0.7% of Gross National Product (GNP) as the target for Official Development Assistance (ODA). The Committee finds it lamentable that Canadian ODA, which in 1992 was only 0.45% of GNP, is dropping even further away from the goal our leaders agreed to at Rio. On the topic of ODA Maurice Strong stated:

On the financial side, I would have to say nobody's performance at this stage is very encouraging; and I can't exclude Canada. We have had some significant reductions in our foreign assistance. I deeply regret that. I think Canadians will have cause to regret that deeply. (65:11)

What is needed is a reorientation of our priorities. We've always done that when our security was threatened. (. . .) When the war came, suddenly we were able to commit vast amounts of money. Our security was at stake.

Our security, I would contend, Mr. Chairman, is at stake more today. . . (65:12)

¹⁵ Holdgate (1991).

This Committee, in its report *A Global Partnership*, expressed the belief that the restructuring of ODA was, perhaps, as important as the level of aid going to developing countries. This sentiment was also expressed by Arthur Campeau:

We no longer talk about humanitarian assistance. Although this looks like humanitarian assistance, we are in fact talking about an investment into the future for all of us. (. . .) It is not sufficient to transfer big sums of money to the countries who request it and to consider that we have reached our objectives solely according to the amounts that we transferred to these countries.

What is important, is the quality of investments that we make into these developing countries. It is incumbent upon the developing countries themselves, through national strategies, through a national plan, to tell us precisely what investment they need, so that we can solve the problems that they have identified as being their priorities. (65:39)

It is now recognized that the old forms of foreign assistance often supported unsustainable programs and projects, and contributed to the Third World's crippling foreign debt. Today, developing nations owe \$1.3 trillion (U.S.) to developed nations, requiring annual interest payments of \$200 billion. This immense debt has tremendously negative socioeconomic and environmental repercussions. For example, it encourages the destruction of tropical forests and the cultivation of cotton and peanuts to supply revenue-earning cash crops for export to developed nations. This causes deforestation, decreased food production, soil erosion, and, as in sub-Saharan Africa, desertification.¹⁶

The past mistakes made in supplying foreign assistance clearly signal the need for wealthy nations to establish specific criteria, or conditions, for the disbursement of aid. In our report *A Global Partnership* a majority of Committee members recommended that the Government of Canada consider using ODA as an inducement to discourage military spending, and to link ODA to programs in developing countries that support environmental protection, sustainable development, and human development (health care, education, population control, and in particular the empowerment of women through literacy). (62:18)

The benefits of focusing spending on education and health have been illustrated in one of India's poorest states, Kerala. Despite the fact that Kerala has a per capita GNP considerably less than the Indian average, life expectancy in Kerala is now more than 70 years as compared to 59 years for India as a whole.¹⁷ Amartya Sen, professor of economics and philosophy at Harvard University, asserted:

Such an accomplishment in the face of very low income and poverty is the result of the expansion of public education, social epidemiological care, personal medical services and subsidized nutrition.¹⁸

¹⁶ Myers (1993).

¹⁷ Hazel Henderson, "New Indicators for a Changing World", *Ecodecision*, June 1992, p. 60-63.

¹⁸ Amartya Sen, "The Economics of Life and Death", *Scientific American*, May 1993, p. 40-47.

Perhaps most remarkable, Kerala's 1951-1961 birth rate of 44 per 1,000 plunged to 20 per 1,000 by 1990. According to Amartya Sen, Kerala's birth rate is similar to China's rate of 21 per 1,000, but is accomplished "without any compulsory birth control policy and without the problem of female infant mortality."¹⁹

The pollutants that threaten to perturb global climate, destroy stratospheric ozone, and accumulate in living systems come overwhelmingly from the developed countries of the Northern Hemisphere, and their spread imposes extra burdens on the nations experiencing the worst of the other trends. "Simply put, the poor are in a mess, and the rich are making that mess worse."²⁰

Arthur Campeau addressed this problem and put forward the concept of "burden sharing". That is, when tackling a global problem such as greenhouse gas emissions, to invest in a developing country "where you can get the biggest bang for the buck". (65:28) It should be noted that this Committee, in its report *A Global Partnership*, suggested that improvements to the operation of a Chinese coal-fired utility would likely yield far greater reductions in the emission of gaseous contaminants than would the same expenditure on a relatively modern utility in Canada. (62:47)

Agenda 21 addresses the need for technology transfer to developing nations. In a general or universal sense it is held that technology transfer is an essential component for the successful promotion of sustainable development in developing countries. However, one Committee member questioned the wisdom of transferring environmental technologies to a developing country with the scientific expertise to develop, produce and market silkworm missiles. This realization very effectively underscores the necessity for rich nations to carefully assess and prioritize the disbursement of their ODA. It also suggests that rich nations may not fully appreciate the extent of the technical and scientific capabilities of many developing countries. Such a lack of understanding may lead to an albeit innocent but patronizing position.

Amartya Sen also challenges the assumption that the poor are too destitute to improve their circumstances; and uses Sri Lanka as a case study. Early in this century Sri Lanka promoted literacy and schooling programs. In the 1940's medical services were massively expanded, and in 1942 it started distributing free or subsidized rice to bolster the nutritional intake of undernourished people. In 1940 the death rate was 20.6 per 1,000, by 1960 it had fallen to 8.6 per 1,000.²¹ In 1987 average Sri Lankan life expectancy topped 71 years and the adult literacy rate was 87%.²²

The fact that a poor country can achieve improvements in health care and life expectancy that, in many ways, rival those of wealthier nations has tremendous policy implications. This ability challenges the often expressed opinion that a developing country can not afford expenditures for health care and education until it is richer and more financially sound. According to Amartya Sen:

¹⁹ *Ibid.*

²⁰ Holdgate (1991).

²¹ Sen (1993).

²² Henderson (1992).

This view ignores relative cost. Education and health care are labour intensive, as are many of the most effective medical services. These services cost much less in a cheap labour economy than they do in a wealthier country. So, although a poor country has less to spend on these services, it also needs to spend less on them.²³

Although circumstances will undoubtedly vary from country to country, it is apparent to this Committee that Canada can best assist Third World nations on the road to sustainable development by empowering people to help themselves. This can most effectively be achieved through the alleviation of debt, and the focusing of our ODA on countries that have national action plans that promote human development (health and education) and that assess and prioritize their national development goals within the concept of sustainable development.²⁴

C. Reform of the United Nations and the International Funding Agencies

Arthur Campeau noted that the United Nations has for too long been a model of "we the governments" as opposed to "we the peoples", as the United Nations Charter declares. Arthur Campeau told the Committee, the United Nations must adapt to the challenges of the 21st century, to respond to the legitimate and necessary participation of all sectors of our societies. In essence, new mechanisms must be developed to democratize the institution, and make it fully accountable to the peoples of both wealthy and poor nations. The "Rio Way" — transparency, inclusiveness and accountability — must become a doctrine of the United Nations.

Maurice Strong also noted that as the United Nations approaches its 50th anniversary it is very badly in need of strong refurbishing and revitalization, and of a recommitment by member states. Although Maurice Strong was hopeful about the establishment of the Commission on Sustainable Development, he expressed concern that its establishment within the structure of the United Nations might cause it to be held captive to the bureaucracy of the United Nations and the traditional ways of the New York diplomatic community.

Jim MacNeill expressed reservations about conducting future international negotiations on the environment within a United Nations forum. The United Nations rule of consensus severely hinders the development of effective international agreements. It is essentially impossible to get 180 governments to agree to anything but the lowest common denominator. Jim MacNeill suggested that future negotiations be shifted into other fora, or in the case of an agreement on sustainable forestry, to limit the negotiating parties to the 25 forest states that are the custodians of 90% of the world's forests.

The traditional approaches and ways of thinking and doing things must be adjusted both within the United Nations and within the international funding institutions. Decision-making at all levels must now be assessed against the linkages between environment and development, and

²³ Sen (1993).

²⁴ The issue of international debt was studied by the Sub-Committee on International Debt of the Standing Committee on External Affairs and International Trade in 1990. In their report tabled 7 June 1990, the Sub-Committee emphasized that "[c]ountries crushed by debt cannot trade more with us or contribute to a healthy global environment. (...) Immediate action on the debt is imperative. But it must be part of an overall agenda for action on North-South issues — an agenda which aims to put an end to the unacceptable consequences of mass poverty on the threshold of the third millenium." House of Commons Standing Committee on External Affairs and International Trade, *Securing Our Global Future: Canada's Stake in the Unfinished Business of Third World Debt*, 7 June 1990, p. 15 and 17.

against the international goals of sustainable development. While it is one thing to formulate policy interventions based on sustainable development and linkages, it is another thing to incorporate these linkages into individual sectors where institutional rivalry has traditionally played down mutual concerns. According to Norman Myers:

The same applies to the United Nations system with its long-standing jealousies on the part of major agencies such as FAO and the World Meteorological Organization, leading to an institutional blockage that has strongly resisted the coordinating and linkages-centred functions assigned to UNEP.²⁵

The challenge is therefore to modify thinking such that development and the environment are no longer viewed as separate activities. To facilitate this direction, Jim MacNeill suggested the resurrection of one of the recommendations for United Nations reform made during UNCED preparations. It was proposed that the Security Council devote one or two sessions a year to the environmental threats to peace and security. This would provoke a whole decision-making process within the United Nations system, and necessitate the preparation of reports and the consideration of environmental threats to global security across a broad number of sectors. Getting people thinking about the environment and sustainable development is the first step in the education process.

Several studies have called upon governments to strengthen the environmental direction, sensitivity, and capacity of the World Bank, the International Monetary Fund, and the regional development banks. In particular, the World Bank has been sharply criticized as it exercises significant policy leadership on the Global Environmental Facility, on other donors and on developing countries, and because of its lack of environmental sensitivity in lending practices. To the World Bank's credit, it has initiated some new reforms; for example, in a recent report the World Bank recognized the importance of improving the status of women. There is however, concern that these changes will not be effective unless the reforms are accompanied by a fundamental commitment to sustainable development and corresponding changes in the bank's institutional culture. In regard to the International Monetary Fund, it has, as yet, exhibited few signs of making the changes necessary to reflect environmental concerns in its decisions.²⁶

ECONOMIC, POLITICAL AND CULTURAL CHANGE

Ultimately, sustainable development will mean placing our economic activities in equilibrium with the environment, in equilibrium with the planet's capacity to recycle resources. This goes far beyond stabilizing our carbon dioxide emissions at 1990 levels by the year 2000, or taking public transport to work. **Sustainable development portends a tremendous change in our economic activities, political institutions and in our cultural values and attitudes.** Placing the economies of developed nations in balance with nature is a political task every bit, if not more, daunting than the stabilization of Third World populations.

A. Subsidies

Maurice Strong asserted:

²⁵ Myers (1993).

²⁶ Jim MacNeill et al., *Beyond Interdependence*, Oxford University Press, New York, 1991, p. 122.

...there are many things we are doing in our fiscal policies, in our subsidy policies, in our incentive policies, in our various sectoral policies, which run absolutely counter to our broad rhetorical commitment to sustainable development. They are things that have grown up over the years for different purposes and have become entrenched in our system. (65:43)

We do need a revolution. We need a revolution in our economic life. (65:36)

According to Jim MacNeill, the 24 OECD countries provide roughly \$1 trillion a year in subsidies, grants, tax write-offs, and incentives in support of energy, agriculture, forestry, fisheries, and water, industrial and regional developments.

These incentives for the most part tilt the playing field against both the economy and the environment simultaneously. They are, as I've said several times, economically perverse, ecologically destructive, and trade distorting, in many cases all at the same time. (67:14)

Maurice Strong pointed out that only a portion of the global funds being misallocated towards unsustainable practices would be sufficient to finance Agenda 21. (65:38)

In Canada, Jim MacNeill claimed, for every \$1 the Canadian Government spends to promote energy efficiency it spends over \$100 in support of the fossil fuel industry, support that encourages more acid rain and global warming. (67:7) The distance between Canadian rhetoric and action is epitomized by the fact that federal subsidies for the Hibernia oil project exceed the total six-year budget allocation for Canada's *Green Plan*.

B. Restructuring Government

"Thunderstorms of rhetoric are followed by droughts of inaction."²⁷ But, how do we turn words into actions? The challenge is to modify the outlook of governments, of policy makers, so profoundly that they no longer see environment and development as two separate arenas of activity. To break the rigidity, a sound start could be made through the introduction of full environmental cost-accounting in all government sectors. Being a policy intervention of comprehensive scope, this action would start to generate a wealth of accurate messages concerning the legitimate use of the environmental resource base that supports the economy.²⁸

The Government of Canada has already recognized the need to integrate environmental considerations into all decision-making processes. However, there has been little concrete action in this direction. As a first step we must investigate why full environmental cost-accounting is not being integrated into decision-making, and then determine what frameworks or mechanisms are needed to facilitate automatic consideration of the environment.

Perhaps the most obvious problem is the sectoral nature of government departments. In Canada, as in many nations, the Department of Environment is a very recent addition to the traditional ministries that manage agriculture, energy, forestry, and other such resource-based activities. These established ministries may not recognize environmental protection as within their mandate. In November 1992, the Environment Committee received a written presentation from Louise Comeau of the Sierra Club, which very astutely addressed this problem:

²⁷ Holdgate (1991).

²⁸ Myers (1993).

Governments as structured, pose one of the greatest barriers to dealing with our environmental problems. The traditional structure where individual departments work on behalf of their "constituencies" is confrontational by nature and has no place in a world focused on sustainable development.

My recommendation to the Committee is that federally and provincially the most senior department must be the Department of Sustainable Development. It would be this department's responsibility to oversee all government initiatives and to assess whether they meet the test of sustainability. First Ministers Conferences on the Economy must be replaced with First Ministers Conferences on Sustainability. Only then with First Ministers taking an active role can governments be focused on the real issues of sustainability. (48 Appendix ENVO-19:11-12)

C. Domestic Policy Reform

A policy measure parallel to full environmental cost-accounting, and achievable more readily, lies with adjustment of pricing policies to reflect full social costs. Many critically important raw materials and goods trade at prices that fail to reflect their effects on air, water, and soil. By adjusting the price of these commodities to internalize their external costs to society we would send a clear message to the consumer.²⁹

The Polluter Pays Principle requires polluting firms to pay the full costs of prevention and control measures, as determined by public authorities. Here, the environmental costs of development and production are reflected in the prices consumers pay for goods, thereby inducing the consumer to choose goods whose production, use, and disposal have the least impact on the environment.³⁰ Although the Polluter Pays Principle was introduced in 1972 by OECD countries, it is not yet an effective policy for its concept depends upon similar environmental regulations and enforcement among trading partners.

Economic instruments, such as tradeable emissions permits, hold tremendous promise for curtailment of abuse to the global commons. They provide incentives for fuel switching and adoption of energy efficiency measures. In addition, as discussed in *A Global Partnership*, they provide mechanisms whereby we could transfer resources to developing countries external to government accounts and tax systems. (62:46)

Jim MacNeill suggested that the federal government, as Canada's largest consumer, could promote new initiatives in the field of energy efficiency by adjustments to its procurement policies. Rather than "command and regulate", improvements in the energy efficiency of vehicles, electric motors, tools and appliances could be achieved if the government simply announced that in 5 years time it would only purchase equipment with a specific energy consumption rating. Regular tightening of the minimum energy specifications on equipment for procurement would ensure that energy efficiency becomes industry's number one research goal.

²⁹ Myers (1993).

³⁰ MacNeill (1991).

Jim MacNeill presented the Committee with a very novel revenue-neutral tax proposal in support of sustainable development. In this scheme there is:

. . . a gradual shift in the burden of taxation, reducing taxes on income, savings, and investment, and increasing them on energy and resource use, on polluting emissions to air, land, and water, and on products with a high environmental impact.³¹

This tax system would undoubtedly have to be adjusted so as not to cause an increased burden on lower income groups, or populations living in remote and/or sparsely populated areas. While there are always formidable political barriers to new taxes, increased public awareness and the transparent coupling of environmental taxes to decreases elsewhere, should expedite this revolution in taxation.

The implementation of sustainable development will have a substantive impact on the labour market, which if not properly managed, could be economically devastating to the country. Arthur Campeau addressed the issue of jobs:

Yes, there will be sectors that will be impacted on. The challenge for us is to identify those sectors and design the kinds of programs to retrain, to ensure that these men and women who are an important part of our society, who must be part of the efforts, are afforded the opportunity of making a meaningful and lasting contribution to the development of this economy. (65:27)

In the transition from unsustainable to sustainable practices, for example, from mining to mineral reclamation, society must ensure that the quality of the jobs, the number of jobs, and the pay rates are equivalent or better than those supplied by unsustainable endeavours.

Jim MacNeill cautioned the Committee that although these political reforms make sense and are urgently needed, how can they be packaged to make them politically attractive, and in a democracy, make them vote winners? A reduction in income taxes, a more energy-efficient future, and new sources of renewable non-polluting energy will undoubtedly attract favour. However, the transition to sustainable development will significantly alter the way we conduct our lives. While the preservation of the biosphere depends upon this change, the successful promotion of this message may indeed be a formidable task.

D. The Challenge of Changing Values

The Honourable John Fraser, Speaker of the House of Commons, addressed the challenge of change:

. . . the revolution required of us all is a revolution in our thinking. To change our thinking we must embark on a journey of collective learning, and to do this by education in its broadest sense.

I feel that the anxiety shared by so many citizens about our global conditions provides the greatest cause of optimism for the future. With all our imperfections we are capable of change when required, in attitudes, in habits and in practices. (65:6)

In a similar vein, Alan Emery expressed his optimism that, to the benefit of tomorrow, new sets of values can be instilled in the children of today.

³¹ *Ibid.*

I submit to you that the decision-makers of tomorrow are the children of today. (. . .) You have to teach them the values of the biosphere. You have to present them with the correct attitudes. I don't know how many of you have children that are still in the age bracket that is highly impressionable, but I can tell you that those children are now modifying the behaviour of their parents, and they will continue to do that. The more of an effect that we have on our children, the more of an effect we will have on the future of the planet. (67:32)

The perception, or fear, of a public indifferent or belligerent to the concept of sustainable development may be inaccurate. Public opinion polls indicate that Canadians are well informed, understand the environmental crisis, and want to do something. It is incumbent upon politicians, upon policy-makers, to see that this "grass-roots" environmentalism is not only encouraged but empowered. The obstacles to a grass-roots progression towards sustainable development must be searched out and removed.

Reducing, reusing, recycling and the appropriate management of wastes are essential steps towards placing human activities in balance with nature. It is unacceptable that millions of tons of organic yard and kitchen waste are enclosed in plastic bags and entombed in landfills, while vast quantities of artificial fertilizers must be synthetically manufactured. The Canadian public is deeply concerned about the thinning ozone layer. The federal government has committed Canada, under the Montreal Protocol, to the early phase-out of ozone-depleting chemicals, and in March 1992 the provincial environment ministers gave their assurances that comprehensive "ozone-saving" regulations would be introduced across Canada by January 1993. Yet, as of May 1993, only five provinces had enacted regulations governing the recovery, recycling and destruction of these chemicals which pose such a tremendous environmental threat. These are but a few examples of where political action fails to facilitate environmental direction.

The solution to our environmental problems, which are growing increasingly grave, does not lie in science or in technology, but in politics and individual action. Of course we need more and better science to understand the ecological linkages of the planet, to understand human behaviour, to improve agriculture, medicine, and forestry. We need new technologies that allow more efficient use of energy, that produce environmentally-benign products and that use scarce resources more economically. All of these are necessary, and much more as well. But the lesson of the recent decades is that scientific understanding and technological capacity are not the limiting factors. The blockage lies in human perception and the willingness of people to change how they behave at the individual, group and national levels.

The need for responsible behaviour and individual action was discussed by John Fraser:

What you will discover (. . .) is that changing our impact on the environment is not the result of wishful thinking, or waiting for someone else to take action for us. Each of us must recognize what we are responsible for — a federal department, a business, a home, or perhaps a school — and ask ourselves the question: "What impact does my activity have on the environment, and how can I lessen that impact?"³²

As important as individual action is, it will be the effect of many concerted efforts that ultimately turns the tide toward sustainable development. "Think globally, act locally" is a familiar phrase; however, all too often the first steps to advancing local action, an infrastructure or instructive model, are missing. Just as it is necessary to remove the encumbrances hindering "grass-roots" environmental efforts, it is also necessary to provide successful working systems for the public to emulate.

³² John Fraser, Speaker of the House of Commons, *Greening The Hill: A Retrospect*, Ottawa, 1991, p. (i).

It was with the dual intent of leading by example and to provide a working model, that the Speaker of the House of Commons on 12 June 1990 launched "Greening the Hill". The mandate of this comprehensive environmental program is to (i) eliminate environmentally harmful policies, practices and materials, and introduce more appropriate alternatives; (ii) to reduce or eliminate wasteful practices; and (iii) to raise the environmental awareness of Members of Parliament, their staff, and employees of the House of Commons and the Library of Parliament. This extensive plan has touched every aspect and activity on Parliament Hill, from reducing, reusing and recycling paper, through composting, improved energy efficiency, alternative transportation fuels, procurement policies, and grounds maintenance to environmental education initiatives. Appendix 2 describes this truly comprehensive program in greater detail. The House of Commons Standing Committee on Environment commends the Speaker of the House and his staff for their efforts and for the creation of a model which will be replicated by other institutions and organizations.

Whether it is on Parliament Hill, in a school, or in a major city, it is exactly this type of program that is needed to get the momentum started, to get people thinking about their impact on the environment and about their role in reversing the deterioration. It is up to environmentalists, such as our distinguished witnesses, and it is up to policy makers such as ourselves, to give this leadership. We must lead by example, give direction, remove obstacles, and empower the people, if humanity is to live in enduring harmony with nature.

APPENDIX A

List of Witnesses

Organizations and Individuals	Date	Issue
House of Commons: The Honourable John A. Fraser, Speaker of the House of Commons	May 3, 1993	65
Ontario Hydro: Maurice Strong, Chairman and CEO, (Former Secretary General of the United Nations Conference on Environment and Development)	May 3, 1993	65
Department of External Affairs and International Trade: Arthur Campeau, Ambassador for Environment and Sustainable Development	May 3, 1993	65
Institute for Research on Public Policy: Jim MacNeill, (Senior Fellow), Environment and Sustainable Development Program	May 11, 1993	67
Canadian Museum of Nature: Alan Emery, Director	May 11, 1993	67

APPENDIX B

GREENING THE HILL

Motion adopted by the Standing Committee on Environment:

Greening the Hill

(Tuesday, March 13, 1990)

The Committee recommends that the Board of Internal Economy consider the advisability of developing a five-year Plan of Action and Budget by March 31, 1990, for implementation of an Environment Action Plan for all precincts of Parliament Hill: the House of Commons, Senate, Library of Parliament, Public Works Canada, and National Capital Commission;

- that an Environment Coordinator be appointed by March 31, 1990 by the Board of Internal Economy, to report to the Chairperson of the Task Force on Environment, and whose role will include evaluation recommendations, developing projects, and implementing a plan which will lead to Parliament Hill becoming an Environment Model for Canada;
- that the physical plant of the House of Commons over the next five years be modified to be as energy conserving and energy efficient as feasible — those modifications to include heating, ventilation and air conditioning (HVAC) systems, power and lighting systems, insulation, water use, air circulation;
- that the human resources necessary for implementation of such a plan be considered and recruited;
- that the Parliament Hill shuttle buses be modified to alternate fuels: natural gas, electric, hydrogen and others, and that these vehicles be visibly marked as to fuel use;
- that the Environment Coordinator be required to report twice per year in open session to the Environment Committee of projects undertaken, projects proposed, savings per project (of energy, materials and capital as well as environmental benefits) as well as costs for future projects, and improvements to procurement policies;
- that there be a Budget for implementing an information strategy directed to Members, federal agencies and the public;

— that the Environment Coordinator solicit proposals to make the House of Commons environmentally friendly for House of Commons staff, MPs, federal agencies, non-government organizations and the public, and that the Coordinator solicit proposals to enhance the quality of food served to include holistic foods with minimal amounts of additives or preservatives and to enhance the quality of fitness and healthful life style programs available to members and House of Commons staff providing services to Canadians — such recommendations to be included in the first six month report to the Environment Committee;

— that in order to increase the awareness of environmentally sound products it is proposed that all Directorates, in conjunction with Purchasing staff, review their contracts and tender specifications for goods and services, to ensure that wherever economically justifiable, specifications be amended to provide for expanded use of products and services that produce fewer polluting by-products and/or environmental hazards during use and disposal than competing products; and that they contain the maximum level recyclable content to reduce post-consumer waste, without significantly affecting the intended use of product or service, and that they be supported by cost analysis justifications in order to ensure that the products are made available at competitive prices.

GREENING THE HILL¹

Present Programme:

- Better Papersave, a paper recycling programme which includes the recycling of fax paper, window envelopes, glossy paper, magazines, and file folders;
- composting fruit and vegetable waste from House Food Services operations;
- multi-material recycling programme for newspapers, glass, cans and waste upholstery;
- procurement policy that ensures that existing and new contracts are screened to assure the environmentally sound nature of products and corporate environmental practices of contracted companies;
- a Task Force on Cycling to make recommendations on facilitating cycling to work at the House of Commons;
- development of a hazardous waste management plan to properly identify, store and dispose of hazardous materials;
- a dry cell battery collection programme as well as a toner cartridge refilling and recycling programme; and
- ongoing conversion of fleet vehicles to natural gas.

Savings & Benefits

Over the past three years, Greening the Hill has been well established and has become a catalyst for change at the House of Commons. Under the auspices of the Speaker, the programme has been successful in substantially reducing the amount of solid waste generated by the House of Commons while also ensuring that many House practices are conducted in the most environmentally responsible manner. Sound environmental practices, entirely worthwhile in their own rights, have also made good economic sense at the House of Commons.

To date, Greening the Hill has achieved overall net savings of more than \$700,000. Over the next five years, the programme will save an additional estimated \$2.7 million, a figure likely to rise significantly if and when new greening initiatives are undertaken. Other savings and benefits highlighted throughout the report include:

- projected annual net savings of \$540,000;
- 78% reduction of House refuse sent to landfill;
- cumulative savings of over \$700,000 from paper reduction initiatives;
- over \$75,000 in revenue generated to date from the paper recycling programme;
- 2,200 tonnes of paper recycled to date;
- conversion to energy efficient lighting in one building so far, generating savings of \$27,200 annually; and

¹ Excerpts from the document entitled: "Greening the Hill: An Economic Analysis" presented to the Standing Committee on Environment on Thursday, May 27, 1993.

- saving of 20 cents per kilometre through conversion of vehicles to natural gas.

From an environmental perspective, no exact dollar value can be placed on all of the Greening the Hill accomplishments, as conventional accounting practices are only now evolving to incorporate environmental and resource depletion costs. However, even if the programme's costs and savings resulted in a break even position, Greening the Hill would be deemed a success, as the tangible environmental improvements identified in this report have been realized at no additional cost to the taxpayer.

Savings & Benefits

Over the past three years, Greening the Hill has been well established and has become a catalyst for change at the House of Commons. Under the auspices of the Speaker, the programme has been successful in substantially reducing the amount of solid waste generated by the House of Commons while also ensuring that many House practices are conducted in the most environmentally responsible manner. Solid environmental practices, which were initially introduced by the House of Commons, have also made good economic sense at the House of Commons.

To date, Greening the Hill has achieved overall net savings of more than \$700,000. Over the next five years, the programme is expected to generate an additional \$2.7 million, a figure likely to rise significantly as new greening initiatives are undertaken. Other savings and benefits highlighted throughout the report include:

- projected annual net savings of \$640,000;
- 78% reduction of House refuse sent to landfill;
- cumulative savings of over \$700,000 from paper reduction initiatives;
- over \$16,000 in revenue generated in relation to the paper recycling programme;
- 2,200 tonnes of paper recycled to date;
- conversion to energy efficient lighting in one building so far generating savings of \$27,500 annually; and

The report titled "Greening the Hill: An Economic Review" presented to the Greening Committee was submitted on October 15, 1992.

**COMPENDIUM OF REPORTS
(with index)**

OF

THE STANDING COMMITTEE ON ENVIRONMENT

34th PARLIAMENT

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(2nd Session, 34th Parliament)

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(3rd Session, 34th Parliament)

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(2nd and 3rd Sessions, 34th Parliament)¹

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- Second Report • **Order in Council appointment of Raymond Robinson as Administrator, James Bay and Northern Quebec Agreement** — June 1989
- Third Report • **Deadly Releases: CFCs** — June 1990
- Fourth Report • **No Time to Lose: The Challenge of Global Warming** — October 1990
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- First Report • **Porcupine Caribou Herd** — October 1991
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- Third Report • **Conservation of the Grand Banks Fish Stocks** — May 1992
- Fourth Report • **Ozone Depletion: Acting Responsibly** — June 1992
- Fifth Report • **From Words to Action** — December 1992

¹ No reports were produced during the First Session

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- **Appointment of Elizabeth Dowdeswell as Executive Director of the UN Environment Program (UNEP)** — February 1993

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² Same Government Response for these two reports.

³ Government Response not yet available.

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- Report B: No Time To Lose: The Challenge of Global Warming**
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UNITED NATIONS WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT

DEADLY RELEASES CFCs

Part I of "Our Changing Atmosphere" Series

"Even if all use of CFCs was halted immediately, the atmospheric concentration of ozone would not return to normal for more than a century."

Third Report of the Standing Committee on Environment

The Honorable David MacDonald, P.C., M.P.
Chairman

June 1990

REPORT A

DEADLY RELEASES CFCs

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"Even if all use of CFCs was halted immediately, the atmospheric concentration of ozone would not return to normal for more than a century."

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Chairman

June 1990

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FOREWORD TO OUR CHANGING ATMOSPHERE SERIES

Human activities are having an increasing effect on our climate. Industrial development, the burning of fossil fuels, deforestation, and even agricultural practices are changing the composition of the earth's atmosphere. (Environment Canada, Atmospheric Environment Service, The Impact of Global Warming, Fact Sheet, 1989, p. 1)

As the Standing Committee on Environment of the House of Commons, we join the international community in recommending strategies to address the atmospheric problems that are affecting our country and our planet. As we began our study it soon became clear that, just as the air we breathe is a mixture of different gases with the potential for complex chemical reactions, so are the various atmospheric problems interwoven.

The Committee has focused on those atmospheric problems which the 1988 Toronto Conference on the Changing Atmosphere identified as the most urgent. Global warming is certainly one of the most compelling. It concerns our use of energy and other resources at the most fundamental level; patterns of use that have become entrenched in our socio-economic system and that are not easy to change, but patterns that must change. Ozone depletion may be relatively simple in theory to prevent compared to global warming, but still requires national action and concerted international cooperation, demonstrated by the Montreal Protocol. Yet even this agreement must be strengthened if the effort is to be successful. Canada has been struggling to reduce acid gas emissions and, after having established domestic control programs, it appears that we may be on the verge of implementing an American-Canadian control program. However, it remains to be seen if these steps will be enough to save our lakes and forests, and reduce the adverse health effects from acidic aerosols. Sadly, acid aerosols are only one component of the myriad of chemical contaminants found in the air that we breathe.

The Committee intends to produce other reports dealing with atmospheric change. We have been conducting extensive hearings on global warming and will table a report recommending policies for reducing Canada's contribution to the problem. The Committee also is alarmed at the potential harm to the environment in general, and to human health in particular, from airborne toxic chemicals. We expect to address the problem of toxic air pollution after completing our major study of global warming.

This first report on "Our Changing Atmosphere" addresses options for controlling the man-made chemicals that are both depleting the Earth's protective ozone layer and contributing to global warming. Society must phase out the use of CFCs (chlorofluorocarbons), halons and related chlorinated solvents, and ensure that they are replaced by the least harmful substitutes possible. There also is a need to ensure that these ozone depleting/global warming substances are recovered, recycled and ultimately destroyed. It has been suggested that if all the CFCs now in use were to be released, the ozone layer would likely be destroyed. The impact on the Earth's life forms could be devastating.

The need to recover these substances from existing uses in refrigeration equipment has given rise to the term "vampire unit", referring to the equipment used in recovering CFCs and halons in a gaseous state. The analogy is simple but effective. A vampire unit connects to the

compressor system in a refrigerator, for example, sucking out the life-blood of the system—the CFCs. At this point, however, the analogy ends, since the vampire unit is protecting life on our planet.

There are three main thrusts to the Committee's recommendations: an accelerated phaseout in the production of CFCs and related ozone depleting substances, beyond that prescribed in the Montreal Protocol; the development of a domestic recovery and recycling system and the call to action of the international community to act decisively in combatting ozone depletion and to assist developing countries to prosper without replicating the harm the industrialized world has done to the Earth's atmosphere. By following our recommendations, we believe that the Government of Canada can set an example for other countries to follow and enhance its credibility as a leader in environmental protection.

A CALL TO ACTION

We, the Members of this Committee, have reached one overpowering conclusion—not just a consensus, but a unanimous opinion—that ozone depletion is a threat to the continuation of life on Earth.

In our view, the governments of the world must immediately declare themselves at war with all of those elements which are responsible for depletion of Earth's ozone, which at the same time contribute to global warming. These are:

- CFCs
- halons
- methyl chloroform and carbon tetrachloride
- HCFCs and HFCs.

Two major public policies will be essential to the world's future:

1. all ozone depleting substances must be eliminated from further use, worldwide; and
2. all such substances must be recovered and destroyed.

We realize that these policies cannot be completely implemented immediately but time is of the essence. In the interest of human survival, we call on governments, industries, labour movements, universities and scientific organizations around the world to initiate action at once which will fulfill these policies while time is still available to defeat this common threat.

In our recommendations we attempt to provide a framework for such action which seems reasonable and realistic in the circumstances of our world today.

These recommendations should be reviewed annually to determine if schedules and timetables can be advanced.

We dedicate these pages to concerned citizens, including teachers, students, scientists, policy-makers, business and labour people.

We, the Members of this Committee, invite their comments and suggestions on the content of this report.

SUMMARY AND PRINCIPAL RECOMMENDATIONS

Life on Earth is shielded from damaging ultraviolet radiation by the ozone layer, yet we are threatening that layer's very existence. If all CFCs dispersed in refrigeration systems throughout the world were released, the ozone layer would probably be destroyed. Moreover, CFCs contribute to global warming, each molecule having up to 20,000 times the greenhouse effect of carbon dioxide. The time to remove the threat that CFCs pose to our atmosphere is now. This report recommends a strategy for eliminating these substances from our environment.

Three issues need to be resolved. First, we must phase out the production and use of CFCs and related substances that are damaging the atmosphere. Second, we must develop and market the least harmful substitutes. Third, we must ensure that those chemicals now in use are recovered, recycled and eventually destroyed—they must not be allowed to escape into the atmosphere. This must be accomplished globally.

CONTROL AND ELIMINATION

Provisions for controlling certain CFCs and halons are contained in the Montreal Protocol of 1987. Although this international agreement would result in a 50% reduction in the production¹ and consumption² of CFCs in the signatory countries by 1998, it has become clear that this is not sufficient to stop depletion of the ozone layer. The Protocol must be strengthened at the June 1990 meeting in London by accelerating the phaseout of those CFCs and halons already covered, by including other ozone-depleting substances and by bringing other countries, particularly developing countries, into the Protocol.

Our first two recommendations call on the federal government to take a strong stand, both at home and at the international negotiating table, for more rapid phaseout of CFCs (used predominantly in refrigeration), halons (used in fire extinguishers) and the chlorinated solvents carbon tetrachloride and methyl chloroform (used primarily as cleaning agents).

(1) We recommend that the following be adopted as the basis for regulations under the *Canadian Environmental Protection Act (CEPA)* and be promoted prior to amending the Montreal Protocol:

- a) a minimum 85% reduction in the production and consumption of all CFCs by 1995, with a complete phaseout by 1997; and
- b) a complete phaseout in the production and consumption of carbon tetrachloride and methyl chloroform by 1995, except for their use as a feedstock for CFC or halon substitutes and as organic laboratory solvents.

¹ As defined in the Protocol, "production" means the amount of controlled substances produced minus the amount destroyed by technologies to be approved by the Parties.

² As defined in the Protocol, "consumption" means production plus imports minus exports of controlled substances.

- (2) We recommend that regulations be invoked under CEPA requiring a 95% reduction in halon production and consumption by 1993, and a complete elimination by the year 2000, except for those "essential uses" where no reasonably performing substitute is available.**

CFCs became widely used in a variety of industrial processes, given their non-toxic and non-flammable nature. Problems arise in substituting other chemicals for these applications. Substitutes already developed can be classified as HCFCs (hydrochloro- fluorocarbons), chemicals that contribute less to global warming and ozone depletion, and HFCs (hydrofluorocarbons), chemicals that contribute to global warming but not to ozone depletion. HCFCs are projected by industry to capture up to 30% of the CFC market by 2000, with HFCs capturing another 9% by that time. Neither group is totally harmless, but using them as temporary bridging chemicals could reduce the continuing damage to the atmosphere by 80 to 90%. We cannot afford to wait for the perfect substitute, but we must choose substitutes carefully. We must assess their benefits in reducing both ozone depletion and global warming, and ensure that the least harmful substitute is used in a particular application.

- (4) We recommend that:**

- a) neither HCFCs nor HFCs be used in any aerosols;**
- b) HCFCs and HFCs only be used in other products as replacements for CFCs where safe alternatives are not available;**
- c) only those HCFCs and HFCs with the least ozone depletion and global warming potential be used in products or processes requiring such substances;**
- d) in future, HCFCs and HFCs not be substituted for CFCs at any time in amounts greater than 30% and 9%, respectively, of present CFC use, and by 2010 the production and consumption of HCFCs and HFCs be discontinued.**

The use of CFCs in automobile air conditioning has been the cause of some introspection by the Committee. Like most people, we would prefer to drive in comfort on a hot summer day. But we cannot accept current technology that allows CFCs to escape from automobile air conditioners because they lack leak-proof systems. The Committee has been advised that an HFC substitute should be available by 1993 or 1994 but that substitute itself will not be totally harmless. In the interim, CFC release will continue to damage the ozone layer and contribute to global warming. Therefore:

- (6) We recommend that air conditioning units for the passenger compartments of all motor vehicles be leak-proof, beginning with the 1992 model year.**

Those members of the public who want to take a stronger position and who own automobiles with air conditioning now, could have the CFCs in the system properly removed. The air conditioner could then be left uncharged until a leak-proof unit could be retrofitted to the automobile or until a harmless substitute becomes available.

GOVERNMENT COOPERATION AND RESOURCES

Many initiatives for managing the phaseout of CFCs, halons and their substitutes that are not completely harmless will involve many or all jurisdictions to be found in Canada. We believe there is a need for leadership to accelerate initiatives. The Canadian Council of Ministers of the Environment is the most appropriate body dealing with multijurisdictional environmental concerns. Therefore:

- (5) We recommend that the Canadian Council of Ministers of the Environment take the lead when multijurisdictional participation would accelerate initiatives for the reduction, recovery, recycling and eventual safe destruction of CFCs and halons.**

The recovery/recycling industry for CFCs, halons and their substitutes is in its infancy. The necessary technology is being developed, but the service industry faces many hurdles in its application. For example, most major automobile manufacturers will soon require their dealerships to recover and recycle CFCs from automobile air conditioners using specialized equipment. Small, independent garages may not be able to afford this equipment, and may lose business. A similar problem will arise in the appliance service industry. Equipment costs will make it difficult for small companies to compete, especially if recovery and recycling are made mandatory, as is proposed in recommendation (8).

- (8) We recommend that Environment Canada be provided the necessary funds to assist the relevant authorities in developing programs for the recovery and recycling of CFCs from commercial, household and mobile refrigeration systems that are to be scrapped or that have been previously abandoned. Once destruction technologies and less harmful substitutes are available, then the recovered, more harmful substances must be destroyed.**

Although the Committee would prefer to see market forces act alone in removing these substances from circulation, we recognize that the accelerated timetable which we propose for the phasing out of CFCs requires federal action. The Committee proposes therefore that a tax be levied on the production of new CFCs and halons. It is hoped that this tax will provide incentive for producing industries to become directly involved in recycling as has reportedly happened in the United States since their tax was implemented. Recycling CFCs should be less costly than producing new CFCs. Recycling should also accelerate the phaseout of their production. Revenues from the tax could be used to support other CFC and halon weaning initiatives at home and abroad.

- (17) We recommend that a tax be levied on CFCs and halons at least equivalent to that to be implemented in the United States. Funds equal to those derived from the tax should be used to support initiatives arising from recommendations of this report.**

INTERNATIONAL RESPONSIBILITY

Assistance to developing countries both financially and in the form of technology transfer will be necessary to ensure that all potential producers of CFCs become members of the "global bargain" to protect the ozone layer, known as the Montreal Protocol.

Although developing countries have 80% of the world's population they have been responsible for only 15% of the world's production of CFCs. But they also have a growing demand for refrigerators, freezers and other refrigeration systems. With their increasing debt they cannot afford the additional, marginal costs of converting to less harmful substitutes. The international community must help. Canada must indicate its whole hearted effort to keep this global bargain alive. Therefore:

(20) We recommend that the federal government contribute to all funding mechanisms developed under the Montreal Protocol. We also recommend that a roundtable be established in Canada consisting of all government departments, industry, non-government organizations and other stakeholders who would be involved in funding and facilitating technology transfer to developing countries.

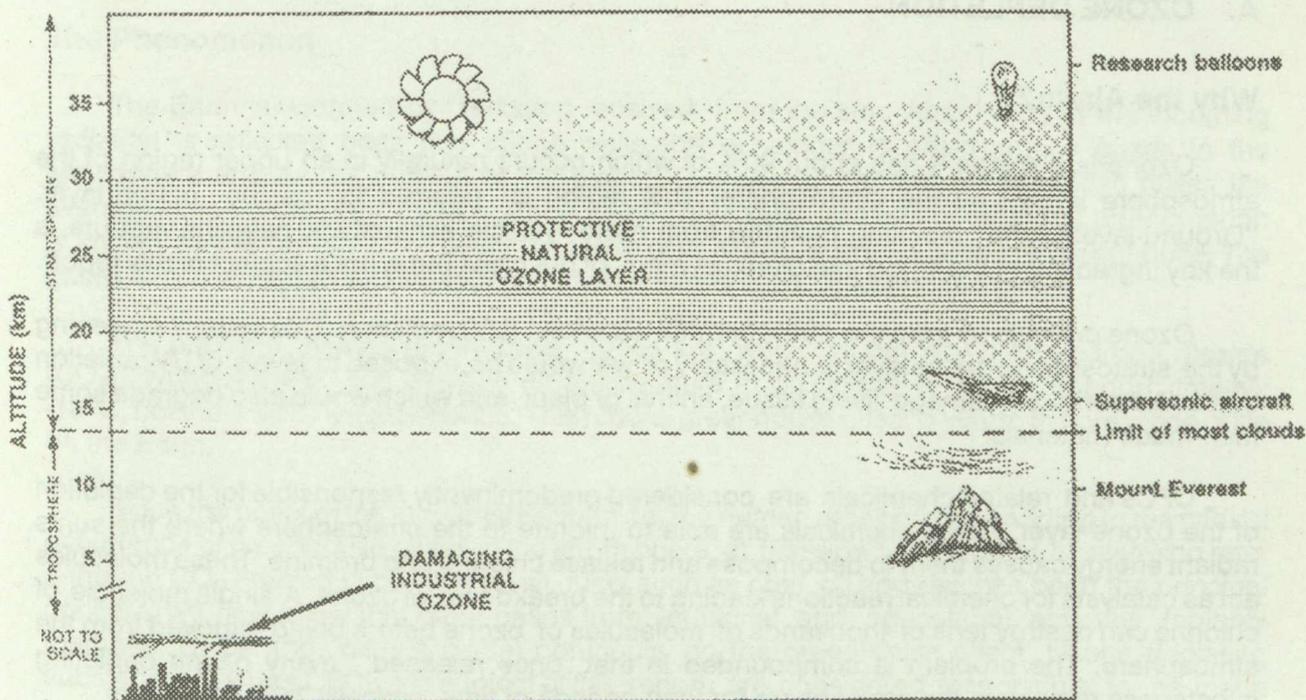
We must also ensure that Canada's policies and actions are consistent with the international goals of global bargains. Therefore:

(22) We recommend that a review be undertaken of trade development programs and subsidies, and of foreign aid policies, programs and projects to ensure they are consistent with the preventive aims of this report.

INTRODUCTION

Although life on Earth is shielded from damaging ultraviolet radiation by the ozone layer, we are threatening that layer's very existence. Since the 1930s, we have emitted millions of kilograms of chlorofluorocarbons (CFCs) and related chemicals that have slowly migrated to the upper atmosphere. There, through a series of chemical reactions, the ozone has progressively been depleted. This has resulted in a worldwide erosion of the protective layer and a pronounced seasonal reduction in ozone concentration over a large area of the southern polar region, known as the Antarctic "ozone hole". If all the CFCs throughout the world were to be released, the Earth's ozone layer would probably be destroyed.

Figure 1 : Ozone in the Atmosphere



In the upper atmosphere, a protective layer of ozone shields us from the sun's damaging rays, while at ground level this same gas is a serious air pollutant. (Most of the ozone in the upper atmosphere occurs between 15 and 35 km, with the heaviest concentration between 20 and 30 km.)

Source: Environment Canada, Atmospheric Environment Service, *The Ozone Layer*, Fact Sheet, Supply and Services Canada, 1987, p. 2.

CFCs, like DDT and PCBs, were considered valuable and beneficial chemicals before their environmental costs were recognized. They are used as coolants in refrigerators and freezers, and in air conditioners for automobiles and large buildings. In some countries, CFCs continue to be employed as propellants in aerosol cans for such products as hair sprays and deodorants. In recent years they have been increasingly used in manufacturing soft foam for cushions, solid foam for packaging and insulation and as a cleaning solvent for micro-electronic circuitry.

CFCs are not the only chemicals responsible for depleting the ozone layer. We now realize that related chemicals such as halons used in some fire extinguishers and certain industrial solvents have similar destructive properties. Only recently, however, have we discovered these same chemicals act as greenhouse gases and that their past release to the atmosphere will cause an estimated 20 to 25% of future global warming.

Controlling the use of these substances will therefore have two benefits: allowing the ozone layer to replenish itself slowly (since ozone molecules do form under normal atmospheric conditions) and decreasing the rate of global warming.

A. OZONE DEPLETION

Why the Alarm?

Ozone is a pungent gas about 90% of which occurs naturally in an upper region of the atmosphere known as the stratosphere. This region is referred to as the ozone layer. "Ground-level ozone", resulting primarily from motor vehicle exhaust and gasoline vapours, is the key ingredient of the smog that blankets many of our cities but is not a subject of this report.

Ozone protects us from the sun's harmful ultraviolet (UV) radiation. This natural screening by the stratospheric ozone layer is necessary or we would be exposed to levels of UV radiation that could seriously damage living tissue, animal or plant, and which would also degrade some man-made materials.

CFCs and related chemicals are considered predominantly responsible for the depletion of the ozone layer. These chemicals are able to migrate to the stratosphere where the sun's radiant energy causes them to decompose and release chlorine and bromine. These molecules act as catalysts for chemical reactions leading to the breakdown of ozone. A single molecule of chlorine can destroy tens of thousands of molecules of ozone before being removed from the atmosphere. The problem is compounded in that, once released, many ozone depleting substances remain in the atmosphere for long periods of time, typically 75 to 100 years.

Skin Cancer and Other UV-Related Hazards

Depletion of the ozone layer has already increased the risk of skin cancer to Canadians by over 15%. Each 1% loss of ozone leads to a 3-4% increase in non-melanoma skin cancer, a 0.6% increase in cataracts, and a 1% reduction in the yield of UV-sensitive crops such as wheat, rice, corn and soybeans. There are other problems such as suppression of the immune

system, suspected increases in malignant melanoma, degradation of industrial materials such as plastics and paints, and a threat to the aquatic food chain given the susceptibility of phytoplankton to UV radiation.

Assessing the Risk

The catastrophic consequences of ozone depletion and the failure of atmospheric models even to predict the ozone hole over the Antarctic are a strong driving force for international cooperation. Inaction in the face of scientific uncertainty can have profound consequences.

Scientific uncertainty does not mean we have to wait for more research to take action. We do not need to know everything in order to do anything. The relevant policy question is not whether the scientists are right but whether policy-makers can afford to be wrong...

There is no insurance policy that will provide adequate coverage should we be wrong.

B. GLOBAL WARMING

The Phenomenon

The Earth is warmed by radiation received from the sun. About 30% of the incoming radiation is reflected back into space while the remainder is absorbed by gases in the atmosphere and by the surface of the planet. The energy trapped by the gases raises the average temperature of the Earth's atmosphere. This natural and well-understood phenomenon is known as the "greenhouse effect" because of its similarity to the action of a greenhouse. The gases which exhibit this behaviour are often referred to as "greenhouse gases".

The principal natural greenhouse gases are water vapour (H_2O) and carbon dioxide (CO_2). Without them, the average air temperature at ground level would be approximately $-18^\circ C$, not the $+15^\circ C$ we experience. This natural greenhouse effect is vital to the presence of life on the Earth.

Since the onset of the Industrial Revolution, the human race has been adding to the natural occurrence of greenhouse gases in the atmosphere, at first slowly but now at an alarming rate. Although CO_2 created in burning fossil fuels such as coal, oil and gas has been the principal concern, we now know that other gases from industrial and agricultural activities (notably methane, CFCs and nitrous oxide) contribute to the greenhouse effect. Ozone depleting substances such as CFCs, the subject of this report, are considered responsible for as much as one-quarter of the extra greenhouse effect.

Although these additional greenhouse gases are increasing the potential to elevate the average temperature of the atmosphere that is, to cause "man-made global warming"—scientists cannot yet predict with certainty at what point society's activities will cause an identifiable warming, nor can they accurately determine the rate of this induced warming. Climate and weather patterns change naturally and it is difficult to separate normal shifts from human induced changes.

It is only a question of time, however, until human induced effects become distinguishable from natural effects. Given the immensity of climatic systems, we can anticipate that once these changes are precipitated, there will be little that humanity can do but watch them unfold and try to adapt to them.

There is debate regarding how quickly society should respond to this threat and how far-reaching public policy initiatives should be at this time. There is little disagreement, however, that we are conducting a global experiment in atmospheric chemistry with little understanding of how it will turn out. Testifying before our Committee on the extent of scientific agreement about the reality of global warming, James Bruce, a leading Canadian authority on climate change, remarked:

... I think on any scientific topic you care to name you can probably find a few scientists who will dissent from the general view of the subject. I have chaired and participated in many meetings with the leading scientists of the world on this topic and I would say I have rarely seen such a consensus on what will happen with increased greenhouse gases in the world's atmosphere. (House of Commons, Standing Committee on Environment, Minutes of Proceedings and Evidence, Issue No. 30, 25 January 1990, p. 45)

Society's emissions of greenhouse gases are changing the chemical composition of the atmosphere at a rate unparalleled in human history. We understand that altering the Earth's climate will have far-reaching impacts on the social, economic and natural systems of our world. The current scientific consensus is that we are already committed to an increase in average global temperature ranging from 1.5°C to 4.5°C in the first half of the 21st century. Warming is expected to be more pronounced at higher latitudes and temperature increases will be accompanied by changes in climatic conditions that are not readily predictable. Patterns of agriculture and water resources will be affected.

Sea Level Rise

Sea level is projected to rise roughly one metre by 2050, flooding coastal lowlands and islands and reducing freshwater supplies as saltwater intrudes into the groundwater regime. Higher temperatures will cause some permafrost, mountain glaciers and polar ice to melt. The upper layers of the oceans will expand through warming, adding to the rise in sea level. Canada could experience a substantial loss of land on Prince Edward Island, the Hudson Bay coastline, and in river deltas such as the lower Fraser and the Mackenzie. A rise in sea level could be catastrophic for low-lying countries and island states. Millions of people could be forced to relocate from the delta regions of Bangladesh and Egypt alone. The Republic of Maldives in the Indian Ocean, with a population of 200,000, has been described by its President as an "endangered nation".

Climate Instability

Populations in many regions of the world could be subjected to increasingly severe and unpredictable cyclonic storms, and more erratic weather patterns. Regional changes in precipitation patterns will occur, concomitant with regional variability in temperature increases. Altered climates would affect world food security by changing agricultural productivity, and would affect the productivity and biological diversity of natural ecosystems, particularly forests.

THE MONTREAL PROTOCOL

Canada and 46 other countries have signed the Montreal Protocol on Substances that Deplete the Ozone Layer, which came into force on 1 January 1989. The Protocol establishes a schedule to reduce the global consumption of five CFCs and three halons. The schedule for their reduction is:

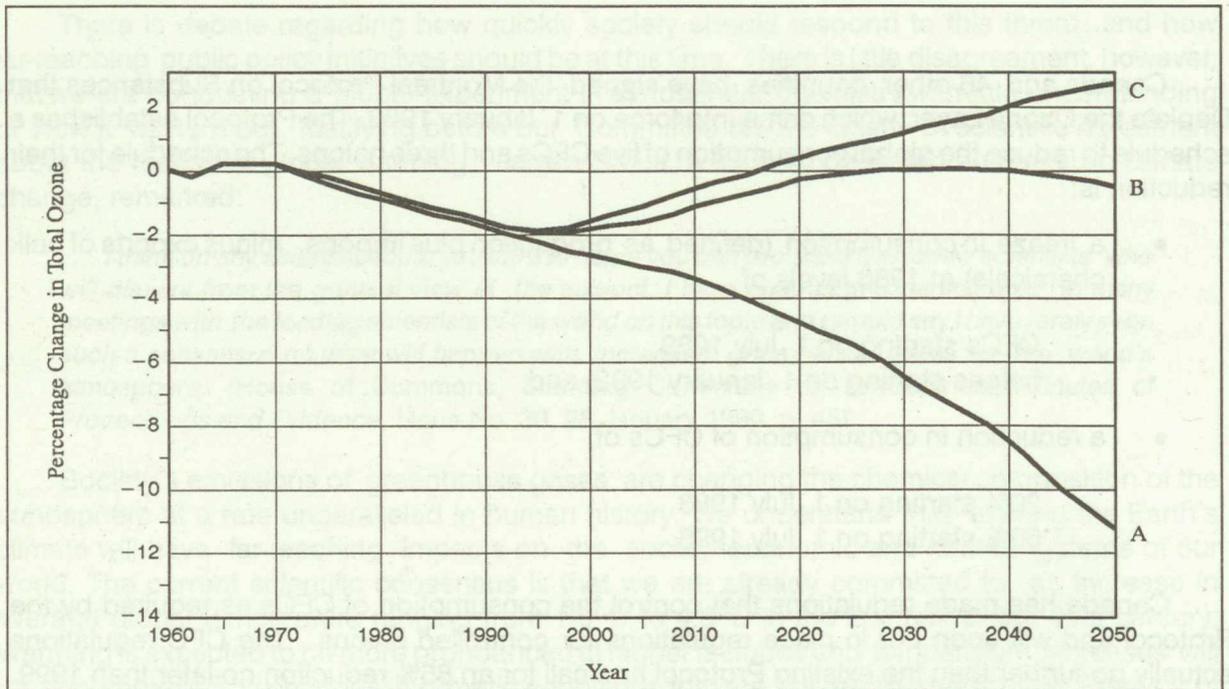
- a freeze in consumption (defined as production plus imports minus exports of bulk chemicals) at 1986 levels of
 - CFCs starting on 1 July 1989
 - halons starting on 1 January 1992, and
- a reduction in consumption of CFCs of
 - 20% starting on 1 July 1993
 - 50% starting on 1 July 1998.

Canada has made regulations that control the consumption of CFCs as required by the Protocol and will soon put in place regulations for controlled halons. The CFC regulations actually go further than the existing Protocol and call for an 85% reduction no later than 1999.

Despite these controls, the total quantity of CFCs in Canada and globally continues to grow. In Canada we are adding some 20,000 to 25,000 tonnes per year to the existing stock. This annual addition is not required to be reduced until 1993 and then only by 20%.

The Protocol provides for adjusting control measures as more environmental, technical and economic information becomes available. As illustrated in Figure 2, compliance with the Protocol as it stands will not allow the ozone layer to recover its natural level of concentration. The only solution is to expand the range of substances covered and advance the target dates for their control. It is hoped this will be achieved at the meetings in London, in June 1990. Advancing the elimination of ozone depleting chemicals would also retard the accumulation of greenhouse gases in the atmosphere.

Figure 2 : Predicted Changes in Ozone Concentration for Different Phasedown Scenarios CFCs



- A - Montreal Protocol unamended, maximum 50% reduction by signatory countries and increase in CFC and halon use by developing countries
- B - CFC and halon phaseout by 2000
- C - CFC and halon phaseout by 2000, and methyl chloroform, carbon tetrachloride and HCFC-22 constant at 1986 levels.

Source : Adapted from: *Protecting the Earth's Atmosphere : An International Challenge*, Report of the Study Commission of the 11th German Bundestag "Preventive Measures to Protect the Earth's Atmosphere". German Bundestag, Publ. Sect., Bonn, 1989, p. 305.

TECHNICAL INFORMATION

A. BACKGROUND

The discovery of the refrigerant properties of CFCs in 1928 was followed in the 1940s by their application as a blowing agent in rigid insulating foam; as a propellant in aerosol cans (originally in those containing pesticides to control malaria) during the Second World War; and as flexible polyurethane foams for furniture in the 1950s. More recently, CFCs have been used as a cleaning solvent, particularly for electronic equipment. A breakdown of global and Canadian use of the five CFCs controlled by the Montreal Protocol is given in Figure 3. This illustration does not include the three halons (fire extinguisher agents) that are also controlled by the Protocol.

Canada's contribution to global ozone depletion is less than 2%, an amount comparable to our contribution to global warming. However, Canada's per capita contribution to CFC emissions, at approximately 0.8 kilogram per year, is the second highest in the world after the United States. The use of CFCs in Canada is substantially different from the global pattern, chiefly because of their virtual elimination from aerosol cans used in the homes of Canadian consumers.

Even if all use of CFCs was halted immediately, the atmospheric concentration of ozone would not return to normal for more than a century. This is due to the long life span of CFCs in the atmosphere—in some cases estimated to be longer than 100 years—and because products made from CFCs, such as foams, continue to release CFCs as they slowly decompose.

There are dozens of end uses for the different CFCs, each of which must be evaluated to ensure that restricting their use is not too disruptive. Using less harmful substitutes and modifying the way some products are made or applied should result in reduced environmental degradation with little disruption to society. More limited use of CFCs alone could displace 29% of their present global use by the year 2000 (UNEP, 1989, p. 11).

The chemicals of concern are not only the fully halogenated¹ chlorofluorocarbons (CFCs), but also:

- hydrochlorofluorocarbons (HCFCs) that are not fully halogenated;
- halons, which are fully halogenated hydrocarbons generally containing bromine;
- carbon tetrachloride and
- methyl chloroform.

¹ A carbon-based molecule is "fully halogenated" when all the other atoms attached to it are halogens. Halogens are a group of elements including fluorine, chlorine, bromine and iodine.

All these chemicals have some degree of ozone depleting potential (ODP) and global warming potential (GWP). Another group of chemicals viewed as substitutes for the CFCs and HCFCs are hydrocarbons that do not contain chlorine or bromine, the molecules that cause the destruction of the ozone. These hydrofluorocarbons (HFCs) are not ozone depleting but may act as greenhouse gases.

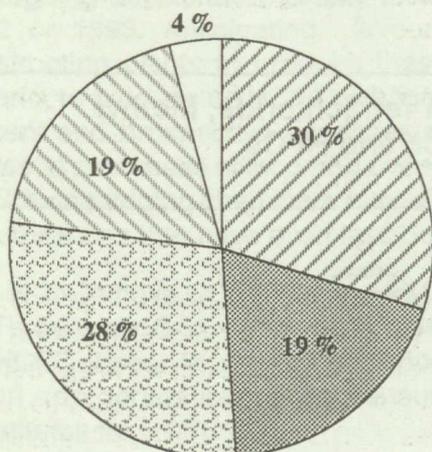
ODP and GWP values have been calculated for most of the 50 or so chemicals that fall into these categories. In assessing their environmental acceptability, both indices need to be taken into account. Using these values, it is possible to estimate the changes in ozone depletion and global warming that could be expected should different practices and combinations of chemicals be selected to replace those now in use.

Figure 4 shows the relative ODP and GWP of selected substances that require control and some of their substitutes. It is evident from Figure 4 that use of the HCFC and HFC substitutes would substantially reduce damage to the atmosphere. It has been estimated that completely substituting HCFCs and HFCs for CFCs would result in a 90% reduction in the overall ODP. Figure 4 also illustrates the pronounced differences in ODP and GWP of the selected HCFCs and HFCs. These differences must be incorporated into government policy.

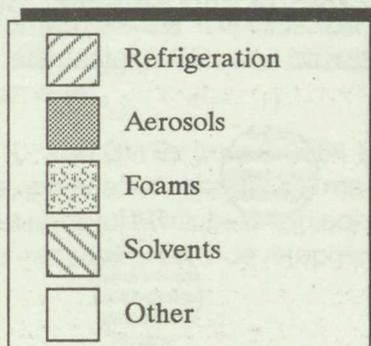
Halons were developed at the end of the Second World War and have grown in popularity as fire extinguishing agents, particularly for use on sophisticated electronic equipment because they are essentially inert and do not leave a residue. The largest release of halons, however, is from testing extinguishers rather than their use in actual fire fighting. There should, therefore, be substantial opportunity for their control even if their use continues. Halons have extremely high ODP (3-10). The GWP is known only for one of the halons, and its value is 0.8.

Carbon tetrachloride is used primarily as a feedstock in producing CFCs. At the time of signing the Montreal Protocol it was believed that controlling the major CFCs would result in the control of carbon tetrachloride as well. Rising levels in the atmosphere indicate, however, that this assumption was incorrect and that the non-feedstock uses of this toxic substance—such as a constituent in pesticides, as a dry cleaning agent, as a solvent in synthetic rubber and dyes, and as a grain fumigant—are substantial. The ODP of carbon tetrachloride is high (1.0-1.2) but the GWP is moderate (0.12).

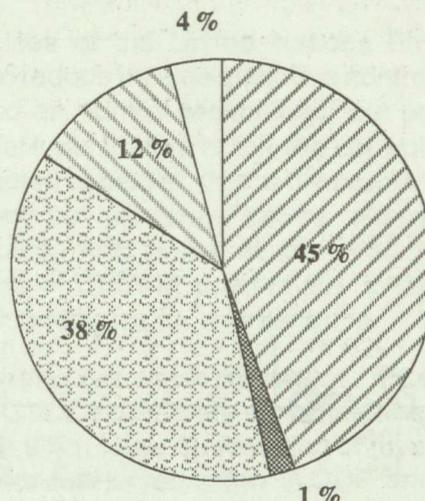
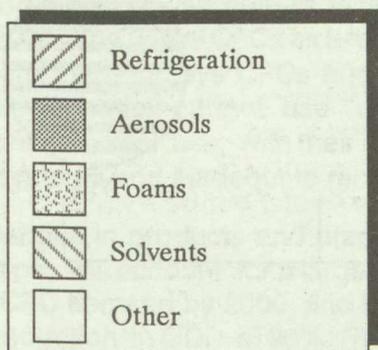
Figure 3 : Global and Canadian Use of Controlled CFCs



Global Use of CFCs (1988)



Canadian Use of CFCs (1989)



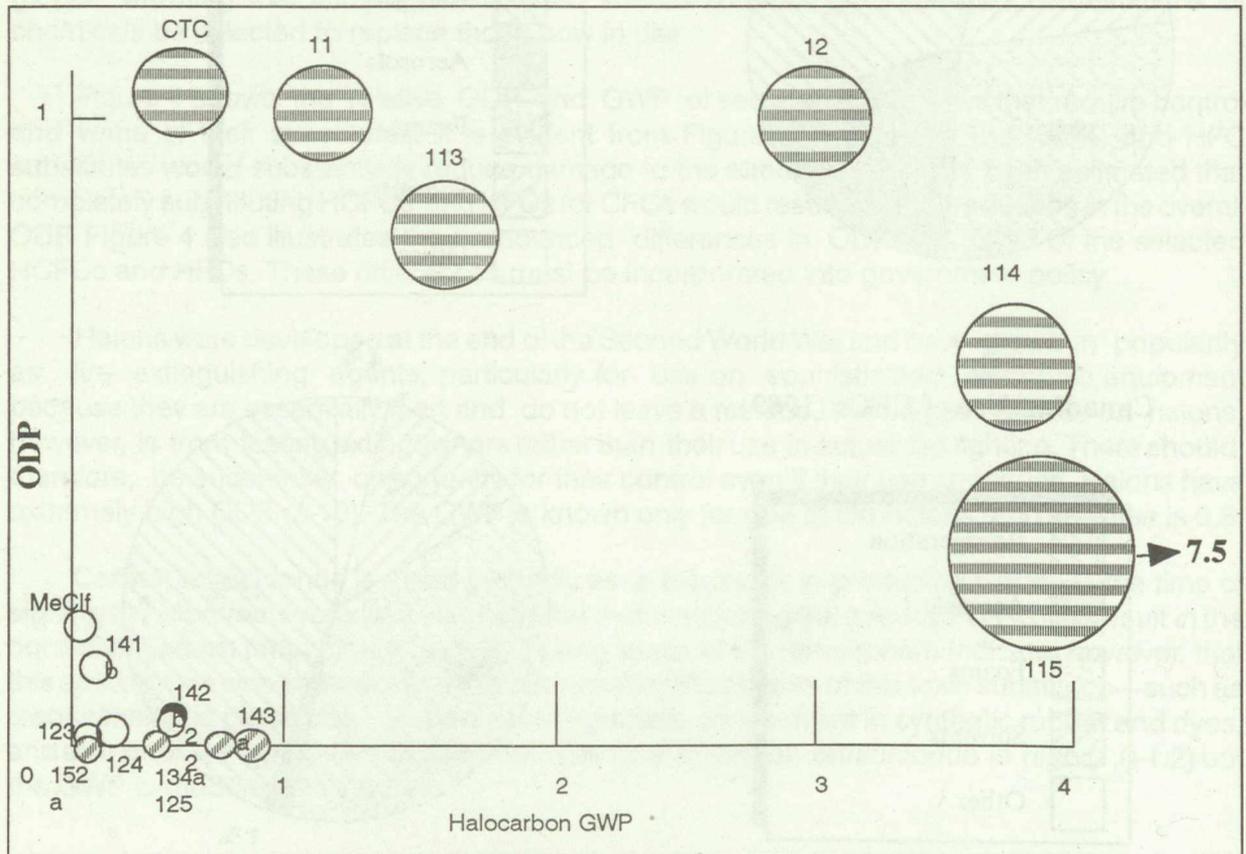
Sources : Dupont Canada Inc., Estimates received by Environment Canada, 27 April 1990 (for the global data).

V. Buxton, Environment Canada, *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue 20, 7 November 1989, p. 34.

Methyl chloroform was introduced in the mid-1950s as a cold cleaning solvent substitute for carbon tetrachloride. Today it is primarily used for vapour degreasing and cold cleaning of fabricated metal parts and other materials, but may have some application as a feedstock for CFC substitutes. Little information is available on the global uses of methyl chloroform, but the large quantities known to be consumed (700 kilotonnes/year) make it a substance of concern for ozone depletion even though its ODP is relatively low (0.11). Its GWP is very low

(0.0074). The lifetime of the product in the atmosphere is short (6.3 years), unlike many other chemicals of concern; once the use of methyl chloroform is stopped, its atmospheric effects will soon cease.

Figure 4: The Relative ODP and GWP of Carbon Tetrachloride, Methyl Chloroform and Selected CFCs, HCFCs and HFCs



HCFCs and HFCs provide large improvements in terms of both ozone depletion potential (ODP) and halocarbon global warming potential (GWP). The area of the circle is proportional to the lifetime of the compound it represents. The centre of the circle marks the ODP and halocarbon GWP. The compounds shown in the illustration are: CFCs-11, -12, -113, -114, -115; carbon tetrachloride (CTC); HCFCs-22, -142b, -124, -123, -141b; methyl chloroform (MeClf); and HFCs-152a, -134a, -125, -143a. The ODPs are calculated from the results of computer model simulations.

Source: United Nations Environment Program/World Meteorological Organization, "Scientific Assessment of Stratospheric Ozone", quoted in Du Pont's *Fluorocarbon/Ozone Update*, August 1989, p. 5.

HCFCs are viewed by industry and by most policy-makers as valuable in an orderly transition from CFCs to a time when non-halogenated substances would dominate most end uses. A few HCFCs are already in use (as in producing rigid foams) and several HCFCs are undergoing accelerated toxicity testing. Results of the long-term toxicity tests are expected by 1992 or 1993. Anticipating favourable results, several companies are converting or constructing plants to produce these HCFCs. Du Pont is constructing a plant in Maitland, Ontario, to produce an HCFC with foam-blowing applications. HCFCs are needed to allow the present and prospective deadlines of the Montreal Protocol to be met while not disrupting industrial processes or incurring overly large economic burdens. It is essential, however, to view HCFCs as bridging chemicals only while industry eliminates CFCs and moves towards the use of substances that have even less potential for damage.

HCFCs have ODPs ranging from 0.02 to 0.10 and GWPs from 0.0064 to 0.11, with most GWPs between 0.02 and 0.10. Given these ranges, every effort should be made to ensure that the HCFC chosen for a specific purpose is the least harmful available. Additionally, there should be an appropriate incentive to ensure continued research and development of harmless substitutes for HCFCs.

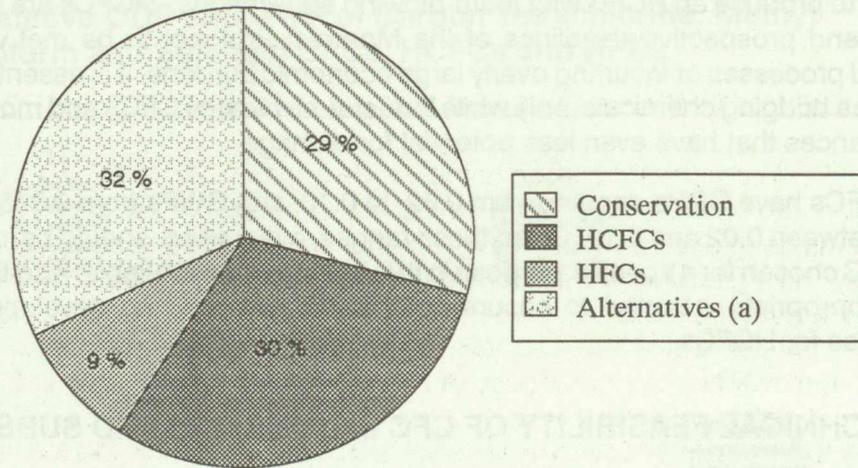
B. TECHNICAL FEASIBILITY OF CFC ELIMINATION AND SUBSTITUTION

A Technology Review Panel under the auspices of the United Nations Environment Program (UNEP) has determined that it is possible to reduce the use of the five controlled CFCs by 95% by the year 2000. This projection is based on current technology, but prospective technological advances should facilitate the complete elimination of the five controlled CFCs before 2000. The use of CFCs as a refrigerant is expected to persist, due to the continuing use of equipment that employs CFCs and/or those that will be produced before alternatives are available, and which cannot use "drop-in" substitutes. Automotive air conditioning systems will be the principal use, with their substantial release of CFCs at present due to insufficiently sealed systems and inadequate recovery/recycle technologies for maintenance.

Changes in products and practices, such as using hot water instead of CFCs to wash microchips, will account for a large reduction in CFC use. HCFCs are projected to account for 30% of CFC demand by 2000, and HFCs for another 9% (Figure 5), resulting in an anticipated overall reduction in ODP of 90%. There is potential for further reduction in ODP and GWP by carefully selecting which HCFC or HFC should replace a CFC for a specific use. According to the Technology Review Panel, which relies on data from industry, the World Meteorological Organization (WMO) and the United States Environmental Protection Agency (EPA), HCFCs will contribute between 2% and 10% to global warming at least until 2030.

Substitutes for CFCs, most importantly HCFCs, can affect global warming in more than one way. They may have their own radiative properties or GWP. Moreover, their use may change the efficiency of equipment and products, which could result in changes in fossil fuel demand and emissions of carbon dioxide. Use of an HCFC in high-quality insulation, for example, may increase energy efficiency sufficient to offset the GWP produced by the HCFC acting as a greenhouse gas. It is thus important to ensure that choices minimize the overall ODP and the GWP. At times, more than one CFC substitute or HCFC may be usable in a given application. The decision to use a particular HCFC must be made on environmental grounds, considering both ODP and GWP.

Figure 5: Projected Displacement of Current CFC Demand by 2000



Note (a) : "Alternatives" are substitutes for CFCs other than HCFCs and HFCs.

Source : United Nations Environment Program, Technology Review Panel, Technical Progress on Protecting the Ozone Layer, 30 June 1989, p. viii, Figure 5.

The Office of Air and Radiation of the U.S. EPA has examined four scenarios for HCFC/HFC substitution, assuming a phasing out of CFCs by the year 2000. One scenario, called "Minimize Greenhouse/Energy Impact," projected that a mix of HCFCs and HFCs would result in an increase in chlorine concentration in the stratosphere of only 0.1 parts per billion (EPA, 1989, p. 3-69). Although there would be a minor increase in chlorine concentration, the CFC replacements in this scenario would decrease global warming by 1% in 2075. Avoiding extensive use of HCFCs with higher ODP, for example HCFC-141b, would preclude significant increases in stratospheric chlorine.

It is important to compare the effectiveness of such policies for CFC replacement. For example, in the EPA's limiting or "worst case" scenario, where "Maximum Use of HCFCs with Maximum Chlorine Content" is considered, the estimated rate of warming would actually increase by 4.3%, indicating the inherent GWP of these substitutes (EPA, 1989, p. 3-59). Comparing this increase to the 1% reduction in GWP that is possible indicates how proper management could make a difference of over 5% in the rate of global warming. In comparison, doubling fuel efficiency of the global automobile fleet would only reduce the global warming effect 7% in 2075 (EPA, 1989, p. 3-59).

Implementing the "Minimize Greenhouse/Energy Impact" scenario is projected to result in a large net global saving in energy costs. Such savings are generated in this scenario with energy consumption being minimized through, for example, the use of ammonia as a refrigerant and energy-efficient vacuum panels instead of conventional foam insulation. The potential global savings in energy costs were estimated by the EPA to total as much as \$US 270 billion and could substantially offset the overall costs of reducing the present use of CFCs (EPA, 1989, pp. 3-47, 3-48 and 3-57).

C. REDUCING THE USE OF OTHER OZONE DEPLETING SUBSTANCES

Methyl chloroform and carbon tetrachloride are expected to be the principal sources of chlorine in the stratosphere once CFCs are phased out of production. Their potential contributions to global warming have not been calculated, perhaps because their GWP collectively is relatively low. Considering the recent, unexpected increase in carbon tetrachloride levels from uses that are not yet fully documented, and because of its GWP, there should be more concern about trends in the use of this solvent. There already is concern regarding methyl chloroform because of its ODP. Since alternates exist for both substances, there should not be any reason why policy and regulation cannot eliminate them by 2000. According to the Technology Review Panel, substitutes exist for 90-95% of methyl chloroform uses. Substitutors also exist for most uses of carbon tetrachloride except in their feedstock application for HCFC's. The UNEP working group in a draft report suggests that it is technically feasible to end the production and consumption of carbon tetrachloride by 2000 (UNEP, 1989a, p. 11).

The feasibility of ending halon use appears to have been the most contentious topic of discussion for the Technology Review Panel. Although much less used than CFCs, halons have an extremely high ODP and a relatively high GWP. Alternatives do exist for halons used in fire extinguishers and fire control systems, but in the minds of some there is a question of the cost:benefit ratio should these alternatives be used on sensitive electronic equipment. They argue that the failure of computerized functions could threaten the environment and human life, health or security.

Apparently economic analyses weighing the costs and benefits of using halons have not been performed. Recent developments by chemical manufacturers suggest that less harmful non-halon and non-CFC alternatives may be available sooner than previously anticipated. Phasing out the use of halons may be less of a technical problem than envisioned.

CONTROL MEASURES

A. TARGETS AND TIMETABLES

There is general agreement that it is technically feasible to phase out use of the five CFCs controlled by the Montreal Protocol. What remains is determining the targets and timetables for their elimination and providing assistance to developing countries to encourage them to join the Protocol. Canada can contribute to this process by controlling CFCs in this country, by helping to develop and implement amendments to strengthen the Protocol, and by indicating its intention to ensure additional resources are available to developing countries. Time, however, is of the essence; the Protocol will be renegotiated in June 1990.

This Committee recommended that Canada take a strong position on amending the control provisions of the Montreal Protocol at the November 1989 international meetings. We stand by, and in some cases strengthen our former position, which was stronger than Canada brought to the negotiating table at that time. Other countries subsequently proposed controls as strong as those of this Committee. We hope that more countries including Canada will have the courage at the June 1990 negotiations to adopt a timetable for eliminating CFCs.

Our recommendations for the control of CFCs and related substances are now more comprehensive than those the Committee made in November 1989. This is primarily the result of two factors. First, more information regarding the technical potentials for controls has been made available since that time, and second, the urgency of the problem has also become clearer to the international community. Targets and timetables as outlined below are necessary to reduce the threat to the ozone layer and to reduce global warming.

(1) We recommend that the following be adopted as the basis for regulations under the *Canadian Environmental Protection Act (CEPA)* and be promoted prior to amending the Montreal Protocol:

- a) a minimum 85% reduction in the production and consumption of all CFCs by 1995, with a complete phaseout by 1997; and
- b) a complete phaseout in the production and consumption of carbon tetrachloride and methyl chloroform by 1995, except for their use as a feedstock for CFC or halon substitutes and as organic laboratory solvents.

Problems in phasing out halons, whose use may be deemed essential because of safety or security applications, have led to disagreement about technically attainable targets. There is also reluctance to further limit the use of halons because of perceived economic costs, should benign and inexpensive substitutes not be found. There does seem to be agreement, however, that improved management of the present stock of halons in fire extinguishing systems and the prohibition of non-essential uses could reduce the demand for halons by 95%.

That said, there maybe an even more compelling reason for eliminating their use.

Unlike CFCs, which release chlorine into the stratosphere, halons release bromine, a much more effective ozone depleter. It is now estimated that the two most common halons, Halon 1211 and Halon 1301, have ozone depletion potentials 15 and 30 times higher than the most damaging CFCs. (Friends of the Earth, Friends of the Earth's Proposals for Amending the Montreal Protocol on Substances that Deplete the Ozone Layer, Submission to the Standing Committee on Environment, 26 January 1990, p. 5)

Therefore:

- (2) We recommend that regulations be invoked under CEPA requiring a 95% reduction in halon production and consumption by 1993, and a complete elimination by the year 2000, except for those "essential uses" where no reasonably performing substitute is available.**

Beyond regulating the production and consumption of CFCs, it is necessary to control certain end uses. Banning CFCs in 1980 as a propellant in three types of aerosols (hair sprays, anti-perspirants and deodorants) reduced this use of CFCs in Canada by 85% at the time. Their application in new aerosol products, however, grew so much that by 1986 it accounted for 12% of total Canadian use. As public concern increased, aerosol manufacturers voluntarily removed CFCs from their products. This has been so effective that now aerosols account for only 1% of CFC use in Canada. Manufacturers of foam packaging are similarly removing CFCs from their products.

Regulations have been proposed under CEPA to control both non-essential uses of CFCs and of halons in small, hand-held fire extinguishers. We are concerned that these regulations have not yet been adopted.

- (3) We recommend that the proposed regulations governing non-essential uses of CFCs and of halons in hand-held fire extinguishers (Ozone-depleting Substances Regulations No. 2 and No. 3) be implemented as soon as possible and that any portions of the regulations to which there has been no legal objection be adopted immediately.**

Assessing the relative harm of chemicals which contribute to ozone depletion and global warming indicates that, in the short term, use of HCFCs and HFCs as substitutes for CFCs may be necessary since harmless substitutes are not yet available, and HCFCs and HFCs are much less harmful than CFCs. In order not to rely too heavily or too long on HCFCs and HFCs, however:

- (4) We recommend that:**

- a) neither HCFCs nor HFCs be used in any aerosols;
- b) HCFCs and HFCs only be used in other products as replacements for CFCs where safe alternatives are not available;
- c) only those HCFCs and HFCs with the least ozone depletion and global warming potential be used in products or processes requiring such substances;

- d) in future, HCFCs and HFCs not be substituted for CFCs at any time in amounts greater than 30% and 9%, respectively, of present CFC use, and by 2010 the production and consumption of HCFCs and HFCs be discontinued.

B. THE NEED FOR COORDINATED ACTIONS

It is clear that phasing out the use of CFCs, halons and their substitutes which still have ozone depletion and global warming potential will require a concerted effort at all levels of governments. Many jurisdictions will be involved in recovery, recycling, transporting and the eventual destruction of these substances. In particular there is a need to accelerate recovery and recycling activities since they are the key to removing our dependence on new molecules of these substances. Recycling will allow us to accelerate the phasing out of production.

There is a need for leadership in this regard. Presently the Canadian Council of Ministers of the Environment is the most appropriate body available to deal with multijurisdictional activities relating to environmental concerns. They should be active in all aspects of managing the phaseout of these substances when more than one jurisdiction is involved.

- (5) **We recommend that the Canadian Council of Ministers of the Environment take the lead when multijurisdictional participation would accelerate initiatives for the reduction, recovery, recycling and eventual safe destruction of CFCs and halons.**

RECOVERY, RECYCLING AND DESTRUCTION

A. RECOVERY AND RECYCLING OF CFCs, HCFCS AND HFCS

In recent years there has been increased interest in developing appropriate technologies (affectionately referred to as "vampire units") for the recovery and recycling of CFCs in industrial processes and from refrigeration and air conditioning equipment. Pressure brought to bear on the industry through public debate, such as that conducted by this Committee, and through local and regional legislation has played an important part in this progress. The State of Vermont, for example, passed a bill restricting the use of CFCs in automobile air conditioners. Subsequently, some of the large automobile manufacturers have indicated that their service depots would soon acquire recovery and recycling equipment. The Greater Regional District of Vancouver and Metropolitan Toronto are implementing bylaws that require the recovery and recycling of CFCs, while Montreal is planning to invoke as regulations the proposed "Code of Practice for the Reduction of CFC Emissions in Refrigeration and Air Conditioning Systems", developed by Environment Canada.

Recovery and recycling of CFCs can be done in several ways. For example, if a refrigeration unit needs repairs the CFCs can be withdrawn into a sealed container and then reinjected into the same unit upon completion of the repairs. Although the CFCs would contain oils and other substances, they are replaced into the same refrigeration unit from which the contamination was derived and they will not need to be repurified. When a refrigeration unit is decommissioned, however, the CFCs are often contaminated by substances that may be incompatible with other refrigeration units, or there may only be limited uses for the contaminated CFCs until they have been repurified. Since units for on site repurification are not available for most situations, recycling will often involve transporting the substance to a place where it can be repurified. Liquid CFCs that are used as solvents or cleaning agents, however, are often contaminated by more dangerous chemicals and must be handled as a hazardous waste until they are purified.

The Committee encourages initiatives being taken by manufacturers such as Inglis, which soon will recover CFCs from refrigerators during repair at its service centres. CAMCO and other companies are investigating technologies for portable CFC recovery and recycling equipment to be used in the home during maintenance procedures. The Committee applauds service organizations, such as the Heating, Refrigerating and Air Conditioning Institute (HRAI), which have helped develop a Code of Practice as well as education and training programs for technicians who design and service refrigeration equipment. CFCs have been voluntarily removed from use by the foam packaging industry and from 95% of the aerosol uses in Canada, those of a medical nature being the main exception.

Automobile Air Conditioners

Not all uses of CFCs in Canada are being reduced, however. The Committee condemns the automobile industry's failure to develop air conditioning units that are leak-proof. An estimated 60% of new cars sold in Canada are equipped with air conditioning units, as are 90% of

the cars exported to the United States (representing 75% of Canadian auto production). We have concluded that all non-commercial vehicles equipped with air conditioning beginning with the 1992 model year should have leak-proof systems, both to prevent the escape of CFCs and to contain the subsequent HFC substitute, which will not be entirely harmless.

- (6) We recommend that air conditioning units for the passenger compartments of all motor vehicles be leak-proof, beginning with the 1992 model year.**

“Code of Practice” for Recycling

The quantity of CFCs contained in appliances, air conditioners and refrigeration units is believed to be sufficiently large that, if released, would so deplete the ozone layer as to threaten life processes. In Canada alone, there are tens of millions of refrigeration units in use, all containing some quantity of CFCs. Each year, the refrigeration and air conditioning industry uses an estimated 7,500 tonnes of the five controlled CFCs. Approximately half of this is in commercial systems, one-quarter in home refrigerators and freezers, and one-quarter in mobile air conditioners. Home air conditioning, both central and window units, heat pumps and commercial unitary air conditioning systems used in malls and buildings up to 10 stories already use an HCFC (HRAI, 1990, p. 6).

Unknown amounts of CFCs are inadvertently being lost to the atmosphere during servicing of these systems. It is essential that these CFCs be recovered and recycled until substitutes are available, at which time they should be recovered and destroyed.

The proposed Code of Practice should provide a guide for recovery and recycling, at least in commercial and industrial applications. The Committee believes, however, that the Code should be upgraded to a regulation. Therefore:

- (7) We recommend that the proposed “Code of Practice for the Reduction of CFC Emissions in Refrigeration and Air Conditioning Systems” developed by Environment Canada for commercial refrigeration units be made a regulation under CEPA. The Committee further recommends that this Code be applied to the management of HCFC and HFCs. These regulations should come into effect by 30 June 1991.**

It is our understanding that Environment Canada is looking at initiatives to ensure that recovery and recycling technologies are available and that education and training programs in their use are developed. Compliance and enforcement capabilities must also be established.

Abandoned Refrigeration Equipment

Previously abandoned refrigeration equipment contains possibly large quantities of CFCs. Canada may even be receiving used refrigerators from scrap dealers in the United States. Although the actual percentage of compressor systems which contain CFCs and are still intact after being dumped is not known, it would be prudent to recover the CFCs from this potential source of emissions. As well, CFCs should be recovered when refrigeration units are removed from service and before they are dumped. We understand that the City of Toronto may soon introduce special equipment to be towed behind garbage trucks to pick up this type of waste and recover their CFCs. Such municipal initiatives should be encouraged. In this regard:

- (8) We recommend that Environment Canada be provided the necessary funds to assist the relevant authorities in developing programs for the recovery and recycling of CFCs from commercial, household and mobile refrigeration systems that are to be scrapped or that have been previously abandoned. Once destruction technologies and less harmful substitutes are available, then the recovered, more harmful substances must be destroyed.**

Recycling of CFC Solvents

Some CFCs are in liquid form at room temperature and are used as solvents. Those should also be recycled until phased out. Industry is optimistic that replacements can be found for most solvent uses and should be encouraged to make these substitutions as rapidly as feasible. Until then, industry should be required to recycle CFCs employed as solvents, since the technology to do this is becoming available.

- (9) We recommend that the Canadian Council of Ministers of the Environment coordinate appropriate jurisdictions in the making of regulations for the recycling of CFCs used as solvents. When alternatives to solvent CFCs and destruction technologies are available, the CFCs must be recovered and destroyed.**

Technologies for Destruction

Ultimately, technologies will be required to destroy CFCs, halons, HCFCs, HFCs and related substances. The Committee is concerned that sufficient progress be made for their incineration or other means of destruction. We do not want to see problems of storage arise, as is the case for PCBs, particularly considering the volatility of some of these substances. Therefore:

- (10) We recommend that funding be provided by the federal government to assist the provinces and producing industries in developing the appropriate destruction technologies for CFCs, halons, HCFCs, HFCs and related substances. Once developed, the appropriate jurisdiction should make regulations for the destruction of these substances.**

Life Cycle Management

Proper management of the recovery, recycling and destruction of those substances presently in refrigeration units is essential, as is the complete "cradle-to-grave" management of new CFC production and of HCFC and HFC substitutes as they become commercially available. "Life-cycle" management of CFCs and their replacements need not involve overly cumbersome manifest systems for tracking these substances. In fact, only those substances used as solvents should be classified as hazardous wastes, not CFCs used as refrigerants. This point of clarification recently was made by the EPA in the U.S. (Federal Register Vol. 54, No. 144, 28 July 1989, pp. 3135-3137). The classification of CFCs and related substances in different jurisdictions should be the same to allow for national uniformity. There may be

occasions when a province or a municipality will invoke regulations regarding these substances under their own legislation. In such cases consultation with the federal authorities hopefully would occur. Efforts would be made to coordinate the regulatory agendas. To this effect:

- (11) We recommend that national standards and guidelines be developed for classifying CFCs and related substances to ensure that regulations concerning their handling and transportation are uniform across the country.**

To ensure life-cycle management of CFCs, HCFCs and HFCs that are not used as solvents:

- (12) We recommend that "cradle-to-grave" management be applied to new CFCs, HCFCs and HFCs used for refrigeration purposes, ensuring that the producing and importing industries are responsible for tracking these chemicals to their final end use. Regulations with respect to the recovery, recycling and destruction of these substances should govern the remainder of their life cycle.**

B. RECOVERY OF HALONS

We are concerned about the continued production and consumption of halons and have recommended their accelerated phaseout. Environment Canada has proposed regulations to remove halons from hand-held fire extinguishers. Formal objections to these proposed regulations, however, have been filed by several parties, including trade associations in the United States. The Committee has acknowledged these legal objections in Recommendation (3), but would like to see them resolved as soon as possible in order that these regulations can proceed.

The largest quantity of halons and source of emissions, however, is not found in hand-held fire extinguishers but large flooding systems, similar to the familiar overhead water sprinkler systems. Most emissions from these flooding systems occur during installation when the system is tested, or during periodic tests to ensure that the system is functional. There are alternative testing methods available that use less harmful gases and we believe that those methods should be mandatory.

We also believe that halons should not be used in flooding systems except in cases where such use is deemed essential. Some high technology industries with halon flooding systems are planning to remove them. We hope that others will follow such leads, independent of any regulations or amendments to the fire code. Careful management of the existing quantity of halons using recovery and recycling technology should readily supply all the halons required for the few uses deemed essential. Once appropriate substitutes become available, however, halons should be removed from use even if the stock of halons (often referred to as a bank) is not depleted.

- (13) We recommend that the National Fire Code and the National Building Code be amended immediately and as necessary to prohibit the testing of flooding systems with halons and to prohibit the construction of**

“non-essential” halon flooding systems. They must also be amended to require the removal of all non-essential halon flooding systems as early as possible but no later than 1 January 1993. Halons will be supplied for essential uses from the existing stock of halons before new halons are consumed. Once substitutes and destruction facilities are available, the remaining stock of halons must be destroyed.

It has been brought to our attention that the federal government is one of the larger users of halons in both flooding and hand-held systems. The Department of National Defence makes extensive use of halons in both essential and non-essential situations. They and other departments must stop using halons except in approved, essential use situations. It is imperative that the government get its own house in order.

- (14) We recommend that the federal government immediately develop a coordinated plan for the removal of “non-essential” halon systems used by any federal government department or agency, and that it provide justification for the retention of any system it identifies as essential.**

C. MANAGING OZONE DEPLETING SUBSTANCES AND THEIR SUBSTITUTES

Implementing all these regulations for CFCs, halons and their substitutes could be an onerous task in view of requirements for enforcement and compliance, and the need for education and training programs. The Committee suggests that the provinces accept responsibility for these initiatives under CEPA, or other legislation such as the *Transportation of Dangerous Goods Act*, where there may be provision for federal-provincial cooperation. There will be numerous occasions, some indicated in this report, where the responsibility will rest solely with the provincial or municipal governments. Various provinces and municipalities are already actively instituting programs for recovery and recycling or regulating the phaseout of some uses of these ozone depleting/global warming substances. There is a dire need for cooperation at all government levels. Recommendation (5) addresses the multijurisdictional aspects of managing these substances.

Implementing changes to relevant codes will affect officials in all jurisdictions.

- (15) We recommend that the federal government and the provinces collaborate in developing a national education program for municipal and other officials responsible for activities that involve CFCs, halons and related substances.**

We also recognize that there will be times when the responsibility for enforcement of and compliance with regulations will rest with the federal government. To handle this additional responsibility, Environment Canada requires a sufficient number of properly trained personnel.

- (16) We recommend that Environment Canada’s budget be increased to ensure the enforcement of and compliance with new regulations where the federal government retains responsibility.**

This is in addition to any new resources that might be required in administering the regulations, and for implementing new education and training programs.

MARKET SIGNALS

Industry has shown initiative in dealing with the issue of reducing CFC use, including research into the development of substitutes. To a lesser degree, industry has shown similar initiative with respect to halons. The signing of the Montreal Protocol, of course, has prompted this development. In fact, since the Protocol was adopted, it has become in the best economic interests of a company to develop alternatives because of the marketing advantage that can be gained by the first company out with a preferred substitute.

Although we would prefer to see minimal disruption of the industries and businesses using these substances, we have concluded that halting ozone depletion is so important that CFCs, halons and related substances must be controlled without delay. Considering the present low cost of CFCs and the predicted costs of their substitutes, it is doubtful that a recycling industry can develop. Intervention in the market appears necessary to compel the recovery and recycling of these substances and to ensure that small businesses are not excluded from this enterprise, particularly from the recovery aspect where a large number of personnel will be needed.

One incentive for the development of such an industry is the requirement that substitutes—HCFCs and HFCs—also be recycled and eventually destroyed, as we have recommended. The HCFC and HFC substitutes will in turn be replaced as less harmful chemicals are developed. There should, therefore, be a relatively profitable market for recovery and recycling enterprises.

Smaller businesses may have the most difficulty with recycling requirements. Will the small independent garage, for example, be able to afford the equipment to recover and recycle CFCs from automobile air conditioners? Will the independent appliance repair business be at a similar disadvantage?

Although the price of CFCs is currently increasing, it is still too low to force consideration of alternatives or to make their recycling commercially viable. A law passed by the U.S. Congress 1 January 1990 placed a tax on CFCs and halons at the production end. The tax raises the price of CFCs from about \$US 0.60 per pound in increments to approximately US \$3.25 by the year 1994. This tax has reportedly been successful in stimulating the producing industries to become involved with recycling. It is less expensive to recycle old CFCs than to produce new CFCs given the rate of taxation. Stimulating recycling in addition to the development of substitutes is necessary if reductions in production and importation are to be achieved.

Revenues derived from a tax on ozone depleting substances in Canada could be used to provide assistance to help small service businesses cope with the anticipated regulatory changes. Revenues could be used for programs such as Environment Canada's Development and Demonstration of Resource and Energy Conservation Technologies (DDRECT) to fund grants and loans for developing recycling technologies and service industries. Perhaps most

important of all, the revenues could provide the additional funds that will be needed to assist developing countries in converting to the new technologies and substitutes so that they can also become signatory to the Montreal Protocol.

- (17) We recommend that a tax be levied on CFCs and halons at least equivalent to that to be implemented in the United States. Funds equal to those derived from the tax should be used to support initiatives arising from recommendations of this report.**

This recommendation was adopted by a narrow majority of the Committee (See Minutes of Proceedings).

Changing the Technology of Production and Use

As substitutes for CFCs and halons become available, there will at times be a choice for a particular end use. The prices of these substitutes will vary, as will their ODP and GWP. We have already emphasized that the less harmful substance should be used, taking indirect effects into consideration when applicable. As an example, the insulating value of foams produced with these substitutes would be a consideration.

To minimize longer-term costs, producers and users should adopt, as they become available, those substitutes which offer large environmental gains. This is not necessarily happening. Although less harmful substitutes for halons appear imminent, some companies are developing products that use halons or are substituting CFCs for halons. Although CFCs could be useful in replacing halons temporarily from essential uses, we would not like to see them used in non-essential situations or as replacements for less harmful alternatives such as dry chemical, fire extinguishing agents.

Because of such developments, which indicate that environmental awareness will not necessarily prevail, market forces need augmenting to ensure use of less harmful substitutes.

- (18) We recommend that when there is a substantial difference in the environmental impacts of two or more substitutes for a given end use, an equalizing tax be placed on the substitute(s) that is (are) more harmful but less costly. The tax should be revised every six years to allow time for the market to regulate itself.**

This recommendation was adopted by a narrow majority of the Committee (See Minutes of Proceedings).

RESEARCH NEEDS

Our understanding of the process of ozone depletion is incomplete. For example, ozone depletion in the Arctic is of particular interest to Canada but we do not know the extent of the depletion or whether the development of an Arctic "ozone hole" is likely. It appears that the atmospheric conditions conducive to the formation of the Antarctic ozone hole are not duplicated in the Arctic but the same conditions may not be necessary. Monitoring indicated an overall reduction of 8% in ozone concentration in the spring of 1989 in the Arctic with larger reductions in some layers of its stratosphere. However, similar depletion was not recorded in 1990. We do not know how to explain the irregularities and do not know for certain whether we are monitoring the appropriate geographic locations.

In the temperate latitudes, such as over southern Canada, we now experience a 2-4% overall annual reduction relative to ten years ago. Seasonally, the reduction is 7-8% for a four to five month period in the spring. Yet we are uncertain of the linkages between the polar regions and the temperate latitudes. Monitoring and research to date have been insufficient to answer these and related questions. Therefore:

- (19) We recommend that adequate funding be made available to the Atmospheric Environment Service of Environment Canada to conduct monitoring of and research into ozone depletion.**

INTERNATIONAL MEASURES

Assistance to and participation by developing countries will be necessary to implement and expand the control measures of the Montreal Protocol. Provision for such an initiative was included in Article 5 of the Protocol. Developing countries cannot afford the increased marginal costs of converting to CFC substitutes. For example, the cost of converting a CFC-producing plant to HCFC or HFC production would be prohibitive for them. These are the major costs currently being considered and are estimated to be \$US 100-250 million over the first three years.

Developed countries are responsible for more than 85% of the production of CFCs, but have only 20% of the world's population. It seems only fair that the main economic benefactors, such as Canada, assist developing countries with the transition to less harmful substitutes. In fact, the success of the Protocol will probably require such a commitment.

There are various formulas that could be used to calculate the contributions of different countries to an assistance fund. It could be based on a percentage of CFC consumption in a given year, or perhaps on the regular United Nations contributions scale, linked mainly to GNP. Whatever the basis and the amount selected, it is essential that Canada contribute its share, which would probably fall within the range of about 2-3.5% of the total.

In addition to funding mechanisms, the Protocol contains provision for the transfer of information and technology. There are still stumbling blocks with respect to intellectual property rights that must be overcome. Canada must demonstrate that it is making a whole-hearted effort to bring the complete global community into the Protocol. We cannot afford to let the withholding of additional funds and selfishness with technology transfer jeopardize the attempt to control CFCs globally. If countries do not sign the Protocol and begin to produce CFCs and related substances, the Protocol would be undermined and life on Earth further threatened. Therefore:

- (20) We recommend that the federal government contribute to all funding mechanisms developed under the Montreal Protocol. We also recommend that a roundtable be established in Canada consisting of all government departments, industry, non-government organizations and other stakeholders who would be involved in funding and facilitating technology transfer to developing countries.**

Industrialized nations and multinational companies should take the lead in negotiating international agreements known as "global bargains". Such bargains will often entail providing financial assistance and technology transfer to developing countries. Given the extremely harmful nature of CFCs to the atmosphere, we should ensure that potential large-scale producers, in particular China, India and Brazil are included in this global bargain, known as the Montreal Protocol.

(21) We recommend that Canada take the lead in negotiating "global bargains". In the CFC global bargain, substitutes for CFCs could be offered in exchange for full participation in the Montreal Protocol, with appropriate conditions for monitoring and inspection. The intention of this bargain is to assist developing countries eliminate their consumption of CFCs.

The Committee is also concerned that Canada's trade and international aid policies be conducive to assisting developing countries in a sustained manner. Environmental impacts must be accounted for when economic policies are set or projects undertaken. It is important that Canadian foreign policy be consistent with the intent of the Montreal Protocol and all other global bargains that may be established in the future.

(22) We recommend that a review be undertaken of trade development programs and subsidies, and of foreign aid policies, programs and projects to ensure they are consistent with the preventive aims of this report.

We view these recommendations as fundamental in protecting the global atmosphere.

PUBLIC EDUCATION AND RESPONSIBILITY

Public pressure has been an effective force in accelerating the removal of CFCs from some products. The two most notable examples are the recent removal of CFCs from most aerosol products, and the substitution of an HCFC and pentane for CFCs in some cups and packaging materials made from rigid foam. The public can do even more, for example, by choosing non-pressurized dispensers, or products packaged in non-petroleum-based material, or products with substantially reduced packaging.

Automobile air conditioners are a substantial source of emissions of CFCs to the atmosphere. A CFC substitute should be available in 1994 or 1995. Until that time, consumers should question the need to purchase an air conditioner in an automobile, unless leak-proof systems become available in the interim. Owners of vehicles with air conditioners should have them serviced only by persons trained and equipped to recover CFCs. It is likely that the "do-it-yourself" canisters of CFCs now available to "top up" leaking systems will soon disappear from the market. Individuals can assist this process by refusing to buy products containing CFCs.

Homeowners will also be required to act responsibly as equipment for recovering CFCs from home refrigeration systems such as refrigerators and freezers becomes available. As regulations for recovery and recycling come into force, consumer cooperation will be needed to ensure that CFCs are properly recovered by authorized personnel. The public must demand access to facilities for the recovery, recycling and ultimate destruction of CFCs.

Just as consumers have been a driving force for industrial responsibility in the use of CFCs in the past, they can be a potent lobby for future initiatives to ban ozone-depleting substances and to control use of their substitutes. Public involvement is essential. That involvement in turn depends on a well informed public.

(23) We recommend that all levels of government, producers of these chemicals, and manufacturers of CFC-containing equipment, develop and implement a coordinated, nationwide public education program for the recovery, recycling, handling, storage and ultimate destruction of CFCs and related substances.

PUBLIC EDUCATION AND RESPONSIBILITY

in order to be able to identify CFCs in the marketplace. The public should be made aware of the fact that CFCs are not only found in household products but also in many other products. The public should be made aware of the fact that CFCs are not only found in household products but also in many other products. The public should be made aware of the fact that CFCs are not only found in household products but also in many other products.

The Commission has also been concerned with the fact that the public is often unaware of the fact that CFCs are not only found in household products but also in many other products. The public should be made aware of the fact that CFCs are not only found in household products but also in many other products. The public should be made aware of the fact that CFCs are not only found in household products but also in many other products. The public should be made aware of the fact that CFCs are not only found in household products but also in many other products.

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Just as consumers have been a driving force for industrial responsibility in the use of CFCs in the past, they can be a potent force for future initiatives to reduce and eliminate CFCs and to control use of their substitutes. Public involvement is essential. That involvement in turn depends on a well-informed public.

(2) We recommend that all levels of government, producers of CFC-containing products and manufacturers of CFC-containing equipment, develop and implement a coordinated national public education program for the recovery, recycling, handling, storage and ultimate destruction of CFCs and related substances.

RECOMMENDATIONS

- (1) We recommend that the following be adopted as the basis for regulations under the *Canadian Environmental Protection Act (CEPA)* and be promoted prior to amending the Montreal Protocol:
 - a) a minimum 85% reduction in the production and consumption of all CFCs by 1995, with a complete phaseout by 1997; and
 - b) a complete phaseout in the production and consumption of carbon tetrachloride and methyl chloroform by 1995, except for their use as a feedstock for CFC or halon substitutes and as organic laboratory solvents.
- (2) We recommend that regulations be invoked under CEPA requiring a 95% reduction in halon production and consumption by 1993, and a complete elimination by the year 2000, except for those "essential uses" where no reasonably performing substitute is available.
- (3) We recommend that the proposed regulations governing non-essential uses of CFCs and of halons in hand-held fire extinguishers (Ozone depleting Substances Regulations No. 2 and No. 3) be implemented as soon as possible and that any portions of the regulations to which there has been no legal objection be adopted immediately.
- (4) We recommend that:
 - a) neither HCFCs nor HFCs be used in any aerosols;
 - b) HCFCs and HFCs only be used in other products as replacements for CFCs where safe alternatives are not available;
 - c) only those HCFCs and HFCs with the least ozone depletion and global warming potential be used in products or processes requiring such substances;
 - d) in future, HCFCs and HFCs not be substituted for CFCs at any time in amounts greater than 30% and 9%, respectively, of present CFC use, and by 2010 the production and consumption of HCFCs and HFCs be discontinued.
- (5) We recommend that the Canadian Council of Ministers of the Environment take the lead when multijurisdictional participation would accelerate initiatives for the reduction, recovery, recycling and eventual safe destruction of CFCs and halons.
- (6) We recommend that air conditioning units for the passenger compartments of all motor vehicles be leak-proof, beginning with the 1992 model year.

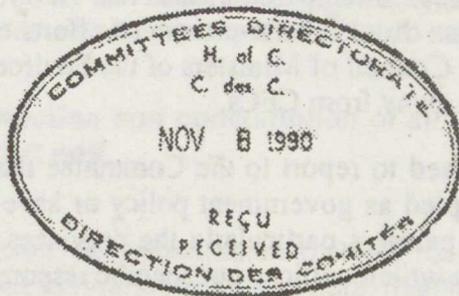
- (7) We recommend that the proposed "Code of Practice for the Reduction of CFC Emissions in Refrigeration and Air Conditioning Systems" developed by Environment Canada for commercial refrigeration units be made a regulation under CEPA. The Committee further recommends that this Code be applied to the management of HCFC and HFCs. These regulations should come into effect by 30 June 1991.
- (8) We recommend that Environment Canada be provided the necessary funds to assist the relevant authorities in developing programs for the recovery and recycling of CFCs from commercial, household and mobile refrigeration systems that are to be scrapped or that have been previously abandoned. Once destruction technologies and less harmful substitutes are available then the recovered, more harmful substances must be destroyed.
- (9) We recommend that the Canadian Council of Ministers of the Environment coordinate appropriate jurisdictions in the making of regulations for the recycling of CFCs used as solvents. When alternatives to solvent CFCs and destruction technologies are available, the CFCs must be recovered and destroyed.
- (10) We recommend that funding be provided by the federal government to assist the provinces and producing industries in developing the appropriate destruction technologies for CFCs, halons, HCFCs, HFCs and related substances. Once developed, the appropriate jurisdiction should make regulations for the destruction of these substances.
- (11) We recommend that national standards and guidelines be developed for classifying CFCs and related substances to ensure that regulations concerning their handling and transportation are uniform across the country.
- (12) We recommend that "cradle-to-grave" management be applied to new CFCs, HCFCs and HFCs used for refrigeration purposes, ensuring that the producing and importing industries are responsible for tracking these chemicals to their final end use. Regulations with respect to the recovery, recycling and destruction of these substances should govern the remainder of their life cycle.
- (13) We recommend that the National Fire Code and the National Building Code be amended immediately and as necessary to prohibit the testing of flooding systems with halons and to prohibit the construction of "non-essential" halon flooding systems. They must also be amended to require the removal of all non-essential halon flooding systems as early as possible but no later than 1 January 1993. Halons will be supplied for essential uses from the existing stock of halons before new halons are consumed. Once substitutes and destruction facilities are available, the remaining stock of halons must be destroyed.

- (14) We recommend that the federal government immediately develop a coordinated plan for the removal of "non-essential" halon systems used by any federal government department or agency, and that it provide justification for the retention of any system it identifies as essential.
- (15) We recommend that the federal government and the provinces collaborate in the developing a national education program for municipal and other officials responsible for activities that involve CFCs, halons and related substances.
- (16) We recommend that Environment Canada's budget be increased to ensure the enforcement of and compliance with new regulations where the federal government retains responsibility.
- (17) We recommend that a tax be levied on CFCs and halons at least equivalent to that to be implemented in the United States. Funds equal to those derived from the tax should be used to support initiatives arising from recommendations of this report.
- (18) We recommend that when there is a substantial difference in the environmental impacts of two or more substitutes for a given end use, an equalizing tax be placed on the substitute(s) that is (are) more harmful but less costly. The tax should be revised every six years to allow time for the market to regulate itself.
- (19) We recommend that adequate funding be made available to the Atmospheric Environment Service of Environment Canada to conduct monitoring of and research into ozone depletion.
- (20) We recommend that the federal government contribute to all funding mechanisms developed under the Montreal Protocol. We also recommend that a roundtable be established in Canada consisting of all government departments, industry, non-government organizations and other stakeholders who would be involved in funding and facilitating technology transfer to developing countries.
- (21) We recommend that Canada take the lead in negotiating "global bargains". In the CFC global bargain, substitutes for CFCs could be offered in exchange for full participation in the Montreal Protocol, with appropriate conditions for monitoring and inspection. The intention of this bargain is to assist developing countries eliminate their consumption of CFCs.
- (22) We recommend that a review be undertaken of trade development programs and subsidies, and of foreign aid policies, programs and projects to ensure they are consistent with the preventive aims of this report.
- (23) We recommend that all levels of government, producers of these chemicals, and manufacturers of CFC-containing equipment, develop and implement a coordinated, nationwide public education program for the recovery, recycling, handling, storage, and ultimate destruction of CFCs and related substances.



November 8, 1990

The Honourable David MacDonald, P.C., M.P.
Chairman
Standing Committee on Environment
House of Commons
Room 309, East Block
Ottawa, Ontario
K1A 0A6



Dear Mr. Chairman:

Pursuant to Standing Order 109 of the House of Commons, I am pleased to forward to you the enclosed Government response to the recommendations of the Third Report of the Standing Committee on Environment, tabled in the House of Commons on June 13, 1990 entitled "Deadly Releases CFC's".

Protection of the stratospheric ozone layer from the effects of ozone-destroying chemicals such as CFCs and halons is one of the most important global environmental protection issues to be faced by governments. The Government is pleased that the House of Commons Standing Committee on Environment has recognised this and devoted the time and energy to carefully investigate the issue and make the recommendations contained in its report.

Canada has become a world leader in encouraging international protection of the ozone layer by playing a key role in the development of the Vienna Convention for the Protection of the Stratospheric Ozone Layer and the subsequent control treaty, the Montreal Protocol on Substances that Deplete the Ozone Layer. The Montreal Protocol was the first international accord of its kind and set a global precedent for the safeguarding of the environment and human health.

Canada will continue its leadership role to ensure that the Montreal Protocol's control provisions are strengthened to eliminate the use of ozone-depleting substances as soon as possible. Canada will also contribute its share to the Multilateral Fund announced at the London meeting of the Parties to the Protocol, and is taking a lead role in the establishment and operation of the Fund and its associated technical clearing house function. At the first meeting of the Executive Committee for the Multilateral Fund September 19, 1990, it was decided that the Secretariat would be established in Montreal. This Fund will help finance initiatives needed to assist developing countries to obtain and use technologies that are based on non-ozone-depleting substances.

The Canadian control programme is one of the most rigorous in the world. In the first control period for the Montreal Protocol (July 1, 1989 - June 30, 1990), Canadian consumption was 19% lower than it was in 1986, the base year for the Protocol consumption limits. Canada will achieve the first required 20% reduction in CFC consumption almost three years before the 1993

date specified in the Protocol. The "ratchetting down" provisions of the ozone-depleting substances regulations under CEPA will ensure that these gains are not lost by future new demands.

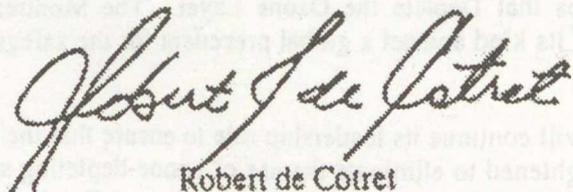
Substitution of non-ozone-depleting substances and implementation of effective recovery/recycle programmes will increase the rate at which Canada moves away from ozone-depleting substances. Joint federal-provincial efforts on recovery and recycling, under the auspices of the Canadian Council of Ministers of the Environment, and industry initiatives will ensure an orderly transition away from CFCs.

I am pleased to report to the Committee that many of the recommendations have already largely been adopted as government policy or have been implemented. Others will be pursued shortly with our partners particularly the provinces within the CCME deliberations. I have attached a document which outlines our specific responses.

For ease of reference, the recommendations have been repeated and are followed by the Government's responses.

In closing, Mr. Chairman, I would like to thank the members of the Committee for their contribution in the development of the optimal solutions to these very complex problems. I look forward to working with you and your colleagues on the development of measures to preserve and enhance our environment.

Yours truly,



Robert de Cotret

GOVERNMENT RESPONSE

1) ***We recommend that the following be adopted as the basis for regulations under the Canadian Environmental Protection Act (CEPA) and be promoted prior to amending the Montreal Protocol:***

a) ***a minimum 85% reduction in the production and consumption of all CFCs by 1995, with a complete phaseout by 1997; and***

Response:

- The government agrees with the Committee's recommendation to phase out CFCs by 1997. Canada's commitment to do this was announced at the London meeting of the Parties to the Montreal Protocol on June 27-29, 1990. Canada and 12 other countries issued a declaration stating their intention to phase out CFCs by 1997, based on the belief that adequate supplies of substitutes will be commercially available by that date.
 - Canada's ability to achieve an 85% reduction in CFC consumption by January 1, 1995 is doubtful, based on the current Canadian use pattern of these chemicals. The most critical CFC use that could affect Canada's ability to meet this date is refrigeration. This sector currently accounts for about 45% of total Canadian use of CFCs, much in servicing existing equipment. The most likely substitute chemical for new or converted refrigeration applications is HFC 134a which is not expected to be commercially available in large quantities until late 1994. The time requirement for equipment conversions, etc. may move the time frame for achieving an 85% reduction beyond 1995.
 - Recycling of refrigerants from decommissioned equipment would be the only way to achieve an 85% reduction by January 1, 1995. Recycling of refrigerants may prove to be technically or logistically less feasible than expected. Volumes collected and recycled may also not be sufficient to meet demand. In these circumstances, an alternative regulatory regime would have to be developed.
 - Environment Canada will continue to examine the feasibility of regulating an early reduction by 1995 as recommended by the Standing Committee. Efforts will also be accelerated to implement a recovery and recycling programme with the provinces. The reduction deadline will be contingent on there being sufficient chemicals (either substitutes or recycled CFCs) to meet the essential new equipment demand and after service requirements for the refrigeration sector.
- b) ***a complete phaseout in the production and consumption of carbon tetrachloride and methyl chloroform by 1995, except for their use as a feedstock for CFC or halon substitutes and as organic laboratory solvents.***

Response:

- With respect to carbon tetrachloride, 99% of current Canadian use is as a feedstock in the production of CFCs. The two other significant uses are as a diluent gas to reduce explosion hazards in the production of chlorine and as a laboratory agent. Canada will

phase out non-feedstock and non-laboratory uses of carbontetrachloride by 1995, a full five years in advance of the amended Montreal Protocol consistent with the Committee's recommendation.

- With respect to methyl chloroform, at the London meeting, the Minister of the Environment announced Canada's commitment to cut methyl chloroform consumption by 100% by 2000, five years in advance of the timeframe specified in the amended Montreal Protocol. For technological reasons, Canada is unable to commit at this point to more than an 85-90% reduction by 1995. The development of substitutes for some uses of methyl chloroform is not as well developed as for other ozone depleting chemicals because it has only recently been identified as a substance requiring control. The Montreal Protocol calls for a review of the feasibility of a more rapid phase out of methyl chloroform at the 1992 meeting of the Parties. Canada will actively contribute to this review and take domestic action consistent with the Parties' conclusions.

- 2) ***We recommend that regulations be invoked under CEPA requiring a 95% reduction in halon production and consumption by 1993, and a complete elimination by the year 2000, except for those "essential uses" where no reasonable performing substitute is available.***

Response:

- Canada does not produce halons and regulations have been made to ban production of halons in Canada. Canada will, consistent with the Committee's recommendation, eliminate halons by the year 2000 with the possible exception of "essential uses". Furthermore, Canada believes that there will be no "essential uses" after 2000.
- As an intermediate step, Canada will reduce halon consumption by at least 50% by 1995. There are currently a number of alternative chemicals under development and as soon as these chemicals are proven as safe fire fighting alternatives and available in commercial quantities, the phase out of halons will be accelerated

- 3) ***We recommend that the proposed regulations governing non-essential uses of CFCs and of halons in hand-held fire extinguishers (Ozone depleting Substances Regulations No. 2 and No. 3) be implemented as soon as possible and that any portions of the regulations to which there has been no legal objection be adopted immediately.***

Response:

- The proposed regulations dealing with non-essential uses of CFCs have been implemented (Canada Gazette, Part II, September 12, 1990). The part of Regulations No. 3 prohibiting the manufacturing and importing of hand-held halon fire extinguishers is being revised to allow use in all aircraft and allow halon recycling in existing portable extinguishers. It will be re-proposed in the Canada Gazette.

4) **We recommend that:**

a) ***neither HCFCs nor HFCs be used in any aerosols;***

Response:

- Canada agrees that HCFCs (except for a very small medical use) should not be used in aerosols. On the other hand, HFCs do not have an ozone depleting potential. In addition, not all HFCs are serious greenhouse gases. Because they have no ozone layer depletion potential, HFC substitutes for CFCs in aerosols should be judged on a case by case basis. Where non-greenhouse gas substitutes are available, they should be used.

b) ***HCFCs and HFCs only be used in other products as replacements for CFCs where safe alternatives are not available;***

Response:

- Again there is agreement with respect to HCFCs but, for the same reasons as previously described, a case by case consideration of HFCs should be undertaken.

c) ***Only those HCFCs and HFCs with the least ozone depletion and global warming potential be used in products or processes requiring such substances;***

Response:

- With respect to HCFCs, Canada believes that these chemicals should be used as transitional substances to allow a more rapid phase out of controlled CFCs. Canada believes that:

- Use of transitional substances should be limited to those applications where other more environmentally suitable alternative substances or technologies are not available;
- Use of transitional substances should not be outside the areas of application currently met by the controlled and transitional substances, except in rare cases for the protection of human life or human health;
- Transitional substances should be selected in a manner that minimizes ozone depletion, in addition to meeting other environmental, safety and economic considerations;
- Emission control systems, recovery and recycling should, to the degree possible, be employed in order to minimize emissions to the atmosphere;
- Transitional substances should, to the degree possible, be collected and prudently destroyed at the end of their final use.

d) ***In future, HCFCs and HFCs not be substituted for CFCs at any time in amounts greater than 30% and 9% respectively, of present CFC use, and by 2010 the production and consumption of HCFCs and HFCs be discontinued.***

Response:

- Canada agrees that HCFCs and HFCs with a significant global warming potential should only be substituted for present uses of CFCs and, in addition, only when no other safer alternative is available.

- Canada believes that it would be imprudent to regulate the prohibition of HCFCs and HFCs by 2010 since such a prohibition would discourage the private sector from investing in the needed CFC alternatives.

- 5) **We recommend that the Canadian Council of Ministers of the Environment (CCME) take the lead when multijurisdictional participation would accelerate initiatives for the reduction, recovery, recycling and eventual safe destruction of CFCs and halons.**

Response:

- The Government agrees with this and will take the recommendation to CCME Ministers.

- 6) **We recommend that air conditioning units for the passenger compartments of all motor vehicles be leak-proof, beginning with the 1992 model year.**

Response:

- Development of substitutes for CFCs in automotive air conditioning is the key solution to this problem. Much work has been done in this regard, and the automotive industry is well on its way to having air conditioning units converted to substitutes within a few years.
- Because of the integrated nature of North American vehicle manufacturing, Canada will consult with the U.S. government on the introduction of hermetically sealed units.

- 7) **We recommend that the proposed "Code of Practice for the Reduction of CFC Emissions in Refrigeration and Air Conditioning Systems" developed by Environment Canada for commercial refrigeration units be made a regulation under CEPA. The Committee further recommends that this Code be applied to the management of HCFCs and HFCs. These regulations should come into effect by 30 June 1991.**

- 8) **We recommend that Environment Canada be provided the necessary funds to assist the relevant authorities in developing programs for the recovery and recycling of CFCs from commercial, household and mobile refrigeration systems that are to be scrapped or that have been previously abandoned. Once destruction technologies and less harmful substitutes are available then the recovered, more harmful substances must be destroyed.**

Response:

- Canada in co-operation with the provinces is developing a recycle and recovery Action Plan. It is recognized that recovery is a key element of an early phase out of production of CFC's. The action plan will ensure a concerted national effort to maximize recycling and recovery. If provincial regulations and voluntary actions do not produce the desired results, Canada will regulate recycling. Environment Canada will devote the necessary funds to develop these programs.
- The Code of Practice can and will be applied to HCFCs and HFCs.

- 9) ***We recommend that the Canadian Council of Ministers of the Environment coordinate appropriate jurisdictions in the making of regulations for the recycling of CFCs used as solvents. When alternatives to solvent CFCs and destruction technologies are available, the CFCs must be recovered and destroyed.***

Response:

- The government agrees with this recommendation, and will take it to CCME Ministers.
- All large companies and many smaller ones are practicing solvent recovery/ recycling. Problems specific to small companies are being studied.

- 10) ***We recommend that funding be provided by the federal government to assist the provinces and production industries in developing the appropriate destruction technologies for CFCs, halons, HCFCs, HFCs and related substances. Once developed, the appropriate jurisdiction should make regulations for the destruction of these substances.***

Response:

- Canada is working with the Provinces on demonstration project. New destruction technologies are currently being studied, tested and evaluated in the USA and Japan. Furthermore, the Parties to the Montreal Protocol established in June, 1990 a committee on destruction technologies. This international committee will assess the efficiency and environmental acceptability of destruction technologies and develop approval criteria.

- 11) ***We recommend that national standards and guidelines be developed for classifying CFCs and related substances to ensure that regulations concerning their handling and transportations are uniform across the country.***

Response:

- International recommendations developed by the Parties to the Protocol exist with respect to customs coding to address this point. Canada will implement these recommendations.

- 12) ***We recommend that "cradle-to-grave" management be applied to new CFCs, HCFCs and HFCs used for refrigeration purposes, ensuring that the producing and importing industries are responsible for tracking these chemicals to their final end use. Regulations with respect to the recovery, recycling and destruction of these substances should govern the remainder of their life cycle.***

Response:

- CEPA envisages life cycle management of toxic substances. Working with the provinces, Canada will ensure that all life cycle aspects necessary for recovery and recycling of CFCs and transitional substitutes for refrigerants are adequately addressed.

- 13) ***We recommend that the National Fire Code and the National Building Code be amended immediately, as necessary to prohibit the testing of flooding systems with halons and to prohibit the construction of "non-essential" halon systems. They must***

also be amended to require the removal of all non-essential halon flooding systems as early as possible but no later than 1 January 1993. Halons will be supplied for essential uses from the existing stock of halons before new halons are consumed. Once substitutes and destruction facilities are available, the remaining stock of halons must be destroyed.

Response:

- Canada is examining specific proposals for amendments of the National Fire Code and the National Building Code, that call for recovery and recycling of halons and analysis of alternatives to halons at the project design stage before new halon systems are approved.

- 14) **We recommend that the federal government immediately develop a coordinated plan for the removal of "non-essential" halon systems used by any federal government department or agency, and that it provide justification for the retention of any system it identifies as essential.**

Response:

- Environment Canada is preparing a strategy for halon recovery and recycling in federal facilities.

- 15) **We recommend that the federal government and the provinces collaborate in developing a national education program for municipal and other officials responsible for activities that involve CFCs, halons and related substances.**

- 23) **We recommend that all levels of government, producers of these chemicals, and manufacturers of CFC-containing equipment, develop and implement a coordinated, and nationwide public education program for the recovery, recycling, handling, storage, and ultimate destruction of CFCs and related substances.**

Response:

- Canada supports the committee recommendations and will take them to CCME. Canada-wide consultations carried out earlier this year have clearly indicated the key importance of training and education in the environmental field. The need for training and education to deal with ozone related issues will be addressed.

- 16) **We recommend that Environment Canada's budget be increased to ensure the enforcement of and compliance with new regulations where the federal government retains responsibility.**

Response:

- Ozone layer protection is a priority. Canada will ensure that its regulations are vigorously enforced.

- 17) **We recommend that a tax be levied on CFCs and halons at least equivalent to that to be implemented in the United States. Funds equal to those derived from the tax should be used to support initiatives arising from recommendations of this report.**

18) We recommend that when there is a substantial difference in the environmental impacts of two or more substitutes for a given end use, an equalizing tax be placed on the substitute(s) that is (are) more harmful but less costly. The tax should be revised every six years to allow time for the market to regulate itself.

Response:

- Further analysis is required to determine whether the government should accept, modify or reject these tax proposals.
- As stated in the Green Plan document entitled "A Framework for Discussion on the Environment" and the report on the Green Plan consultations, the government recognizes that there may be areas where tax measures or other economic instruments, such as tradeable permits and deposit-refund systems, can make a useful contribution to achieving environmental objectives. At the same time, there are a number of important considerations to be taken into account in assessing whether one or more tax initiatives would be the best way to address specific environmental problems. For example, these considerations would include assessing the ability of tax initiatives to modify behaviour towards the environment. Also, anticipated environmental benefits must be weighed against the costs of using tax initiatives, including the costs in terms of competitiveness, growth and prices for consumers. Accordingly, the government is evaluating the merits and limitations of applying various types of economic instruments to environmental problems in the context of the Green Plan. As part of this evaluation, the Government will release a discussion document on economic instruments in 1991.
- Regarding the issues of dedicating the tax revenues to related uses, there are a number of factors to bear in mind. First, earmarked taxes reduce accountability and effective fiscal management because they remove the allocation of tax revenue from the regular process of periodic review and control. Second, they impose rigidities on the government's revenue allocation decisions and reduce the ability to respond to new and changing priorities. Finally, introducing a dedicated tax in one policy area would undoubtedly lead to strong pressures to extend the principle to other policy area. Such an extension would lead to significant problems for budgetary allocations and control. However, given the fact that the issue of earmarking the revenues from environmental taxes was raised during the recent consultations on the Green Plan, the government will be examining this area further.

19) We recommend that adequate funding be made available to the Atmospheric Environment Service of Environment Canada to conduct monitoring of and research into ozone depletion.

Response:

- Proposals to increase Canada ozone layer monitoring stations, to establish expanded long-term monitoring of ozone-active chemicals and to participate in cooperative intensive field research studies of Arctic ozone depletion are being developed.

- 20) ***We recommend that the federal government contribute to all funding mechanisms developed under the Montreal Protocol. We also recommend that a roundtable be established in Canada consisting of all government departments, industry, non-government organizations and other stakeholders who would be involved in funding and facilitating technology transfer to developing countries.***

Response:

- Canada is contributing approximately \$10 million to the Multilateral Fund for developing countries, which was established at the London meeting of the Parties. In addition, we are committed to giving the Secretariat for the Fund, which will be located in Montreal, every support needed to ensure its rapid and successful establishment including a financial contribution of over \$5 million. Canada is a member of the Executive Committee that administers the Multilateral Fund. At the first meeting of the Committee, Canada covered the administrative costs and provided financial assistance to developing country representatives to allow them to travel to the meeting.

- 21) ***We recommend that Canada take the lead in negotiating "global bargains". In the CFC global bargain, substitutes for CFCs could be offered in exchange for full participation in the Montreal Protocol, with appropriate conditions for monitoring and inspection. The intention of this bargain is to assist developing countries to eliminate their consumption of CFCs.***

Response:

- Canada took a leading role at the London meeting of the Parties to the Montreal Protocol in the development of the Multilateral Fund to assist developing countries to become Parties to the Protocol.
- Developing countries are quite supportive of the Fund. The most significant "bargain" has already been offered. The two largest non-Parties, India and China (representing approximately 40% of the world's population), have indicated their intention to ratify the Protocol as amended. Since a formal mechanism is now in place to provide financial and technical assistance to developing countries, further "bargain" striking is not felt to be necessary.

- 22) ***We recommend that a review be undertaken of trade development programs and subsidies, and of foreign aid policies, programs and projects to ensure they are consistent with the preventive aims of this report.***

Response:

- The elaboration of Canadian policies and positions with respect to the provisions of the Montreal Protocol involve interested government departments, including External Affairs and International Trade Canada and the Canadian International Development Agency. Programmes and policies of these departments concerning trade and development assistance are designed and implemented recognising Canada's obligations under the Montreal Protocol. Canada will consult closely with its major partners on trade implications of the provisions of the amended Montreal Protocol and

the Committee's recommendations in order to ensure common approaches are taken. Indeed, the review recommended and the eventual modifications of programs would take into consideration the objective of protecting the ozone layer, our international trade obligation under GATT and the Free Trade Agreement.

THE STANDING COMMITTEE ON THE ENVIRONMENT

No Time To Lose:
The Challenge of Global Warming

Part II of "Our Changing Atmosphere" Series

"By the time scientists have all the answers to these questions, the climate change may have been driven by human society to the point where the answers are largely academic."

October 1990

The Honorable David MacDonald, P.C., M.P.
Chairperson

TEXT OF REPORT

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NO TIME TO LOSE: THE CHALLENGE OF GLOBAL WARMING

The average temperature of the Earth is rising. Many scientists believe that this temperature increase is an early manifestation of a global warming that is being precipitated by the emission of certain gases from the industrial and agricultural activities of humanity. If present trends in the atmospheric accumulation of so-called "greenhouse gases" — principally carbon dioxide, CFCs, methane and nitrous oxide — continue, they will reach the equivalent of twice the pre-industrial level of carbon dioxide within 40 years. How this change will affect global climate is uncertain but the scientific consensus today is that temperatures will rise by an average of 1.5° to 4.5° C, with larger increases at high latitudes and smaller increases in the tropics. This warming would be sufficient to alter rainfall patterns and temperature regimes around the globe and to increase mean sea level, perhaps by a half-metre or more. This is likely to be accompanied by changes in wind patterns, ocean currents, the accumulation of snow and ice in polar regions, the frequency of severe storms, variations in the range of disease-bearing organisms and changes in natural ecosystems such as forests and wetlands. In turn, these changes would affect the habitation patterns and agricultural and industrial activities of the human population. One of the key events that expanded the debate about global warming from the scientific domain into the political arena was the Toronto Conference on "The Changing Atmosphere: Implications for Global Security", held in June 1988.

Given the mounting evidence that human activities are beginning to alter the basic equilibrium processes of the Earth, this Committee in 1989 launched a study of global climate change from a Canadian perspective. We wanted to assess the state of knowledge regarding human-induced change in the Earth's climate, its potential impact on the welfare of Canadian and global society, Canada's role as a precipitator of climate change, and policies which we could recommend to reduce both Canada's emissions of greenhouse gases and those of other countries through our foreign aid and trade policies and the export of appropriate technologies and expertise. Today, having heard almost 60 witnesses on the subject and having received more than 200 public submissions, the Committee presents its principal findings in this **interim report**. The Committee's detailed analysis and a more lengthy set of recommendations will be presented in a comprehensive final report.

The Committee presents its interim report on the eve of the Second World Climate Conference in Geneva. This meeting is expected to provide the framework within which countries can take national and international initiatives to limit and reduce climate change. We hope that our views will strengthen Canada's position at this conference, and reinforce the growing international call for action.

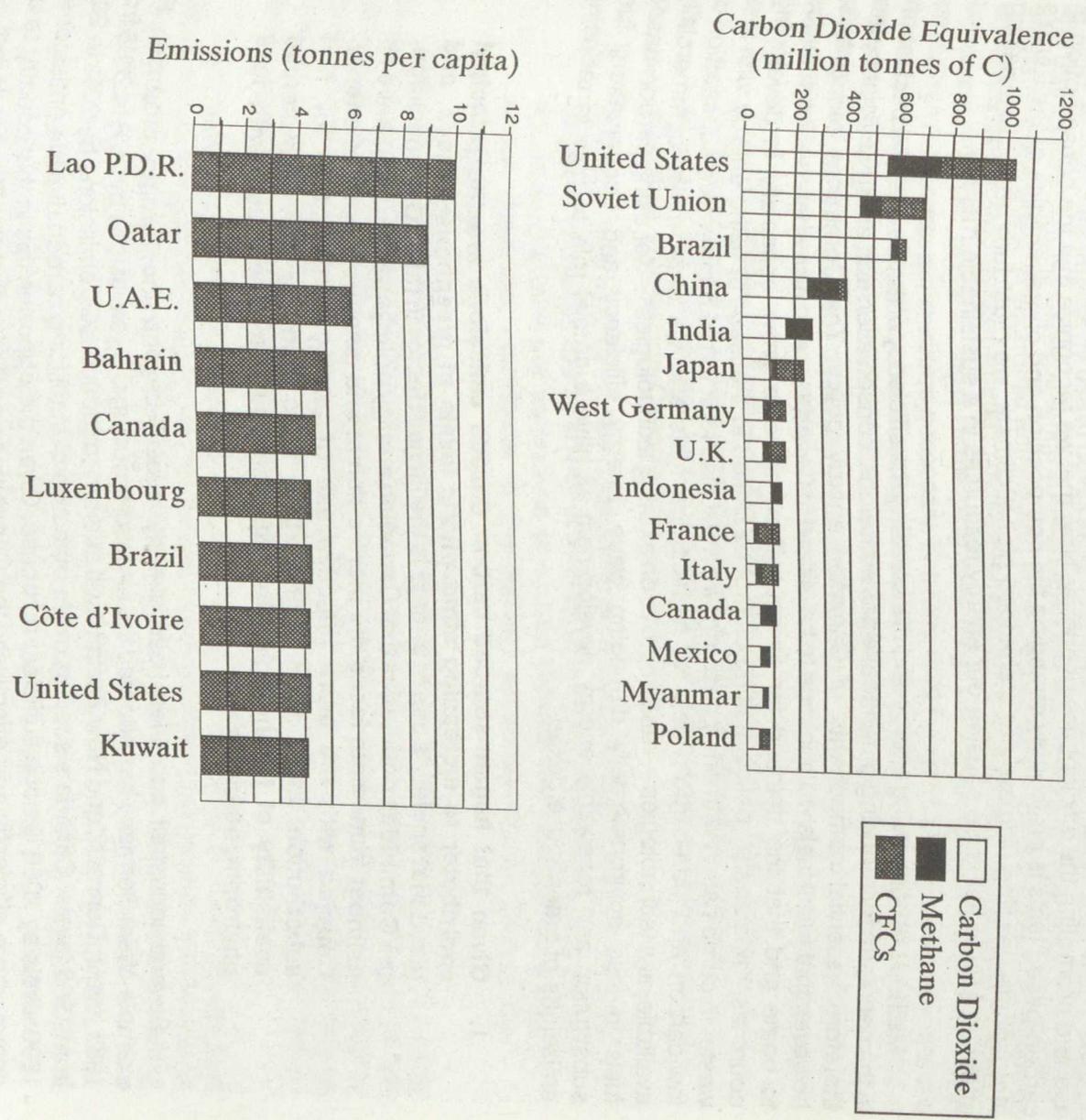
The sense of urgency which prompted this Committee to undertake a study of the complex and compelling phenomenon of global climate change has been reinforced in the course of its work. We acknowledge that much remains to be learned about the phenomenon of climate

change, the rate at which the activities of human society will propel such change, and the magnitude and distribution of its effects. By the time scientists have all the answers to these questions, however, global climate change may have been driven by human society to the point where the answers are largely academic.

Given the speed with which humanity's energy-using, industrial, forestry and agricultural activities are altering the composition of the atmosphere, and consequently changing its thermal properties, we see no validity in the argument that governments should delay acting until more detailed information on the likely effects of global climate change is gathered. If human society is in fact initiating profound changes in the climatic systems of our planet, then delaying action could lead to devastating effects on many of the Earth's peoples. If the skeptics are correct and climate change is less of a problem than most scientists anticipate, the policies which we are proposing will still return many benefits, both environmental and economic. We have accepted the argument that a precautionary principle must apply in so vital a situation.

The World Resources Institute (WRI) in a 1990 report, *World Resources 1990-91*, ranked the 50 countries of the world with the largest net emissions of greenhouse gases in 1987, using carbon dioxide (CO₂), methane (CH₄) and chlorofluorocarbons (CFCs) as the indicators for its "Greenhouse Index", with methane and CFCs expressed as carbon dioxide heating equivalents in metric tons (tonnes) of carbon. According to the WRI estimates, Canada ranked twelfth that year and contributed 2% of total global emissions. While this may not appear to be a substantial share, it is being generated by only 0.5% of the world's population. On a per capita basis, WRI placed Canada fifth at 4.5 tonnes annually per person, exceeded only by four developing countries which either have high rates of deforestation or are Persian Gulf nations consuming energy at a high per capita rate while flaring large quantities of natural gas. Figure 1 shows Canada's ranking both as a total and a per capita emitter of greenhouse gases in 1987.

Figure 1: Canada's 1987 Ranking as a Total Net Emitter of Greenhouse Gases and as a Per Capita Emitter



Source: World Resources Institute, *World Resources 1990-91*, Oxford University Press, Toronto, 1990, p. 15 and 17.

The manner in which Canadians use energy is the principal determinant of our country's emissions of greenhouse gases. Although Canadians improved their efficiency of energy use significantly in the 1970s and 1980s, other industrialized countries did as well or better in responding to the oil shocks of this period and we remain one of the most inefficient energy users in the developed world.

Canada's energy policies traditionally have focused on increasing the domestic supply of energy; much less attention has been paid to the question of modifying our patterns of energy use and promoting the efficient use of energy. Now that we recognize that the consumption of carbon-based fuels is profoundly changing the composition and characteristics of the Earth's atmosphere, leading ultimately to a changed global climate, we must turn our policy-making attention fully to the issue of using our energy resources in a sustainable manner.

Methods of conserving energy and of increasing the efficiency of its use offer the best return in the near term for reducing greenhouse gas emissions: conservation and energy efficiency are therefore essential components of Canadian energy policy. The Committee recognizes, however, that fossil fuels will continue to be utilized in Canada — and elsewhere — for decades to come and that the demand for energy will continue to grow, especially in developing countries. Thus energy policy-making cannot be limited to the issue of using energy with less waste. In combination with energy saving, we must also look to the progressive substitution of low-carbon and non-carbon fuels for high-carbon fuels and we must make commercially available new technologies — and improve on existing technologies — for using carbon-based fuels in less environmentally damaging ways. Energy efficiency and conservation, fuel substitution and renewable energy development all have a crucial role to play in reducing emissions of greenhouse gases.

- 1. Given that human-sourced carbon dioxide emissions are the principal contributor to increasing atmospheric levels of greenhouse gases, and given that society's use of energy is the largest factor in this CO₂ generation, the Committee concludes that Canadian energy policy-making must have as its most immediate focus the more efficient and conserving use of energy. Coupled with the more effective use of energy is the need for fuel substitution away from high-carbon fuels and for the commercial availability of technologies for exploiting carbon-based fuels with less environmental impact.**

Several industrial countries have already moved beyond the Toronto proposal. For example, West Germany has adopted the target of reducing CO₂ emissions by 25% in 2005 from 1987 levels; Denmark and New Zealand will attempt to reduce CO₂ emissions by 20% in 2000 from 1990 levels. Canada's support of the objective of stabilizing carbon dioxide emissions at 1990 levels by 2000 is not a sufficient response. Given the opportunities in this country to use energy more efficiently and effectively, the Committee concludes that the Toronto target — a 20% reduction in the 1988 level of CO₂ emissions by 2005 — is the minimum that Canada should strive for as an interim goal. The City of Toronto itself, in Canada's largest metropolitan centre, has declared "an official commitment to the 20% reduction of the 1988 levels of carbon emissions into the atmosphere within the City of Toronto by the year 2005".

The Committee understands that a 20% reduction in the 1988 level of global carbon dioxide emissions would not be sufficient to stabilize the concentration of this gas in the atmosphere. Although the manner in which carbon cycles through the atmosphere, the oceans and the biosphere is not well understood, historical observations of the rising atmospheric concentration of CO₂ suggest that roughly half of the carbon released to the atmosphere through human activities remains there. Apparently then, CO₂ emissions would have to be reduced by more than half to achieve the long-term objective of stabilizing the atmospheric concentration of carbon dioxide, insofar as that concentration is a function of human activity. Given that commercial energy use in developing countries today is often at extremely low levels and that these countries will experience substantial increases in future energy use as part of their efforts to raise levels of economic activity and improve standards of living, it is incumbent on industrialized countries like Canada to make even greater reductions in CO₂ emissions to offset increases that will occur in most developing countries. Longer-term targets for even lower emissions in Canada are therefore necessary. The May 1990 Bergen Conference report, entitled *Action for a Common Future*, observes that a reduction of 60-80% in current CO₂ emissions is ultimately required. A 50% reduction in CO₂ emissions by the year 2020, compared with the level of 1988 emissions, has been discussed as a second-phase target for Canada; the Committee believes that the federal government should seriously consider adopting this longer-term target.

2. **The Committee recommends that the Toronto target of a 20% reduction in human-sourced CO₂ emissions by the year 2005, compared to the 1988 level of emissions, be adopted by the federal government as its minimum interim objective in reducing Canadian CO₂ emissions.**
3. **Among other initiatives, the Committee recommends that Canada adopt the target of reducing the intensity of energy use in the Canadian economy by 2% annually, until our emissions of carbon dioxide are reduced to a level which does not contribute to the further accumulation of CO₂ in the atmosphere.**

Although there is not a strict one-to-one correspondence between the intensity of energy use in Canada and emissions of carbon dioxide, the Committee's research indicates that the relationship is strong. When the other policy elements of fuel substitution and technological improvements in carbon-fuel use are added to this objective of using energy with increasing efficiency in the Canadian economy, the relationship between energy intensity and carbon dioxide emissions could be substantially improved upon.

If Canadians are going to accept far-reaching changes in the patterns of energy use that policies to combat global climate change will require over time, they must be well informed about the need for these changes and the benefits that can accrue from such policies. Communicating information to the public is a vital element of federal policy-making. But public information and education are not ends in themselves. The Committee has noted that public opinion is often well in advance of government policy. A better informed populace can become a strong advocate of new policy and can pressure governments to make changes that they might otherwise be reluctant to carry forward.

4. **The Committee recommends that Environment Canada, as the lead agency, coordinate the development by federal departments and agencies of comprehensive public information and advocacy programs directed to**

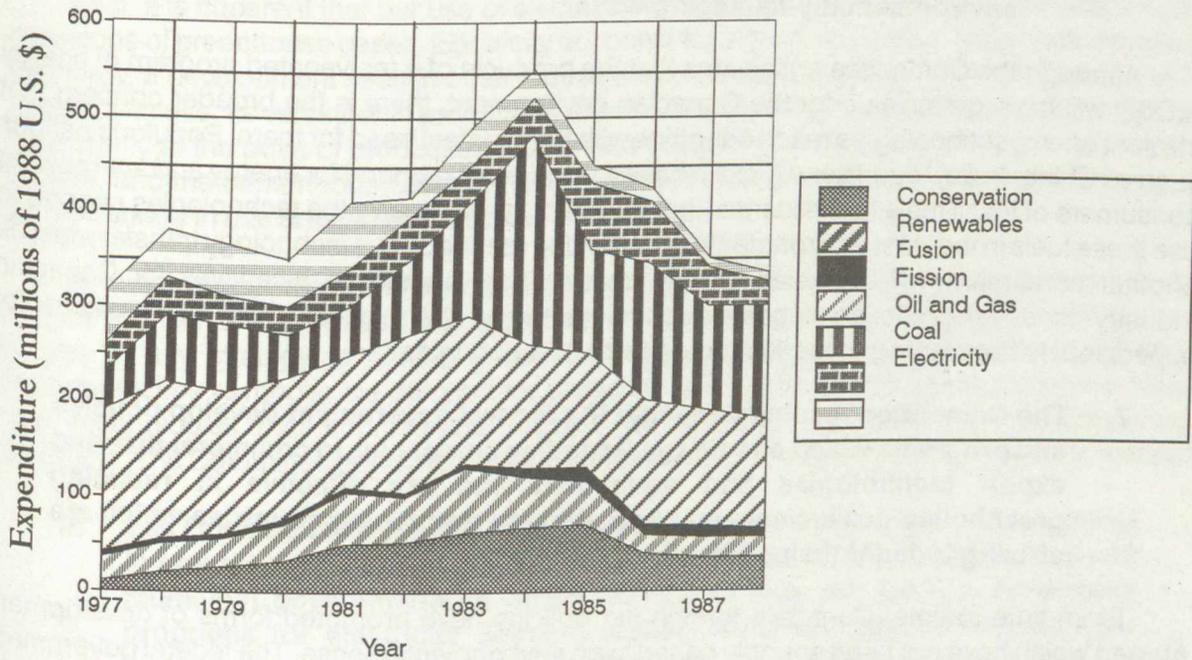
individual Canadians, to Canadian business and to other institutions, identifying the role that each can play in reducing greenhouse gas emissions.

Canada has a long tradition of a mixed economy — an economy in which both the private sector and governments contribute to development. It is appropriate and necessary that this partnership extend to resolving our environmental problems. Considering how fundamentally important energy is both to the economic and the social welfare of Canadians, addressing the issue of global climate change must involve all sectors of our society.

- 5. The Committee recommends that federal and provincial strategies to combat human-induced global climate change combine strong regulatory systems with a careful utilization of market forces to develop economically efficient programs for reducing greenhouse gas emissions in Canada.**

In the 1970s and early 1980s, Canada developed an energy research, development and demonstration (R,D&D) program that was world-leading in several respects. It emphasized energy conserving technologies and alternative forms of energy development, while simultaneously supporting a strong effort in conventional energy R,D&D. The federal government also established public information programs which were acknowledged internationally for their effectiveness and scope. Unfortunately, these programs were not sustained and the non-conventional aspect of the energy R,D&D program has been markedly reduced. The termination in 1986 of the National Research Council's Division of Energy, which had been the lead federal agency for alternative energy R,D&D, set the stage for this decline. Government support for conservation and renewable energy R,D&D in fiscal year 1990-91 is running at a level only about one-third that of the years of peak support in the early 1980s, as reported by the International Energy Agency (IEA). Figure 2 displays government spending in Canada on energy R,D&D by type from 1977 through 1988, measured in constant 1988 U.S. dollars.

Figure 2: Government Expenditures on Energy R,D&D in Canada by Type, 1977-1988, Measured in Constant 1988 U.S. Dollars



Note: The category "Electricity" includes electricity conversion and transmission R,D&D, energy storage and energy systems analysis.

Source: Organisation for Economic Co-operation and Development, International Energy Agency, *Energy Policies and Programmes of IEA Countries: 1988 Review*, Paris, 1989, p. 97-105.

The earlier interest in conservation and alternative energy R,D&D was largely prompted by energy supply concerns arising from two international oil shocks. When oil supplies increased in response to high prices and fears of further supply interruptions, the world oil market became glutted, the price of oil plummeted and interest in new energy initiatives waned. In retrospect, this complacency was short-sighted; it stemmed from a failure by policy-makers to take a strategic, long-term and holistic view of the environmental, economic, social and political impacts of global energy development. Today we especially cannot ignore the environmental implications of using energy; the need to restore a vigorous R,D&D program in energy conservation and alternative energy development is manifest.

6. **The Committee recommends, for the purpose of attaining integrated environmental and economic objectives, that the federal government considerably increase its support for research, development and demonstration directed to:**

- (a) **the more efficient and conserving use of energy;**
- (b) **fuel substitution leading to reduced greenhouse gas emissions; and**
- (c) **technologies for producing and using fossil fuels in less environmentally-damaging ways.**

Although the Committee anticipates that the products of a rejuvenated program of energy R,D&D will have great value for the Canadian environment, there is the broader concern that efficient energy technologies reach countries with the greatest need for them. Populous nations such as China, India, Nigeria and Mexico have a huge latent demand for energy and are growing consumers of fossil fuels. It is essential that these countries receive the technologies needed to use these fuels in the least environmentally damaging manner. Thus technology transfer must be another cornerstone of Canadian energy policy. There should be incentives for Canadian industry to develop the appropriate technologies and there need to be mechanisms for expeditiously transferring these technologies to other countries.

- 7. The Committee recommends that the federal government develop policies and programs which encourage Canadian companies to commercialize and export technologies and equipment that are effective in reducing greenhouse gas emissions, particularly to developing countries which are striving to build their domestic economies.**

From time to time, Canada's foreign aid policies have promoted forms of development abroad which have not been soundly based in an environmental sense. The federal government should be more discriminating in its aid programs and trade policies, removing incentives which encourage forms of development or the transfer of technologies and equipment that are not environmentally appropriate.

- 8. The Committee recommends that the federal government use environmental considerations as a filter for its foreign aid and trade initiatives, encouraging programs and technologies which convey environmental benefits and ending or modifying those that are environmentally unacceptable.**

In stressing the international element of Canadian policy-making, the Committee accepts the view that environmental problems are ultimately irremediable if we cannot solve the problem of poverty that afflicts so many of the Earth's inhabitants. Much of the global population lives in conditions of hunger, disease, illiteracy and conflict. The developing world as a whole is labouring under a crushing burden of external debt. Until the human condition can be substantially improved, the prospects for successfully addressing global environmental concerns are vanishingly small.

This Committee endorses the conclusions and recommendations contained in the June 1990 report of the House of Commons Standing Committee on External Affairs and International Trade, entitled *Securing Our Global Future: Canada's Stake in the Unfinished Business of Third World Debt*. In particular, we agree with the basic finding of that study: "The primary long-term goal of action on Third World debt must be sustainable human development in the debtor countries."

In its more detailed analysis, the Committee considered strategies for reducing greenhouse gas emissions at the sectoral level in Canada. Although the bulk of this study and the detailed recommendations arising from it will be presented in the comprehensive report to follow, the Committee does want to express several general conclusions at this time.

First, it is apparent that our use of electricity will have a major bearing on Canada's future emissions of greenhouse gases. Electricity accounts for a growing fraction of Canada's end use of energy, a development seen in other industrialized countries as well. This is a function of its versatility in use, its versatility in production and its cleanliness at the point of use (although not necessarily at the point of production). Given the rising importance of electricity in our energy system, and the tremendous variability across Canada in the means by which it is generated, policy-making in this area faces particular challenges.

In keeping with the Committee's philosophy that the principal issue of concern is the manner in which energy is used, it is apparent that Canada's electrical utilities have a major part to play in any strategy to reduce greenhouse gas emissions. Several utilities have taken important steps to modify the demand for electricity within their service areas and to introduce new technologies that improve the process of producing, transmitting and consuming electricity. The Committee applauds these initiatives and encourages other utilities to follow suit.

- 9. The Committee concludes that Canada's electric utilities are a key element in reducing greenhouse gas emissions and urges provincial, territorial and municipal governments to direct utilities to take the lead in developing programs for electricity demand management and for introducing new technologies which improve—in both an energy and an environmental sense—the production, transmission and consumption of electricity.**

Energy use in the transportation sector is another key element in modifying patterns of Canadian energy production and consumption. The Committee supports continuing efforts to increase fuel efficiency in motor vehicles and the intelligent development of mass transit systems. Substantial gains remain to be made in increasing the fuel efficiency of vehicles with internal combustion engines.

- 10. The Committee recommends that fuel efficiency standards be legislated for cars and trucks.**

Beyond improved fuel efficiency and an increased reliance on mass transit, the Committee sees a need to make basic changes in the energy sources for the transportation sector. It is possible, for example, to design production systems for biomass-derived fuel alcohols that are CO₂-neutral in their impact. When the technology for producing fuel ethanol from forest biomass is commercialized, the Committee visualizes energy plantations being developed in support of the transportation sector. In the longer term, the Committee sees a major role for hydrogen and electricity as transportation fuels. Depending upon the means by which fuel alcohols, hydrogen and electricity are produced, these energy "carriers" could be far smaller net contributors to greenhouse gas emissions than are motor vehicle, aviation, rail and marine transport fuels today. Although the federal government supports a modest program of research, development and demonstration in transportation fuels, the Committee does not consider this effort to be at all commensurate with the magnitude of the challenge and the opportunities involved.

11. The Committee recommends that the federal government introduce a major research, development and demonstration program with its objective being the commercial development of transportation fuels and systems that result in the lowest economically and technically feasible emissions of greenhouse gases.

Forests play an important role in the global-warming equation. As a tree increases in size, it accumulates CO₂ from the atmosphere through photosynthesis, converting it into wood. As long as the tree is alive and growing, it acts as a sink or repository for atmospheric carbon. Deforestation causes an increase in the concentration of CO₂ in the atmosphere, partly through a reduction in overall photosynthetic activity and partly through the release of carbon stored in the forest biomass. Deforestation may occur as a consequence of commercial harvesting or as a consequence of "natural harvesting", the destruction of trees by wildfire, insects or disease.

The extensive commercial harvesting of trees and the loss of trees from other causes in the developed countries, Canada included, has not always been followed by adequate replanting of stock. Reforestation of deforested areas has always been essential to maintain a healthy, productive forest for commercial, recreational and ecological reasons. In the context of global warming, reforestation gains an additional importance as a means to sequester more atmospheric carbon dioxide.

The forest is a dynamic, living entity and the carbon stored in wood will eventually be returned to the atmosphere. The most effective and efficient fixation of atmospheric carbon occurs in the early stages of a forest stand, when the trees are growing rapidly. As the stand ages, the rate of carbon release through respiration increases and, eventually, the balance will shift to a net loss of carbon to the atmosphere as the sum of carbon released through respiration and decay exceeds that sequestered by photosynthesis. Ultimately, when the stand reaches advanced age and the trees begin to die, the balance will shift predominantly to carbon release.

The best way, therefore, to maximize carbon sequestration by Canadian forests is through programs designed to develop and maintain vigorously growing forest stands. This can be done by ensuring prompt regeneration of harvested areas, either through planting or by natural means, and reducing the extensive losses of stands to wildfire, insects and disease.

Notwithstanding the importance of vigorously growing forest stands in carbon sequestration, the Committee recognizes that old-growth forests have a unique status in Canada, as elsewhere. Such forests have an enduring value as a locus of genetic diversity and must be protected for their intrinsic cultural and ecological qualities.

Forest land classed as "NSR" is "not satisfactorily (or sufficiently) restocked (or revegetated), productive forest land that has been denuded and has failed partially or completely to regenerate naturally or to be artificially regenerated." Dr. J.S. Maini of Forestry Canada told the Committee that there are 244 million hectares of inventoried productive forest land in Canada, of which 7%, or 17 million hectares, is classified as NSR.

The principal type of agreement in Canada pertinent to reforestation is the Federal-Provincial Forest Resource Development Agreement (FRDA), jointly administered by the federal and provincial governments. Most of the FRDAs have now expired, including those with Ontario, Saskatchewan, Alberta, Newfoundland and British Columbia. Similar agreements with Quebec and Manitoba have also expired.

New reforestation agreements "... remain in limbo because the federal and British Columbia governments are arguing over changes in a funding formula." (*Financial Post*, 21 August 1990). The Minister of Forestry Canada has been quoted as stating that he wants the British Columbia agreement settled before dealing with Ontario, Quebec and the Prairie Provinces. The Committee notes this impasse with concern, and we make the following recommendation.

12. Recognizing that Canada's forests are a major reservoir for atmospheric carbon and that the losses of forest stands through commercial harvesting, wildfire, insects and disease have resulted in a rate of harvesting of Canada's commercial forests and wild lands exceeding the rate of restocking, the Committee recommends that:

- (a) the federal government expedite negotiations with the provinces on federal-provincial agreements for the management of Canada's forests;
- (b) provincial governments be urged to ensure that NSR lands are adequately reforested through replanting programs or through natural regeneration of the forest cover, and in a reasonable period of time;
- (c) the losses to wildfire, insects and disease be reduced wherever possible; and
- (d) future forest resource development agreements be linked to prompt regeneration and protection of all deforested areas, whether harvested commercially or depleted naturally.

Afforestation, in the context of programs to combat global warming, involves the creation of extensive plantation forests for the specific purpose of sequestering atmospheric carbon. It has been estimated that one hectare of plantation forest on a good site in the southern United States or the Pacific Northwest will sequester about 6.24 tons of carbon annually. Using this figure, it has been estimated that 465 million hectares of plantation forests would be needed to trap the 2.9 billion tons of excess carbon produced each year. This area would be about 1.5 times the current total forested area of the United States, or about 15% of the world total of closed forests. By comparison, the most recent estimate of total industrial plantations worldwide is about 92 million hectares.

There are millions of hectares of land in Canada that could be suitable for plantation forestry, including abandoned and unimproved agricultural lands. There are also opportunities for increased tree planting as part of shelterbelt and windbreak programs in both rural and urban areas. In these latter situations, trees can provide insulation in the winter and shade in the summer, reducing the use of heating fuel and air conditioning in nearby buildings. We believe that the federal government, working cooperatively with provincial and municipal governments, should take the lead in exploring the potential for plantation forestry in Canada, as an interim measure to sequester atmospheric carbon.

13. Given that vigorously growing trees are an effective means for extracting CO₂ from the atmosphere, the Committee recommends that the federal government take the lead in establishing federal-provincial-municipal

programs to encourage development of tree plantations on otherwise unused lands, dedicated to sequestering atmospheric carbon as an intermediate-term strategy for reducing CO₂ levels in the atmosphere.

Trees grow more rapidly, and sequester carbon more efficiently, in the world's tropical regions. Therefore, there is a strong argument for promoting reforestation and the planting of forests in developing countries. It is also important to support efforts to reduce deforestation in those developing countries where this has become a problem.

- 14. Given the interconnectedness of the global environment and the necessity of assisting the developing world in protecting our common environmental heritage, the Committee recommends that the federal government, through its own agencies and through Canada's membership in multilateral organizations, advocate programs to reduce deforestation and to encourage reforestation and the planting of forests in developing countries. Support for these activities by the federal government must not reduce current and planned Canadian support for other development assistance programs.**

Strategies to reduce greenhouse gas emissions necessarily cut across the area of responsibility of many government departments, at all levels of government. Whereas policy-making in the past was typically a vertically coordinated activity within a government department, today environmentally oriented policies are seen to extend horizontally across all government activities. We fully support the view of the Brundtland Commission that environmental policies and disciplines should permeate all departments and agencies of government, just as fiscal and economic considerations do.

Governments in general have not yet learned how to develop policy across areas of responsibility and overcome narrowly vested interests; indeed, some governments have yet to acknowledge the need for new approaches to policy-making. The concept of sustainable development depends on our constructing innovative approaches to policy formulation, and the Committee expresses its hope that the Government of Canada will move quickly to entrench environmental considerations in the operations of all federal departments and agencies. The Committee makes the following recommendations regarding the mechanisms by which this environmental function could be developed across federal government activities.

- 15. The Committee recommends that the Minister of Environment have the responsibility and authority to develop policies, programs and regulations that span the full range of activities of the federal government, analogous to the Minister of Finance for financial and economic affairs, and that the Environment Minister report to Parliament annually on the environmental impact of all federal activities.**
- 16. The Committee recommends that the Auditor General, working in conjunction with the Departments of Environment and Finance, establish an environmental audit function to assure that all federal departments and agencies have implemented environmental assessment processes, and to monitor the effectiveness of environmental programs. Specifically, the Auditor General should monitor the progress of all federal departments and agencies in setting and attaining targets for greenhouse gas emissions.**

17. The Committee recommends that all federal departments and agencies, as part of their budget submissions, report on the direct and indirect impacts of their operations on global warming, and set annual targets for reductions in greenhouse gas emissions.

Minister of the Environment
The Honourable David Emerson, M.P.
Chairman
Standing Committee on the Environment
House of Commons, Park Street
Ottawa, Ontario
K1A 0A6

Dear Mr. Chairman:

I would like to use this opportunity to thank you and the members of the Standing Committee on the Environment for taking the time and energy to conduct your study on the climate change issue, and for your report's success in highlighting the challenges of global warming.

I am pleased to learn that the Government will publish a comprehensive response to this study. I would be pleased to see the Government's response to the recommendations of the Standing Committee.

I am pleased to see the Government's commitment to the development of a comprehensive response to the study's findings. I would be pleased to see the Government's response to the recommendations of the Standing Committee.

Minister of the Environment



Ministre de l'Environnement

MAR 15 1991

The Honourable David MacDonald, P.C., M.P.
Chairman
Standing Committee on the Environment
House of Commons, East Block
Room 309
Ottawa, Ontario
K1A 0A6

Dear Mr. Chairman,

I would like to take this opportunity to thank you and the members of the Standing Committee on the Environment for taking the time and energy to conduct your study on the climate change issue, and for your interim report "No Time To Lose: The Challenge of Global Warming".

I look forward to your final report on the issue to which the Government will table a comprehensive response. At this time, I would be pleased to have you accept this letter as the Government's response to the interim report, in accordance with the provisions of Standing Order 109.

Your continued contribution to the development of responses to climate change and other environmental issues is appreciated.

Yours sincerely,

A handwritten signature in cursive script that reads "Robert R. de Cotret".

Robert R. de Cotret

Ottawa, Canada K1A 0H3



SEP 20 1991

The Honourable David MacDonald, P.C., M.P.
Chairman
Standing Committee on Environment
House of Commons
Room 309, East Block
Ottawa, Ontario
K1A 0A6

Dear Mr. Chairman:

Pursuant to Standing Order 109 of the House of Commons, I am pleased to forward to you the enclosed Government response to the recommendations of the report of the Standing Committee on Environment, tabled in the House of Commons on March 25, 1991 entitled Out of Balance: The Risks of Irreversible Climate Change.

Response to the threats posed by increasing concentrations of greenhouse gases in the atmosphere has become one of the more difficult and central global environmental issues being addressed by the international community. The Government is pleased that the House of Commons Standing Committee on Environment has recognized this, and devoted the time and energy to investigate the issue and make the recommendations contained in this report.

In December 1990, the Government announced Canada's Green Plan which forms the basis of Canadian policy dealing with Canada's environment and environmental issues of concern, including global warming. I am pleased to see that the Green Plan and other Government policy responds positively to the recommendations of the Standing Committee's report.

For ease of reference, the Government response to the Standing Committee's report contains an introduction that outlines the proposed National Action Strategy on Global Warming, and repeats each recommendation followed by the Government's response to each recommendation.



In closing Mr. Chairman, I would like to thank the members of the Standing Committee for their contribution in the development of approaches to the global warming issue. I look forward to working with you and your colleagues on the development of measures that will assist in preserving and enhancing the state of our environment.

Yours sincerely,

Jean J. Charest

GOVERNMENT RESPONSE

INTRODUCTION

Since the main thrust of the Standing Committee's report deals with policies to limit Canadian emissions of carbon dioxide, one of the major greenhouse gases, it seemed appropriate to outline as an introduction, the framework that the government's response to the 25 recommendations of the report is based on. This includes *Canada's Green Plan* and the proposed *National Action Strategy on Global Warming*. Readers will be familiar with the Green Plan. They may not be as familiar with the National Action Strategy which is summarized in the following.

The National Action Strategy on Global Warming

In recognition of the need for a coordinated and consultative approach, the federal departments of Energy, Mines and Resources and of the Environment, in cooperation with their provincial and territorial counterparts, developed the National Action Strategy on Global Warming. The Strategy was reviewed by federal and provincial Environment Ministers at the November 1990 meeting of the Canadian Council of Ministers of the Environment. Ministers agreed to release the Strategy for public discussion. They also transmitted the document to their Energy colleagues for their review.

This Strategy, which involves a comprehensive and phased approach, provides a framework for Canadian initiatives to reduce emissions of greenhouse gases. The initial set of initiatives will involve efficiency measures which are economically or socially attractive in their own right. It is also proposed that federal, provincial and territorial governments commence examination of more aggressive and far-reaching measures that may become necessary to meet the goal of stabilization or other objectives. These could address the use of tax and other fiscal measures, electricity pricing structures, incentives provided for more efficient electricity and gas use/conservation as compared to supply expansion, lifestyle changes, and changes in the way our cities function.

According to the proposed National Action Strategy, Canada's limitation strategy on climate change would be based on the following fundamental principles. Comprehensiveness; importance of international agreements; and, flexibility.

Comprehensiveness: The principle of a comprehensive approach means that a response to the problem of global warming must address all of the major greenhouse gases, addressing sinks as well as sources.

International Agreement: This second principle recognizes that the problem of global warming is, by definition, a global one, and cannot be resolved by any one country or group of countries. It requires a concerted international response. There are some measures that can be taken to

reduce greenhouse gas emissions which are judged to be desirable in their own right — it makes sense for countries to take such measures unilaterally. Other measures, however, could entail significant costs, or could confer a competitive disadvantage. Before introducing such measures, countries must be assured that the burden is being shared, and that they will not be penalized in terms of international competitiveness. This principle is particularly relevant in the case of Canada, which is an extremely open economy and highly dependent on international trade for its economic well-being.

Flexibility: The principle of flexibility includes several aspects. It recognizes that scientific and socioeconomic understanding of the problem of global climate change and its solutions is not complete. Thus, a National Action Strategy should be allowed to evolve as new information or technologies become available. It also recognizes that different jurisdictions and sectors may wish to address the problem in different ways. Building a high degree of flexibility into the Canadian Strategy will ensure that the problem of global warming is addressed in a least-cost fashion which should minimize adverse economic impacts for any one region.

RECOMMENDATION 1 (Paragraph 1.11)

We also recommend that action should be taken now, not 3 to 5 years from now, to reduce substantially the rate of greenhouse gas emissions throughout the world and specifically in Canada.

Response:

- The National Action Strategy on Global Warming and the Green Plan call for a phased, progressive approach towards limiting emissions of greenhouse gases. This will involve first doing those things which make sense in their own right, either because they are economic or because they also help to achieve other policy and environmental objectives, starting with those measures that have shorter lead times.
- The consumption of fossil fuels is the primary source of Canada's CO₂ emissions, and it is an important source of other greenhouse gases. CO₂ emissions can be limited by reducing overall energy demand and by switching to less carbon-intensive energy sources. In the short term, there is limited scope for substitution away from fossil fuels or to less carbon-intensive fuels. Therefore, the federal government's immediate emphasis, in terms of measures to reduce CO₂ emissions, will be on energy efficiency improvements. The federal government will also encourage provinces and municipalities to do likewise.
- Chlorofluorocarbons (CFCs) are best known as substances which deplete the ozone layer. CFCs, however, are also an important group of greenhouse gases. Measures to reduce the consumption of CFCs play a dual environmental role.
- Under the 1987 Montreal Protocol, Canada is committed to a 50 per cent reduction in consumption of five CFCs by 2000. Regulations implementing these obligations came into effect in July 1989. Canada will achieve the first 20 per cent reduction in CFC consumption this year, almost two years before the 1993 date specified in the Protocol.

- In June 1990, the Parties to the Montreal Protocol agreed to accelerate the phase-out of the five types of controlled CFCs to a 100 per cent phase-out by 2000. Canada and 12 other countries issued a separate declaration committing to eliminate these CFCs no later than 1997. Regulations will be introduced to achieve these more rigorous targets and schedules.
- Land fill sites are an important source of methane emissions. The federal government and the provinces have taken a major step towards reducing emissions from this source through the adoption of a national target of reducing waste generation by 50 per cent by the year 2000. Under the aegis of the Canadian Council of Ministers of the Environment, packaging waste will be reduced by 20 per cent by 1992 and by 35 per cent by 1996.

RECOMMENDATION 2 (Paragraph 2.10)

The Committee recommends that Environment Canada, as the lead agency, coordinate the development by federal departments and agencies of comprehensive public information and advocacy programs directed to individual Canadians, to Canadian business and to other institutions, identifying the role that each can play in reducing greenhouse gas emissions.

Response:

- An informed population is essential in addressing and adapting to climate change. Actions by individual Canadians are part of the problem and must be part of the solution. Therefore, beginning in 1991 the government will launch a major public information campaign, in order to stress the importance of individual action and to put Canadians in a position to make more informed decisions.
- The Green Plan and the National Action Strategy on Global Warming clearly acknowledge the critical role of environmental education. At present, many departments develop and produce public education materials which contribute to increased public understanding of the climate change issue, its causes, impacts and possible solutions. It is important that relevant departments continue to draw on their expertise and knowledge and that of their clients and partners in industry to ensure that education programs become effective instruments for reducing greenhouse gases.
- Under the Green Plan's Environmental Citizenship Program (ECP), Environment Canada will seek to coordinate and integrate public information and advocacy programs directed to individual Canadians, to Canadian business and to other institutions, identifying the role each can play in reducing greenhouse gas emissions. The Government of Canada must act as a catalyst. The necessary expertise and capacity for improving the environmental literacy of Canadians lies largely outside of government. Wherever possible, therefore, ECP will seek to enter into partnership arrangements with other organizations and institutions.
- The development of some policies and response strategies to address certain aspects of the climate change issue necessitate shared responsibilities. This is particularly true where energy is involved as a source of greenhouse gas emissions. The Green Plan

makes specific reference to the expansion of Energy, Mines and Resources, Canada's existing programs for encouraging energy efficiency, alternative energy and technology development to deal with the energy component of greenhouse gas emissions.

- The Minister of Energy, Mines and Resources will issue a challenge to take advantage of all opportunities to save on energy consumption. Under this challenge program:
 - agreements will be reached with major energy-using organizations in Canada on performance and/or prescriptive energy-saving initiatives they will undertake;
 - an annual report will be made to Parliament on progress in meeting energy efficiency objectives; and
 - detailed information on Canadian energy consumption by end-use will be conveyed to the public.

RECOMMENDATION 3 (Paragraph 3.3)

The Committee strongly recommends that Canada implement immediately a National Program of Greenhouse Gas Emissions Measurement and Source Identification, and that the data be tabled annually in Parliament.

Response:

- Environment Canada and Energy, Mines and Resources have developed an initial inventory of sources and emissions of the four principal greenhouse gases in Canada for base year 1987 (more recent data are available for carbon dioxide).
- Expressed in terms of CO₂ equivalents, these data indicate that CO₂ accounted for about 56 per cent of Canada's known man-made greenhouse gas emissions in 1987, while CFCs, methane and nitrous oxide accounted for 14 per cent, 10 per cent and 5 per cent respectively.
- Energy consumption and agricultural land use are two principal man-made sources of CO₂ emissions in Canada. A preliminary estimate of emissions from agricultural land use is that these amount to about 85 million tonnes of CO₂ per year but this estimate is highly uncertain. Fossil fuel energy use accounts for over 450 million tonnes of CO₂. Non-energy sources, such as cement and ammonia production and incineration, account for about 12 million tonnes per year.
- In the case of CFCs, emissions in 1987 were about 19,000 tonnes or the equivalent of 112 million tonnes of CO₂. CFCs are principally used commercially in foam, refrigerants, air conditioners, aerosols and solvents. Canada will eliminate non-essential use of five designated CFCs by 1997.
- Data on emissions of other greenhouse gases are not as fully developed as for CO₂ and CFCs. Preliminary estimates of our 1987 emissions of methane and nitrous oxide are 3800 kilotonnes and 141 kilotonnes respectively. In the case of methane, about 50 per cent of anthropogenic emissions come from landfill sites, while about 25 per cent come from large animals. In the case of nitrous oxide, about 55 per cent of emissions are from fossil fuel combustion, about 25 per cent from the use of nitrogen fertilizers and about 20 per cent from nitric acid production.

- Under the Green Plan, the federal government, in cooperation with the provinces and industry, plans to establish a comprehensive greenhouse gases inventory and reporting system. This system will be incorporated in federal/ provincial agreements which will establish regular reporting procedures and schedules.

RECOMMENDATION 4 (Paragraph 3.12)

We recommend that Canada, together with other countries, should make a major effort to achieve the goal of the Accelerated Policies Scenarios, i.e. stabilization of greenhouse gases by the middle of the next century, at levels that may be higher than at present but will be "well below an equivalent doubling of CO₂ over pre-industrial levels." We recommend also that the Government of Canada develop and publish a strategy for the Canadian Component of such a global target.

Response:

- At the Second World Climate Conference in Geneva in the fall of 1990, Ministers and other representatives from 137 countries agreed "that the ultimate global objective should be to stabilize greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with climate". Representatives affirmed that "in order to reduce uncertainties, to increase our ability to predict climate and climate change on a global and regional basis, including early identification of as yet unknown climate-related issues and to design sound response strategies, there is a need to strengthen national, regional and international research activities in climate, climate change and sea level rise". The representatives also maintained that "there is a need to intensify research on the social and economic implications of climate change and response strategies."
- Permanent and lasting solutions to the threat of global warming will take years to develop and implement and will require coordinated international action. While there are similarities between the issues involved in reaching international agreement on a coordinated approach to global warming and other environmental issues, such as stratospheric ozone depletion, the difficulties are likely to be more severe in the case of global warming. This is because activities giving rise to greenhouse gas emissions are deeply integrated in the economic structures of countries, and are widespread throughout the economy.
- Canada is participating with its international partners in seeking a coordinated approach to solving the global warming problem. Despite the difficulties in developing an international consensus, substantial progress has been made in a relatively short time. The 1988 Toronto Conference on the Changing Atmosphere was the first major conference at which policy-makers and scientists came together to consider the implications of human activity on the atmosphere. In February 1989, Canada and 23 other countries signed the Hague Declaration, which recognized the need for an international convention on climate change. At a subsequent meeting in November 1989, at Noordwijk, the Canadian Environment Minister and Ministers from 75 other countries emphasized the importance of establishing quantified targets and schedules to limit or reduce emissions of greenhouse gases. Ministers also

recognized the need to stabilize atmospheric concentrations of greenhouse gases while ensuring stable development of the world economy. In May 1990, at a meeting of the United Nations Economic Commission for Europe in Bergen, Norway, 34 member countries (including Canada) committed to establish national strategies and/or targets and schedules, no later than the start of negotiations on an international framework convention on climate change, to limit or reduce emissions of CO₂ and other greenhouse gases as much as possible and to stabilize them. At the Second World Climate Conference, Ministers and other representatives welcomed the commitments by Canada and other countries "to take actions aimed at stabilizing their emissions of CO₂, or CO₂ and other greenhouse gases not controlled by the Montreal Protocol, by the year 2000 in general at 1990 levels." Representatives also urged developed countries "to analyze the feasibility of and options for ... a staged approach for achieving reductions of all greenhouse gas emissions not controlled by the Montreal Protocol" over the next two decades and beyond.

- Negotiations on an International Framework Convention on Climate Change commenced in February. The negotiations are aimed at producing an umbrella agreement among nations of the world to reduce human-induced climate change, and will be accompanied, either simultaneously or through subsequent agreements, by protocols with binding commitments to specific actions to achieve the objectives of the Convention. The Convention could be ready for signature at the 1992 U.N. Conference on Environment and Development.
- Under the Green Plan, Canada is actively participating in the negotiations of the International Framework Convention on Climate Change and the development of implementing protocols. The federal government believes that to be effective, the Convention must be designed to attract the maximum number of countries as well as a balance between developed and developing countries. The special concerns of the developing countries must be addressed so that they can fully participate in the negotiations. To this end, Canada has committed \$1 million to the World Meteorological Organization to assist developing countries understand the issue of climate and climate change and how to respond to it.
- As a first step towards solving the global warming problem, Canada is committed to stabilize national emissions of CO₂ and other greenhouse gases, not controlled by the Montreal Protocol, at 1990 levels by the year 2000. The federal government believes that further reductions in emissions are required and that they should be based on a program of targets and schedules agreed upon internationally. In this context, the technical feasibility and the cost and trade implications of further reductions in emissions will be examined including the 20 per cent reduction in CO₂ emissions called for by the Toronto Conference.
- There is undoubtedly some scope for reducing emissions without incurring major economic costs, and some reductions can result in economic benefits. Canadian efforts to reduce emissions can increase production efficiency, make our firms more competitive on world markets, and help promote the development of a Canadian environmental service industry which would be well placed to take advantage of overseas opportunities.

- It must be recognized, however, that some measures being examined as having potential to reduce emissions could affect the competitiveness of Canadian businesses, particularly if Canada's major trading partners, including the United States, do not undertake similar actions. For this reason, policies and programs to reduce emissions must be developed through consultation with all interested parties, and must be sensitive to the policies and programs of our major trading partners.

RECOMMENDATION 5 (Paragraph 3.15)

The Committee recommends that the Toronto target of a 20% reduction in humansourced CO₂ emissions by the year 2005, compared to the 1988 level of emissions, be adopted by the federal government as its minimum interim objective in reducing Canadian CO₂ emissions.

Response:

- Canada committed to stabilize its emissions of CO₂ and other greenhouse gases other than those already controlled by the Montreal Protocol, at 1990 levels by the year 2000 at the Ministerial Conference on Sustainable Development in Bergen (May 1990). This commitment was reinforced at the Second World Climate Conference in Geneva (November 1990) and is a central element of the Government's Green Plan.
- The Government of Canada believes that further reductions in greenhouse gas emissions are required and that these should be based on a program of targets and schedules agreed upon internationally. In this context, the technical feasibility and the cost and trade implications of further reductions in emissions will be examined, including the 20 per cent reduction in CO₂ emissions called for by the 1988 Toronto Conference. This would require consultation and cooperation among all levels of government and stakeholders as well as education programs to encourage action by all Canadians; an approach that is essential to the development of a credible strategy to limit emissions — one which is capable of achieving stated goals for reductions of emissions.

RECOMMENDATION 6 (Paragraph 3.19)

Canada adopt the target of reducing the intensity of energy use in the Canadian economy by 2% annually, until our emissions of carbon dioxide are reduced to a level which does not contribute to the further accumulation of CO₂ in the atmosphere.

Response:

- Energy intensity is a measure of a country's dependency on energy and is usually estimated in terms of energy consumption per capita or per unit of economic output (GDP). Using either of these measures, Canada is one of the most energy intensive countries in the world. This does not mean, however, that Canada is the most, or even one of the most energy inefficient countries in the world.
- There are several reasons why Canadian energy intensity is so high: the Canadian climate is harsher than that of many other countries; Canada has a relatively low population density leading to greater use of energy per capita in transporting both

people and goods; many of Canada's industries such as aluminium, and pulp and paper are energy intensive requiring a large amount of energy per unit of output; and in part because of our rich endowment of energy resources, energy prices in Canada are low relative to other countries, which does not encourage an individual conserving lifestyle.

- This is not to say that there are not opportunities to improve the efficiency of energy use in Canada. For this reason the Government has introduced measures to improve Canada's energy efficiency, via the Green Plan. Initially the focus will be on initiatives to increase efficiency and the use of alternative energy sources that are economically or socially attractive in their own right. The Government will seek industry's commitment to help achieve energy efficiency gains as well as to share information on new energy efficiency technologies and practices. Government-industry cooperation will take place on several fronts: The Minister of Energy, Mines and Resources will establish a National Advisory Council to promote industry-government cooperation and to establish energy efficiency targets for each of Canada's industrial sectors.
- Reductions in energy intensity will depend on many factors, such as the structure of the economy which is variable and not readily predictable. There are other factors to be considered, as well. For example, the assumption given in the recommendation is that energy intensity reflects CO₂ emission levels. In actual fact, energy intensity could remain unchanged or even increase, but emissions of CO₂ could be reduced if the energy source shifted from those that did not result in the emissions of CO₂.

RECOMMENDATION 7 (Paragraph 4.5)

We also welcome the statement that the use of CFCs in car air conditioners will be phased out by the 1995 model-year, although we recommend that this provision should apply to all vehicles, not just to cars, and that air conditioning units in vehicles should be required to be leak-proof by model-year 1992.

Response:

- Canada has in place domestic regulations, under the Canadian Environmental Protection Act (CEPA), to implement the Montreal Protocol's CFC control obligations. Draft regulations under CEPA were proposed in the spring of 1989. The final regulations came into effect in July 1989.
- The federal government recently announced its intention to ban the use of CFCs in automobile air conditioners and other products. The target dates for these bans, which go beyond the requirements of the amended Montreal Protocol, are
 - 1993 for their use as blowing agents in flexible foams
 - 1994 for their use as solvents for sensitive electronic equipment
 - 1994 for their use as hospital sterilants
 - 1995 for their use as blowing agents in poured and sprayed plastic foam insulation, and
 - the 1995 model-year for use of CFCs in automobile air conditioners; in 1997, all air conditioners in new vehicles will be CFC-free.

- Given the lead time required for engineering, it is not feasible to make leakproof air conditioning systems mandatory by the 1992 model-year.
- The government is preparing regulations aimed at achieving the 1997 phase-out. In addition, it plans new regulations to ensure that the 19 per cent reduction in CFC use already achieved in Canada is taken as a starting point for the more stringent reductions agreed to at the London Conference in June 1990. Further measures to help Canada achieve its goal are being pursued with the 'provinces.

RECOMMENDATION 8 (Paragraph 4.8)

The Committee recommends that the Government of Canada, in cooperation with provinces and municipalities, strongly encourage the introduction of a requirement that CFCs be removed from used equipment before disposal.

Response:

- The federal government, in cooperation with the provinces, is developing a national action plan for the recovery and recycling of CFCs. Pilot studies to determine the feasibility of CFC recovery from used equipment before disposal are being carried out by several provinces and municipalities.

RECOMMENDATION 9 (Paragraph 4.16)

The Committee recommends therefore that the federal government investigate urgently the data offered to us by the Canadian Gas Association, preferably through an independent survey of the leakage problem. In addition to clarifying important problems of domestic priorities, we believe that independent evidence on this issue will materially assist Canada in international negotiations on a global warming convention.

Response:

- In 1990, the World Resources Institute published information which suggested that methane losses from pipelines in Canada could be as high as 16 per cent of total natural gas production.
- At a workshop with American officials last year, there was consensus that in Canada and the United States, methane losses from natural gas transmission and distribution are less than 0.5 per cent. The Institute has recently recanted and agrees that losses are less than 0.5 per cent.
- Further verification of methane emissions from natural gas transmission and distribution will be undertaken as part of the joint work by Environment Canada and Energy, Mines and Resources on greenhouse gases emission inventories.

RECOMMENDATION 10 (Paragraph 4.18)

Given the human-sourced carbon dioxide emissions are the principal contributor to increasing atmospheric levels of greenhouse gases, and given that society's use of energy is the largest factor in this CO₂ generation, the

Committee concludes that Canadian energy policy-making must have as its most immediate focus the more efficient and conserving use of energy. Coupled with the more effective use of energy is the need for fuel substitution away from high-carbon fuels and for the commercial availability of technologies for exploiting carbon-based fuels with less environmental impact.

Response:

- The objectives of Canadian energy policy are varied and far-reaching. Among others they are to ensure that Canadian consumers and industry make informed decisions on energy-related matters so that they use and produce energy in an environmentally responsible fashion. As a result of concern for climate change and other energy/environment concerns, the focus of implementing this objective is shifting to the conserving and efficient use of energy.
- The National Action Strategy on Global Warming and many of Canada's Green Plan initiatives present examples of this focus. For example, a *National Efficiency and Alternative Energy Act* should result in meaningful improvements in energy efficiency at end-uses. New fuel efficiency targets should substantially improve the performance of new vehicles, while a concerted effort will be made on the development and introduction of lower carbon-intensive and alternative fuels into the market place. Efforts to improve the efficiency with which carbon based fuels are combusted are increasing both through government agencies such as CANMET and through private sector initiatives; it is realized that there is a need to increase efficiency to remain competitive and to deal with other energy related environmental concerns.
- In this regard, the federal government supports the use of a comprehensive and staged approach to reducing greenhouse gas emissions. Initially, the focus will be on energy efficiency and alternative energy initiatives which are economically attractive in their own right or that meet multiple policy objectives. If this is insufficient to meet declared objectives, more far-reaching and tougher federal and provincial measures would be considered. These could include: the use of fiscal instruments, restructuring of energy pricing, and more regulatory intervention. Before such second-step measures would be implemented full consultation and an in depth understanding of their economic costs and benefits would be necessary. For example, full consideration of the "Citizens Code of Regulatory Fairness" including consultations and regulatory impact analysis would be required, before any regulatory initiatives would be implemented.

RECOMMENDATION 11 (Paragraph 4.24)

The Committee recommends that federal and provincial strategies to combat human-induced global climate change combine strong regulatory systems with a careful utilization of market forces to develop economically efficient programs for reducing greenhouse gas emissions in Canada.

Response:

- Measures for reducing greenhouse gas emissions in Canada will combine the use of regulatory systems and market forces, in addition to other means such as suasion, public information and education. The Government is also committed under the Green Plan to building and strengthening partnerships with Canadian industry and consumers to achieve environmentally responsible decision-making.
- The Government recognizes that action may be required to provide information on the availability and benefits of measures to overcome market barriers. The need for such measures is part of the rationale for some regulatory initiatives such as labelling. An example of this will be found with the introduction of a *National Energy Efficiency and Alternative Energy Act* which would deal with:
 - regulation of minimum energy efficiency levels in energy-using equipment;
 - labelling of products to convey information on energy use; and
 - collection of statistics on energy use.
- The Government also recognizes the potential effectiveness of market forces. In this regard the Green Plan commits to the release of a discussion paper in 1991 on the use of economic instruments to achieve environmental objectives. This will include an analysis of taxes and the possible use of an emissions trading system in attaining reductions in greenhouse gas emissions.
- Under the National Action Strategy on Global Warming, the Federal Government has indicated its support for the use of a comprehensive and staged approach to reducing greenhouse gas emissions in consultation and conjunction with the provinces. If the initial focus on energy efficiency and alternative energy initiatives which are economically or socially attractive in their own right appear not to be sufficient to meet declared objectives, more far-reaching and tougher federal and provincial measures would be considered. These could include: the use of fiscal instruments, such as taxes; restructuring of electricity pricing to encourage conservation versus supply expansion; changing electric and gas utility incentive structures; and more regulatory intervention that could result in lifestyle changes. Before such second-step measures were implemented, however, it would be necessary to have a full understanding as to their economic costs and benefits.

RECOMMENDATION 12 (Paragraph 4.30)

The Committee recommends that all federal departments and agencies, as part of their budget submissions, report on the direct and indirect impacts of their operations on global warming, and set annual targets for reductions in greenhouse gas emissions.

Response:

- The Government had adopted a national target of stabilization at 1990 levels by the year 2000, and the Federal Government is committed to putting its own house in order. In this regard Goal 6 of the Green Plan indicates:
 - assurance that the operations and procedures of the Federal Government exceed national targets and schedules for sustaining our environment.
- An example of initiatives in this regard is that, in conjunction with Ontario Hydro's "Power Savers" electrical demand side Management Program, Energy Mines and Resources Canada, with the cooperation of Environment Canada and Public Works Canada is engaged in the development of an energy efficiency program for existing and planned federal installations.
- To date all of EMR's buildings have received comprehensive energy audits by specially trained Ontario Hydro personnel and work is proceeding on the retrofit of all EMR's holdings, per the results of the audit. A similar plan is being developed for 1300 federal installations during the forthcoming fiscal year and for 20,000 installations by the end of the project (forecast as 1995). An energy savings of approximately 15% is expected from this initiative.
- Reductions in greenhouse gas emissions will result from the specific energy efficiency targets under the Code of Environmental Stewardship. If specific commitments to greenhouse gas emission reduction targets for federal departments and agencies were to be made the Code of Environmental Stewardship would likely provide the appropriate venue.

RECOMMENDATION 13 (Paragraph 4.34)

The Committee concludes that Canada's electric utilities are a key element in reducing greenhouse gas emissions and urges provincial, territorial and municipal governments to direct utilities to take the lead in developing programs for electricity demand management and for introducing new technologies which improve — in both an energy and an environmental sense — the production, transmission and consumption of electricity.

Response:

- As indicated in the Green Plan, the Government of Canada believes that the provinces and municipalities should give serious consideration to measures which encourage more aggressive demand-side management (DSM) on the part of electric utilities and changes in electricity utility pricing and regulatory structures. There is also interest to

ensure that the environmental implications of generating electricity by different means is clearly understood. In this regard the federal government is closely monitoring the development and progress of a number of different provincial reviews concerned with the relationship between the electricity sector and the environment. The outcome of these initiatives will play a large role in determining the nature and timing of a federal review of the environmental implications of different electricity supply options.

- It should also be noted that the Department of Energy, Mines and Resources is currently working with the Canadian Electrical Association to increase the utilization and effectiveness of DSM by Canadian utilities. EMR is also working with the Canadian Gas Association to encourage the use of demand-side management by gas utilities and pipelines. The objective of demand-side management in the latter context is not only to utilize existing transmission and distribution capacity more effectively, but also to increase the efficiency of gas use.
- Renewable energy sources will be studied in cooperation with the provinces, utilities and other industry partners. Federal efforts will focus on systems design and engineering as well as standard-setting and certification programs (see Response to Recommendation 21(b)).

RECOMMENDATION 14 (Paragraph 4.38)

The Principal/Interest/Taxes/Energy (PITE) type of mortgage incentive makes excellent sense in regard to new construction, and the Committee recommends that Canada Mortgage and Housing Corporation should take the lead in introducing it in Canada.

Response:

- Under the Green Plan, the federal government will be taking a number of initiatives to help improve energy efficiency in new and renovated buildings. Minimum energy efficiency standards will be developed for appliances and equipment. Energuide labelling of home appliances will be enhanced to provide customers with information for financial and energy savings. The 1983 federal measures for Energy Conservation in New Buildings will be updated and regionalized and their incorporation into more federal, provincial and municipal building codes will be encouraged. The R-2000 energy-efficient standard in home construction will be promoted. Efforts will be made to improve awareness of opportunities for energy efficiency in new and renovated buildings. Development and commercialization of promising technologies for energy-efficient buildings (e.g. better windows, lighting and heating and cooling) will be enhanced.
- The federal government believes that the provinces and municipalities should give serious consideration to the issues of electricity pricing and electric and gas utility regulating structures including the possibility of providing for investment and return on investment on the customer's side of the meter.

RECOMMENDATION 15 (Paragraph 4.41)

The Committee recommends that fuel efficiency standards be legislated for cars and trucks.

Response:

- It is anticipated that an Amendment to the Motor Vehicle Fuel Consumption Standards Act will be submitted to Parliament the end of 1992. At that time, new fuel efficiency targets will be announced which will contribute substantially to the Canadian commitment to stabilize greenhouse gases. These targets will apply to cars and light trucks.

RECOMMENDATION 16 (Paragraph 4.43)

Recognizing that Canada's forests are a major reservoir for atmospheric carbon and that the losses of forest stands through commercial harvesting, wildfire, insects and disease have resulted in a rate of harvesting of Canada's commercial forests and wild lands exceeding the rate of restocking, the Committee recommends that:

- (a) the federal government expedite negotiations with the provinces on federal-provincial agreements for the management of Canada's forests;**
- (b) provincial governments be urged to ensure that NSR lands are adequately reforested through replanting programs or through natural regeneration of the forest cover, and in a reasonable period of time;**
- (c) the losses to wildfire, insects and disease be reduced wherever possible; and**
- (d) future forest resource development agreements be linked to prompt regeneration and protection of all deforested areas, whether harvested commercially or depleted naturally.**

Response:

- The forestry initiatives of the Green Plan demonstrate the Government's commitment to balanced forest management practices and sustainable forestry in Canada. For example, up to eight model forests will be developed in partnership with provinces and industry in the major Canadian forest regions as working models of sustainable development. As well, the Green Plan outlines initiatives that will support the continued diversity of Canadian forests, and ensure that a comprehensive national forestry database is developed and maintained, both prerequisites for sustainable forestry.

Response to the specific sub-recommendations follow:

- (a) New five year federal-provincial forestry agreements were signed with New Brunswick, Nova Scotia and Prince Edward Island in 1989 and 1990. More recently, agreements have been signed with Newfoundland, Manitoba and

British Columbia. A new agreement with Saskatchewan is expected to be signed shortly. Negotiations are currently underway with the remaining provinces to conclude agreements as soon as possible.

- (b) Provincial governments sign long term forest management agreements with the forest industry which require the adequate regeneration of areas harvested by the industry, under license, on Provincial Crown lands. In addition, the federal government through its forestry agreements with the provinces, assists in regenerating older areas that have not regenerated adequately in the past or that have not been adequately reforested. This "backlog" of non-satisfactorily regenerated land is commonly referred to as NSR lands. A key principle of the federal government in negotiating new agreements, is that the provinces commit to regenerating all future cutover areas in order not to expand the backlog of NSR lands.
- (c) A large part of Forestry Canada's research and development program is aimed at improving detection of forest pests and fires and reducing their contribution to forest losses. As indicated in the Green Plan the Government will accelerate and intensify efforts to develop and deploy environmentally acceptable solutions to forest damage by insects and disease. Forestry Canada, in conjunction with provincial and industrial partners will accelerate the creation of computer aided management tools and their transfer to forest managers.
- (d) The federal-provincial forestry agreements are partly aimed at rehabilitating the backlog of NSR lands whether natural or man-made. Some provinces have additional backlog rehabilitation programs whereby the provinces and industry sign forest management agreements requiring adequate forest regeneration on provincial crown land where forest harvesting has occurred. Most areas of natural depletion, primarily from forest fires, regenerate adequately on their own over time.
- The federal government has developed eight new forestry principles which will be included in the new round of federal provincial forestry agreements. These principles are in support of sustainable development of our forests and include, among others, a commitment to the prompt regeneration of newly harvested areas. The eight forestry principles guide federal involvement in forestry agreements and are consistent with the National Forest Sector Strategy (1987). They were presented by the federal Minister of Forestry to his provincial colleagues in June 1989 at a meeting of the Canadian Council of Forest Ministers (CCFM). These principles involve:
 1. long-term forest management planning;
 2. improved forestry information;
 3. roles and responsibilities for silviculture;
 4. integrated forest management;
 5. research, development and technology transfer;

6. federal funding for incrementality;
7. public awareness; and
8. human resource development.

RECOMMENDATION 17 (Paragraph 4.51)

Given that vigorously growing trees are an effective means of extracting CO₂ from the atmosphere, the Committee recommends that federal government take the lead in establishing federal-provincial-municipal programs to encourage development of forests on otherwise unused lands, dedicated to sequestering atmospheric carbon as an intermediate-term strategy for reducing CO₂ levels in the atmosphere.

Response:

- Over the past several years, the federal government's forestry science and development activities have been active in examining the role of Canada's forests in the context of global warming. Preliminary results from a recent study by Forestry Canada, using 1986 data, indicate that Canada's forests are a net natural sink for carbon. This means that the country's forests are presently removing more carbon from the atmosphere during their growth than they are losing from decomposition and burning.
- The federal government is currently exploring the prospects for undertaking a national tree planting program for the purpose of sequestering carbon. A major thrust will involve cooperative initiatives with individuals and organizations for a community tree planting program in urban areas, where trees can lower peak energy demands by 20 to 40 per cent simply by providing shade and windbreaks. The goal is to encourage the planting of up to 325 million trees in rural areas as well as in and around 6,000 cities, towns and communities across Canada.

RECOMMENDATION 18 (Paragraph 5.10)

The Committee recommends that the federal government use environmental considerations as a filter for its foreign aid and trade initiatives, encouraging programs and technologies which convey environmental benefits and ending or modifying those that are environmentally unacceptable.

Response:

- The Government of Canada is using environmental information more actively in examining questions of trade and policy, drawing on advice from outside bodies with environmental experience in deploying our resources to meet the new and growing challenges. Foreign aid programs and technologies that convey environmental benefits are encouraged by the fact that environmentally sound development is one of the six priorities of Canada's Official Development Assistance Charter. This priority is pursued through: the funding of programs and projects that enhance the

environment, the promotion of environmental awareness, institution-building and support, data collection, and the mandatory environmental screening of all aid projects, a process that has been in place since 1986.

- Canadian Development Assistance projects have for some time been subject to careful screening for their environmental impact. This process will become more systematic and visible with the expected passage of the *Canadian Environmental Assessment Act*.
- A long term objective of CIDA is to encourage and assist developing countries to develop and implement their own capacity for environmental assessment. With this in view, respect for home country regulations and assessments will be a major element in the procedures applying to Canadian projects abroad.
- Achieving trade practices and disciplines that accommodate environmental imperatives is a challenge to all trading nations. Canada is currently discussing with its partners in the OECD the various means by which this goal can be more fully realized. This includes means by which all trading nations can be assured that adequate environmental assessments will be in place for major projects.

RECOMMENDATION 19 (Paragraph 4.61)

The Committee recommends that the federal government develop policies and programs which encourage Canadian companies to commercialize and export technologies and equipment that are effective in reducing greenhouse gas emissions, particularly to developing countries which are striving to build their domestic economies.

Response:

- The Government fully recognizes the global nature of many environmental problems, and is aware of the need for Canada to take an active role in their remediation, particularly through the transfer of technology to developing countries. Transferring our technology will assist developing countries build their domestic economies, while providing new markets for Canadian technologies. In particular, this can provide a role for Canadian resource processing industries which share environmental challenges similar to those encountered by industries in developing countries. In many cases the transfer of technology will allow a larger net reduction to be made in the emission of greenhouse gases per dollar of investment.
- Privatization and deregulation have made it easier for Canadian firms to start up in new areas of endeavour such as the development of new environmental technologies. Additionally, the development of partnerships between industry and government departments such as examples given below and through ISTC and External Affairs will increase the role our efforts will play in helping developing countries meet environmental obligations.
- The Department of Energy, Mines and Resources is already carrying out a number of initiatives in the transfer of environmentally-sensitive technology, particularly under the auspices of CANMET. Their activities have been in coordination with the International

Energy Agency (IEA), and on a bilateral basis. For instance, CANMET has given advice to China on how to burn coal more cleanly. It will likely play an even larger role in future energy technology initiatives, given that the Minister's National Advisory Council to CANMET has formally urged it to make its expertise available to developing countries.

- The Canadian International Development Agency (CIDA) assists developing countries with the transfer of technical equipment and technological skills that would reduce greenhouse gas emissions. One major area of focus over the years has been the development of hydroelectric potential in developing countries. To date CIDA has provided over half a billion dollars of assistance for these projects. This has permitted developing countries to avoid the use of hydrocarbons for the production of electrical energy.
- The promotion of energy efficiency, improved energy management, and the use of renewable energy sources have been among CIDA's priorities for some time now. Projects financed by CIDA, such as the industrial energy conservation projects in southern Africa and Senegal, wind and solar powered water pumping in the Sahel and northern Africa, solar crop drying in the ASEAN region, wood farming, more efficient charcoal production and improved fuelwood utilization in Zaire, all illustrate the commitment on the part of CIDA to the sustainable and environmentally beneficial path of development. CIDA is also supporting work of the International Institute for Energy Conservation in analyzing the transport problems of Asian cities with one objective being increased energy efficiency.
- As outlined in the Green Plan, during 1991, the Government will also launch the Environmental Technology Commercialization Program to provide financial resources on a cost-shared basis for partnerships and joint ventures. Up to 50 per cent of funding will be provided to attract private venture capital for environmental technology demonstration projects. Joint venture and consortium opportunities will be developed for Canadian firms in the environmental technology industry, both in Canada and internationally.

RECOMMENDATION 20 (Paragraph 4.64)

Given the interconnectedness of the global environment and the necessity of assisting the developing world in protecting our common environmental heritage, the Committee recommends that the federal government, through its own agencies and through Canada's membership in multilateral organizations, advocate programs to reduce deforestation and to encourage reforestation and the planting of forests in developing countries. Support for these activities by the federal government must not reduce current and planned Canadian support for other development assistance programs.

Response:

- Canada has been a strong advocate of programs to reduce deforestation and to encourage reforestation in developing countries through its membership in multilateral organizations and via participation in bilateral arrangements. Canada supports the International Tropical Timber Organization which promotes forest

conservation and the wise use of the forest resource, and through the Canadian International Development Agency (CIDA) supports the Tropical Forestry Action Program.

- In particular, through its regular programming, CIDA together with the International Development Research Centre (IDRC) commits on average about \$100 M annually to international forestry development programs and is presently assisting developing countries like Honduras, Senegal and India to optimize the social, economic and environmental returns from forest land through better management practices. A major Amazon forest management project in the province of Acre in Brazil is in the planning stage. Assistance is also provided to help in the establishment of protected areas and to manage wildlife resources.
- Forestry Canada maintains extensive scientific exchanges with leading forest and developing nations to ensure that Canada remains at the forefront of forest-environmental research, and to facilitate the transfer of forest management technology to developing countries. Through the North American Forestry Commission (NAFC), we are supporting the establishment of a monitoring system of forest health in Mexico. Canada was also instrumental in the establishment of the International Council for Research in Agroforestry which provides the means for the integration of these two disciplines in tropical countries. A further example of scientific assistance is the involvement of Forestry Canada scientists in cooperation with CIDA in the establishment and operation of the Canada-ASEAN Tree Seed Centre in Thailand.
- Canada is also playing a lead role in preparatory work towards an international convention on the conservation and sustainable development of forests, in conjunction with preparation for the 1992 United Nations Conference on Environment and Development (UNCED).

RECOMMENDATION 21 (Paragraph 5.10)

The Committee recommends, for the purpose of attaining integrated environmental and economic objectives, that the federal government considerably increase its support for research, development and demonstration directed to:

- (a) the more efficient and conserving use of energy;**
- (b) fuel substitution leading to reduced greenhouse gas emissions; and**
- (c) technologies for producing and using fossil fuels in less environmentally-damaging ways.**

Response:

- The Government of Canada believes that the dual objectives of improved environmental quality and improved economic performance, including international competitiveness are simultaneously achievable through the support for research,

development and demonstration (RD&D) initiatives aimed at: increased energy efficiency; the promotion of alternative fuels; and mitigation of the effects of fossil fuel consumption/production on the environment.

- The approval of continued funding for the Panel on Energy Research and Development (PERD), in 1988, reaffirmed an awareness that a coordinated energy R&D program is important to enhancing Canada's energy choices and environmental quality. This program, which is coordinated by EMR, has shifted from technical emphasis on fossil fuels to energy efficiency, alternative energy sources and the environmental effects of energy supply and use. The Government's current policy is market oriented and was designed to provide the maximum leverage of federal dollars by building on cooperative relations with industries and the provinces.
- Although the Department of Energy, Mines and Resources is the lead department with respect to energy related research, development and demonstration (RD&D) as illustrated through initiatives outlined below, other departments are also involved in this area of RD&D. Industry, Science and Technology Canada has initiatives to assist industry in identifying and developing action plans to remediate environmental problems, including those that contribute to emissions of greenhouse gases. ISTC's "Environmental Industries Sector Initiative" recognizes the need for stronger alliances among university, government and private sector labs for the development of new science and technology based solutions, in addition to the need for industry partners, especially among resource processors. The government will work with the private sector to ensure the growth and development of new industries through such programs.
- With respect to the specific sub-recommendations:
 - (a) Government priority, at least in the short term will be focused on the efficient and conserving use of energy. By necessity this includes RD&D across a broad spectrum of uses from consumer products to buildings, transportation and our major industrial sectors. EMR will undertake measures to promote the development and commercialization of promising technologies for energy efficient buildings and specific industrial sectors. For example, the 1983 federal Measures for Energy Conservation in New Buildings will be updated and regionalized, and their incorporation into more federal, provincial and municipal building codes will be encouraged. This program will include promoting the R-2000 energy-efficient standard in home construction, and improving awareness of opportunities for energy efficiency in new and renovated buildings. As well, the development and commercialization of promising technologies for energy-efficient buildings (for example, better windows, lighting and heating or cooling) will be enhanced.

The Government will seek industry's commitment to help achieve energy efficiency gains as well as to share information on new energy efficiency technologies and practices. Government-industry cooperation will take place on several fronts: The Minister of Energy, Mines and Resources will establish a National Advisory Council to promote industry-government cooperation and to establish energy efficiency targets for each of Canada's industrial sectors.

Programs will be developed to train and certify energy efficiency managers in industrial firms as well as to identify and develop promising technologies specific to each industry sector.

(b) While energy efficiency measures are important in the short term, Canada's ability to meet its longer-term goal to reduce greenhouse gas emissions depends upon our ability to move to less carbon-intensive energy sources. Alternative transportation fuels from plentiful, diverse sources such as natural gas and biomass can have a major role to play in meeting these goals as well as improving urban air quality. Initiatives in this area will include:

- accelerated development and market penetration of alternative transportation fuel, including expansion of natural gas markets, increased availability of alternative fuel vehicles, and encouragement of ethanol and methanol as automotive fuels and fuel feedstocks, and support for research and development of alternative fuel sources such as hydrogen.

Renewable energy sources such as passive, active and photovoltaic solar energy options will be studied in cooperation with utilities and other industry partners, in particular with reference to use in northern and remote communities. Federal efforts will focus on systems design and engineering as well as standard-setting and certification programs. Initiatives will include:

- enhanced research and development of alternative energy sources, including photovoltaics, fuel cells, landfill gas recovery, passive solar energy and other renewable energy technologies;
- cost-shared market assessments of non-fossil energy sources; and
- increased research, development and demonstration of advanced energy systems (e.g. combined cycle generation to improve the efficiency of coal-to-electricity conversion, co-generation or district energy systems).

(c) The Government fulfills its environmental responsibilities using a multifaceted approach including: RD&D on energy-related technologies and systems (intra-departmentally and through EMR's Panel on Energy Research and Development (PERD)); and, policies and programs to develop and promote energy efficiency and the use of alternative energy sources. Currently, these varied initiatives address a wide range of environmental concerns relating to the effects of energy production/ consumption on soil, water and air quality. Increasingly, however, in keeping with the concerns of Canadians over such problems as acid rain, urban air quality and global warming, resources in this area are being reallocated so as to most effectively address atmospheric environmental issues. By nature of their contribution to these atmospheric problems, the clean combustion of fossil fuels is of prime importance.

RECOMMENDATION 22 (Paragraph 5.18)

The Committee recommends that a study of the regional implications of proposed greenhouse gas limitation measures be included as a vital part of the National Action Strategy on Global Warming.

Response:

- The National Action Strategy on Global Warming has three components: limiting emissions of greenhouse gases; anticipating and preparing for the potential climate changes which Canada and Canadians may experience as a result of global warming; and, improving scientific understanding and increasing prediction capability with respect to climate change.
- The emission limitation component of the Strategy is based on four principles. The need to be comprehensive, address all greenhouse gases and sinks and taking account of interactions with other atmospheric issues and pollutants. The recognition that all Canadians have a responsibility to take domestic action to respond to the problem but that certain actions can only be taken in concert with our major trading partners. The need to be flexible and to be adaptable to new information and developments. The recognition of the importance of regional differences.
- The principle that a limitation strategy should recognize the importance of regional differences is essential in the case of a country as large and regionally diverse as Canada. This principle has three primary aspects. It recognizes that while the federal government may introduce measures to reduce greenhouse gas emissions which have broad applicability across Canada, these measures will of necessity not reflect regional conditions. It will be necessary for the provinces and territories to introduce measures which are region-specific. For this reason, the set of limitation initiatives introduced will likely vary from jurisdiction to jurisdiction.
- This principle also recognizes that the impact of national measures that are introduced will not necessarily be the same in all regions. Certain regions, for example, have fewer options in terms of energy supply than other regions. Therefore, in examining possible national measures, the specific characteristics of regional economies will be taken into account, and any national measures introduced will be fair and equitable across regions.

RECOMMENDATION 23 (Paragraph 5.27)

The Committee recommends that the federal government introduce a major research, development and demonstration program with its objective being the commercial development of transportation fuels and systems that result in the lowest economically and technically feasible emissions of greenhouse gases.

Response:

- While energy efficiency measures are important in the short term, Canada's ability to meet its longer-term goal to reduce greenhouse gas emissions depends upon our ability to move to less carbon-intensive energy sources. Alternative transportation

fuels from sources such as biomass can have a major role to play in meeting these goals as well as improving urban air quality. Green Plan initiatives in this area will include: accelerated development and market penetration of alternative transportation fuel, including market expansion of natural gas for vehicles; increased availability of alternative fuel vehicles, and encouragement of ethanol and methanol as automotive fuels and fuel feedstocks, and support for research and development of alternative fuel sources such as hydrogen.

- Although alcohols can substitute for gasoline as low level blends without any modification to vehicle fuel systems it must be borne in mind that to proceed further there must be adequate delivery and distribution systems, as well as a reasonable supply of vehicles that burn alternative fuels.
- As outlined in the Green Plan, during 1991, the Government will also launch the Environmental Technology Commercialization Program to provide financial resources on a cost-shared basis for partnerships and joint ventures. Up to 50 per cent of funding will be provided to attract private venture capital for environmental technology demonstration projects. Joint venture and consortium opportunities will be developed for Canadian firms in the environmental technology industry, both in Canada and internationally. Initiative types indicated in the recommendation could be considered under this program.

RECOMMENDATION 24 (Paragraph 6.4)

The Committee recommends that the Minister of Environment have the responsibility and authority to develop policies, programs and regulations that span the full range of activities of the federal government, analogous to the Minister of Finance for financial and economic affairs, and that the Environment Minister report to Parliament annually on the environmental impact of all activities.

Response:

Ministerial Authority and Responsibility

- Based on existing legislation (the *Department of the Environment Act* and *The Canadian Environmental Protection Act*) the Minister of the Environment has the authority to develop guidelines and in many cases regulations covering a broad range of activities of the federal government.
- The most recent development in this regard is the proposed *Canadian Environmental Assessment Act*. This would give the Minister of the Environment the right to refer any project to mediation or a review panel after consulting the appropriate authority. The Act would require the Minister of the Environment to table an annual report on the success of implementation of the Act.
- In conjunction with the introduction of the Bill, the government undertook to establish a much enhanced and progressive environmental review process for all its new policies and programs. Under the new process, ministers have decided that the environmental

implications of all proposed policy and program initiatives will be considered before decisions are made. The Minister of the Environment will provide advice to assist responsible authorities in the assessments. When a new policy or program is announced a statement of its environmental implications will be made public, and be reviewable by the Standing Committee on Environment.

- A number of institutional reforms have already taken place that indicate how the Government is committed to integrating environmental considerations into policy making processes and day-to-day operations:
 - The government has established a Cabinet Committee on the Environment whose mandate is to manage the Government's environmental agenda and to ensure that policies, programs and other initiatives requiring federal support are compatible with the Government's environmental goals.
 - The Minister of the Environment is also a member of the Cabinet Committee on Priorities and Planning, which determines the Government's major priorities.

Federal Code of Environmental Stewardship

- To demonstrate the federal government's continued commitment to the principle of sustainable development, the Government of Canada plans the following Green Plan initiative:
 - In 1991, the Government will adopt a comprehensive Code of Environmental Stewardship covering all areas of federal operations and activities.
- The Code will integrate environmental concerns into both policy and program planning as well as into day-to-day operations. It will ensure that all operations and activities of the federal government meet or exceed the standards and practices that the government recommends to others.
- The Code will be complemented by a list of targets or objectives. These targets will reflect environmental commitments that the Government has made or is making, and that will be implemented in its operations. They will cover a broad range of issues, from waste generation to contaminated site clean-up and emission standards.
- The Government will establish an Office of Environmental Stewardship to act as a focal point for coordination, assist the adoption of the Code and targets, provide information and guidance, and serve as a link between operating managers and scientific experts. The Government will ensure that environmental considerations are integrated into purchasing policies and practices; federal departments and agencies will develop environmental action plans indicating how they will implement the Code and report regularly on its implementation.
- With respect to the recommendation for an annual report to Parliament, the Green Plan also commits the Government to a more rigorous approach to State of the Environment Reporting. Specifically:
 - beginning in 1992, the Government will introduce an annual address to Parliament providing a State of the Environment Policy Statement;

RECOMMENDATION 25 (Paragraph 6.5)

The Committee recommends that the Auditor General, working in conjunction with the Departments of Environment and Finance, establish an environmental audit function to assure that all federal departments and agencies have implemented environmental assessment processes, and to monitor the effectiveness of environmental programs. Specifically, the Auditor General should monitor the progress of all federal departments and agencies in setting and attaining targets for greenhouse gas emissions.

Response:

- The Green Plan has committed federal departments and agencies, beginning in 1992, to implement policies and procedures for environmental auditing in cooperation with the Office of the Comptroller General (OCG). A number of federal departments and agencies have already undertaken environmental audits. The OCG is working closely with the Department of the Environment (DOE) in order to see that federal departments and agencies are provided with suggested principles and practices for effective environmental auditing. DOE and OCG will work with federal departments and agencies to ensure that they are aware of the need for, and give proper consideration to conducting environmental audits of areas of environmental concern. The OCG will also work with departments and agencies to see that they plan and conduct audits of their commitments in implementing the Code of Environmental Stewardship.
- Whether all departments and agencies will set targets for greenhouse gas emissions remains to be determined. Where there is need, because of the nature of departmental or agency operations, the setting and attaining of targets for greenhouse gas emissions will be covered under this policy implementation and auditing regime.
- The Office of the Auditor General will conduct audits in these areas in accordance with its mandate.

THE STANDING COMMITTEE ON ENVIRONMENT

**Out of Balance
The Risks of Irreversible Climate
Change**

Part III of "Our Changing Atmosphere" Series

"This is simply a matter of where all the individual small contributions add up. There is simply no way one country or a small group of countries can solve this problem. We are all into it, and we all have to make our own contribution."

March 1991

The Honourable David MacDonald, P.C., M.P.
Chairperson

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CHAPTER 1

BASIC ISSUES

A. GLOBAL WARMING IS REAL AND SERIOUS

1.1 Our report is based on three main premises:

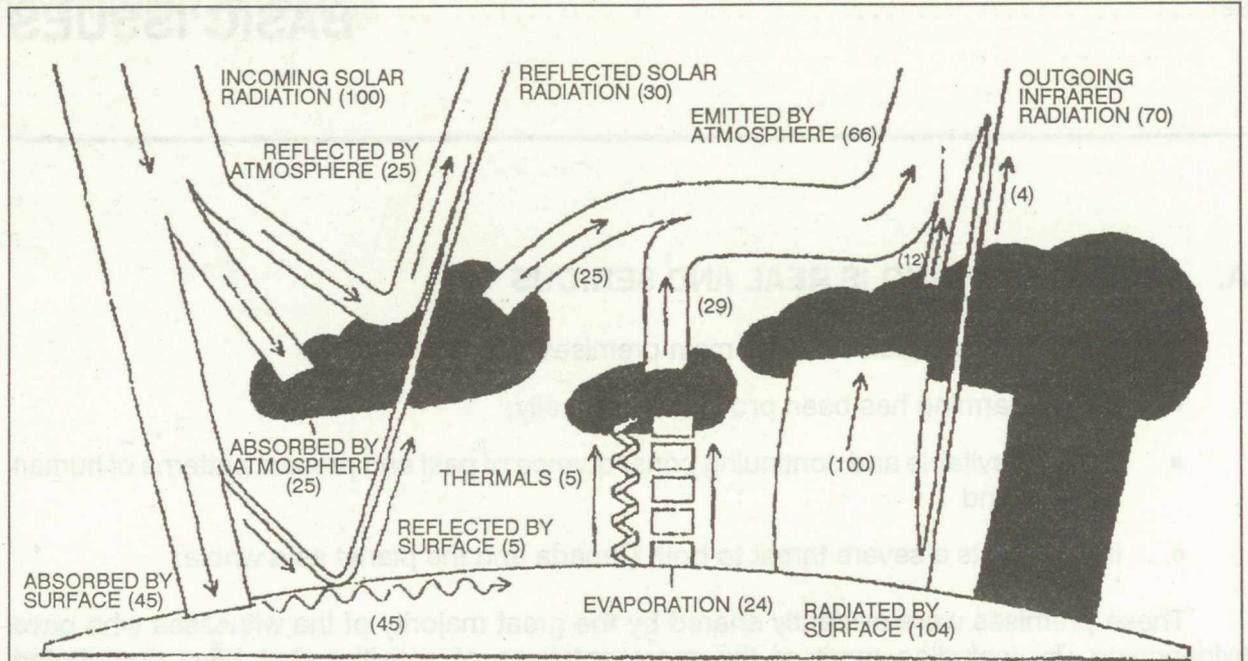
- global warming has been proved scientifically;
- it is an inevitable and continuing consequence of past and present patterns of human activity; and
- it represents a severe threat to both Canada and the planet as a whole.

These premises were evidently shared by the great majority of the witnesses who gave evidence to us, including most of the representatives of activities that have contributed significantly to the present crisis. They also emerge clearly from the meetings of scientists and governments that have taken place in recent years, most notably at the Second World Climate Conference, which took place in Geneva late in 1990.

1.2 The "greenhouse effect" is the result of a very complex chain of scientific processes in the atmosphere and at the earth's surface, and it is not yet fully understood in quantitative terms. In principle, however, the effect is straightforward and easy to understand. The earth's atmosphere, like the glass of a greenhouse, is highly transparent to incoming radiation from the sun, most of which is at very short wavelengths (including what we call visible light). The atmosphere is, however, less transparent to the heat energy that is radiated from the earth's surface at longer (infrared) wavelengths (Fig. 1). Eventually a balance is struck between incoming radiation and outgoing radiation, but the temperature of the earth and its atmosphere at which the balance is struck depends on the amount of the gases in the atmosphere that can absorb this infrared radiation: the so-called "greenhouse gases". The greater the amounts of these gases in the atmosphere, the higher will be the temperature at which the earth and its atmosphere will be in equilibrium.

1.3 It has long been recognized that one consequence of the burning of fossil carbonaceous fuels (such as coal, oil and natural gas) is a gradual increase in the amount of carbon dioxide (CO_2) in the atmosphere, and therefore an increase in what we now refer to as "global warming". Humanity is also adding other greenhouse gases to the atmosphere, some of which are very much more effective than CO_2 in absorbing radiation (Figs. 2 and 3 and Table A).

FIGURE 1

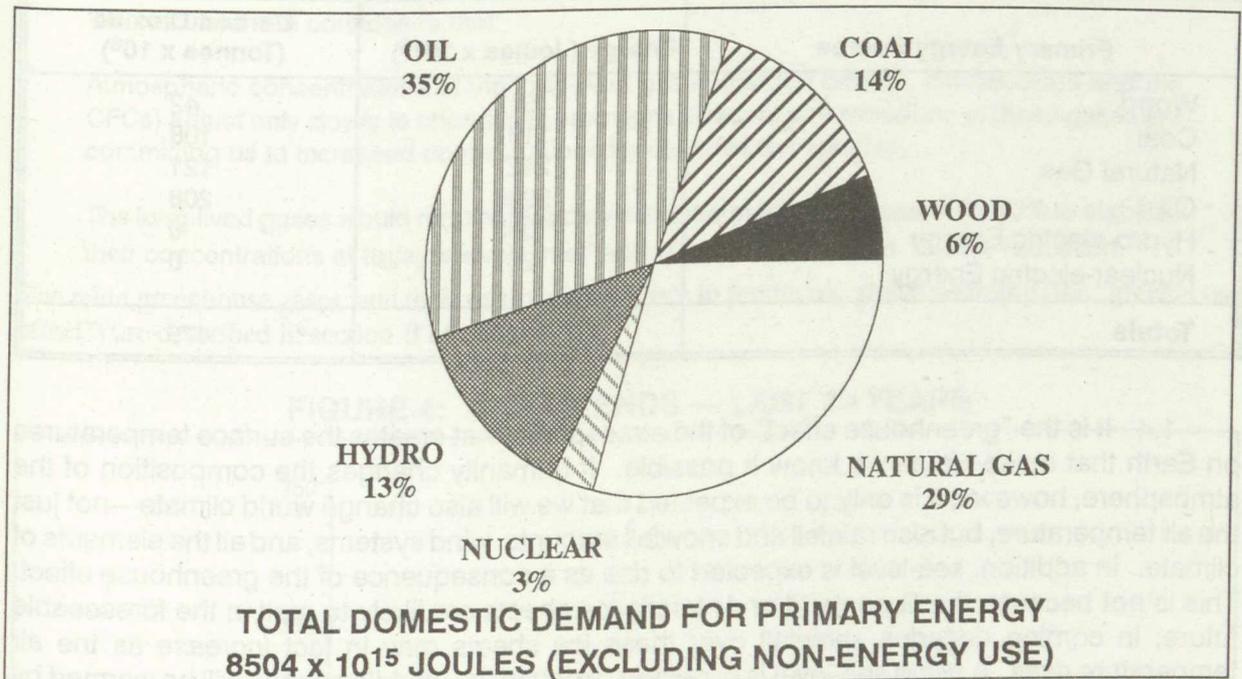


GREENHOUSE EFFECT arises because the earth's atmosphere tends to trap heat near the surface. Carbon dioxide, water vapour and other gases are relatively transparent to the visible and near-infrared wavelengths that carry most of the energy of sunlight, but

they absorb more efficiently the longer, infrared wavelengths emitted by the earth. Most of this energy is radiated back downward; hence an increase in the atmospheric concentration of greenhouse gases tends to warm the surface.

Source: Evidence to the Committee from Mr. Henry Hengeveld (Atmospheric Environment Service, Environment Canada)

**FIGURE 2:
PRIMARY ENERGY DEMAND IN CANADA 1988, BY FUEL**



**FIGURE 3:
CO₂ EMISSIONS BY PRIMARY FUEL IN CANADA, 1988**

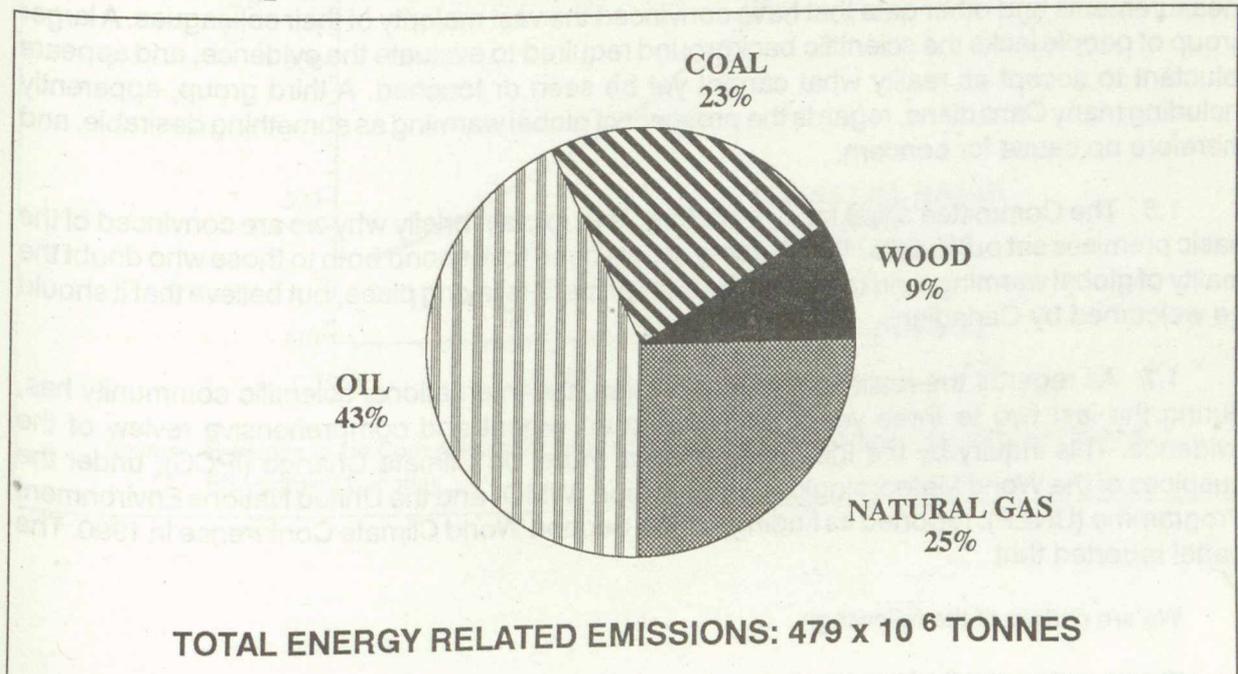


TABLE A: DOMESTIC DEMAND FOR PRIMARY ENERGY IN CANADA BY FUEL AND RELATED CARBON DIOXIDE EMISSIONS (1988)

Primary Energy Source	Energy (Joules x 10 ¹⁵)	Carbon Dioxide (Tonnes x 10 ⁶)
Wood	517	42
Coal	1191	108
Natural Gas	2427	121
Oil	2995	208
Hydro-electric Energy	1093	0
Nuclear-electric Energy	281	0
Totals	8504	479

1.4 It is the "greenhouse effect" of the atmosphere that creates the surface temperatures on Earth that make life as we know it possible. If humanity changes the composition of the atmosphere, however, it is only to be expected that we will also change world climate—not just the air temperature, but also rainfall and snowfall amounts, wind systems, and all the elements of climate. In addition, sea-level is expected to rise as a consequence of the greenhouse effect. This is not because the Greenland or Antarctic ice sheets are likely to melt in the foreseeable future; in coming decades snowfall over these ice sheets may in fact *increase* as the air temperature rises. A rising sea-level is expected because the world's oceans will be warmed by the atmosphere above them, and as water gets warmer it expands in volume.

1.5 There is no mystery to what is happening, yet there are still some who are unconvinced. A very few of these are scientists who offer alternative explanations for the measurements and other data that have convinced the vast majority of their colleagues. A larger group of people lacks the scientific background required to evaluate the evidence, and appears reluctant to accept as reality what cannot yet be seen or touched. A third group, apparently including many Canadians, regards the prospect of global warming as something desirable, and therefore no cause for concern.

1.6 The Committee's first task, therefore, is to explain briefly why we are convinced of the basic premises set out in para. 1.1. In doing so, we need to respond both to those who doubt the reality of global warming, and to those who accept that it is taking place, but believe that it should be welcomed by Canadians.

1.7 As regards the reality of global warming, the international scientific community has, during the last two to three years, undertaken an urgent and comprehensive review of the evidence. This inquiry by the Intergovernmental Panel on Climate Change (IPCC), under the auspices of the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), reported its findings at the Second World Climate Conference in 1990. The panel reported that

We are certain of the following:

The greenhouse effect is real....

Man made emissions are substantially increasing the atmospheric concentrations of the greenhouse gases: carbon dioxide, methane, the chlorofluorocarbons, nitrous oxide and tropospheric ozone. These increases will lead to a warming of the Earth's surface...

We calculate with confidence that:

Atmospheric concentrations of the long-lived gases (carbon dioxide, nitrous oxide and the CFCs) adjust only slowly to changes in emissions. Present day emissions of these gases are committing us to increased concentrations for decades to centuries....

The long-lived gases would require reductions in man-made emissions of 60-80% to stabilize their concentrations at today's levels; methane would require only a 15-20% reduction.¹

The main greenhouse gases, and their relative importance in producing global warming (the "greenhouse effect") are described in section B of this chapter.

FIGURE 4: CO₂ TRENDS — LAST 30 YEARS

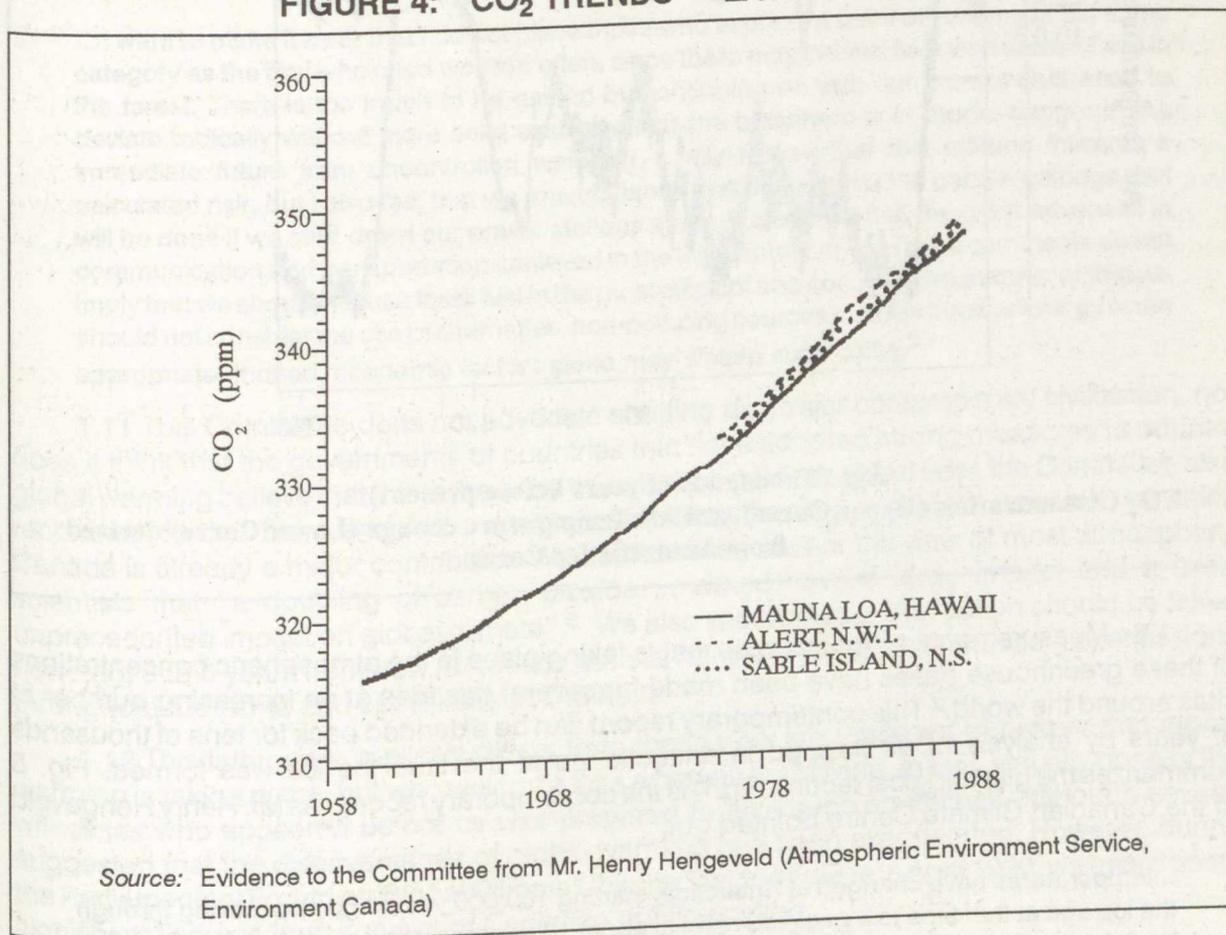
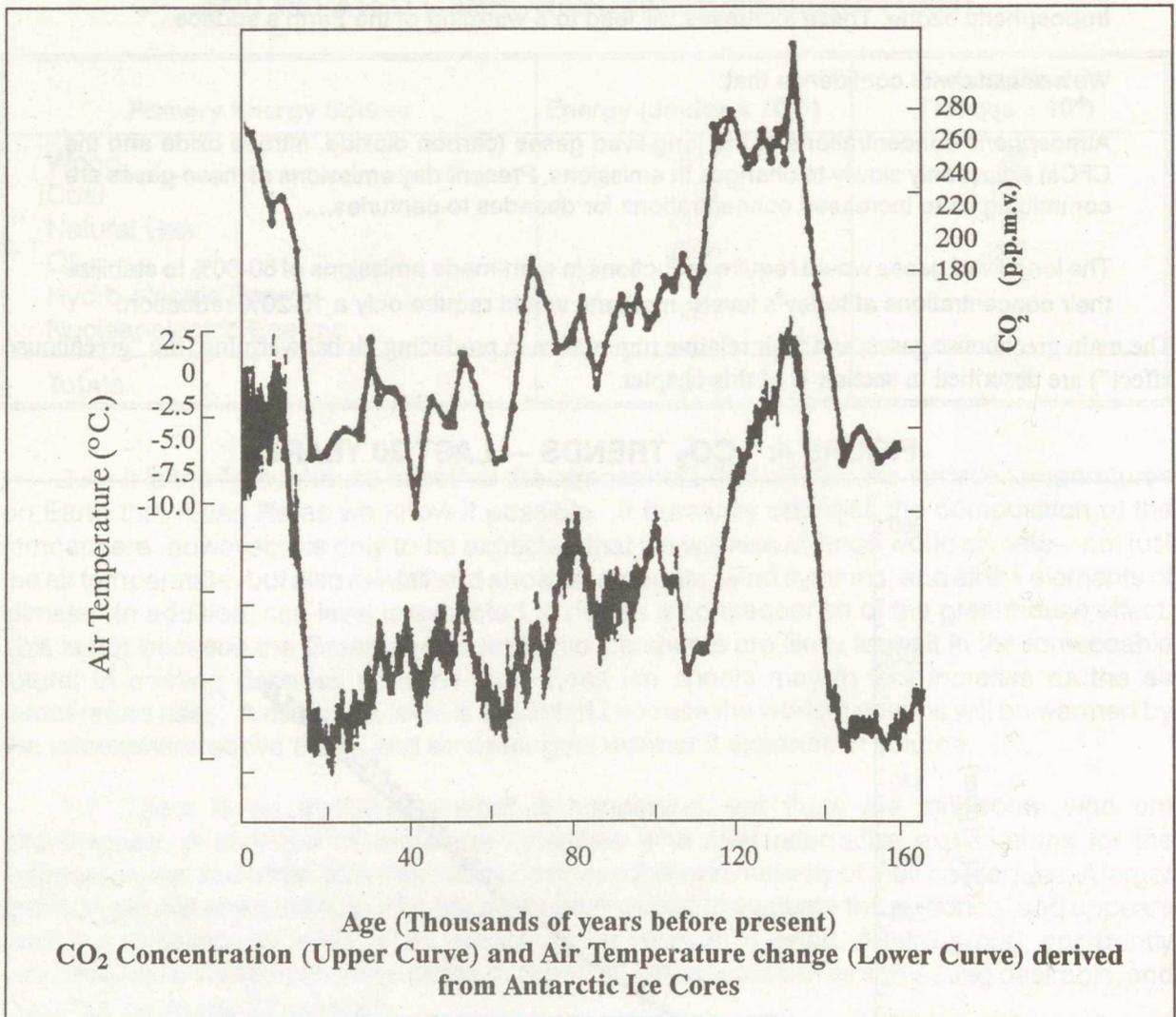


FIGURE 5: HISTORICAL TEMPERATURE AND CO₂ CORRELATION



1.8 Measurements of the increase that is taking place in the atmospheric concentrations of these greenhouse gases have been made for several decades at an increasing number of sites around the world.² This contemporary record can be extended back for tens of thousands of years by analysis of air trapped in antarctic ice at the time the ice was formed. Fig. 5 summarizes the glaciological record; Fig. 4 is the contemporary record. As Mr. Henry Hengeveld of the Canadian Climate Centre pointed out,

...temperatures have changed in Antarctica, starting 160,000 years ago and moving through the ice age at that time to a peak interglacial about 10 degrees warmer, and gradually sliding back into an ice age over a period of 80 [thousand] years back up to the current interglacial where we are now...

More important is the correlation of the carbon dioxide concentration with those changes in temperature. They are almost one on one...

We can see that the concentrations today are about 350 parts per million, which is about 25% higher than the highest values of the last 160,000 years... The trend is equally evident in Hawaii, as it is in Alert in the Northwest Territories or off the coast of Nova Scotia.³

1.9 And yet there are still some who doubt. Among the witnesses that appeared before the Committee were representatives of the George C. Marshall Institute of Washington, D.C. The Marshall Institute's report⁴ has probably been the most influential document of its kind in casting doubt on the reality of the greenhouse effect, because of the scientific credentials of those who prepared it. It is, nevertheless, the view of a very small minority in the scientific world. The Committee accepts the view of the vast majority of atmospheric scientists, expressed in the report of the Intergovernmental Panel on Climate Change: "The greenhouse effect is real".

1.10 In any case, it is clear from the evidence it provided to us, and from its report, that the Marshall Institute is mainly urging expanded research on global warming in a 3-5 year period, and the avoidance of drastic policy changes before that research is undertaken. As Dr. Seitz, a former president of the U.S. National Academy of Sciences, told us,

... I want to make it clear that I do not place those who express a word of warning in the same category as the boy who cried wolf too often, since there may indeed be a wolf somewhere in the forest. There is too much to be gained by continuing on with our form of civilization to deviate radically without more solid evidence that the biosphere is in mortal danger in the immediate future from uncontrolled warming. I fully realize that this attitude involves a calculated risk, but I also feel that we must balance that risk against the certain damage that will be done if we shut down our power stations and our factories, halt the great advances in communication and transportation achieved in the last century or so. These comments do not imply that we should not use fossil fuel in the most efficient and conservative manner or that we should not consider the use of alternative, non-polluting sources such as nuclear energy when appropriate. Indeed, economic factors alone may dictate such shifts.⁵

1.11 This Committee does not advocate shutting down our contemporary civilization, nor does it think that the governments of countries that have adopted strong measures to counter global warming believe that this is the price that must be paid. As noted later, the Committee also recommends that there should be a significant strengthening of climate research, to which Canada is already a major contributor. We do, however, accept the view of most atmospheric scientists that "a doubling of carbon dioxide ... would have a large impact and a likely unprecedented impact on global climate".⁶ We also **recommend** that action should be taken now, not 3 to 5 years from now, to reduce substantially the rate of greenhouse gas emissions throughout the world and specifically in Canada.

1.12 This latter view implicitly differs from those who are prepared to believe that global warming is taking place, but who welcome it as a benefit to Canada. In fact, virtually none of the witnesses who appeared before us was prepared to take such an attitude, although several suggested that the disadvantages of global warming had been exaggerated. However, during the Parliamentary Forum on Global Climate Change that took place in April 1990, we heard some significant findings from surveys of Canadian public opinion:

On the greenhouse effect side, we find from our research that 3 in 10 Canadians actually believe that global warming is going to be positive for Canada. There are going to be warmer winters, we are going to be able to grow more food—these are the reasons they give us in open-ended responses. So in terms of the public, there is a perceptual barrier here to serious efforts on global warming.⁷

1.13 Given the severity of the winter over much of Canada, and similar extremes, such an initial reaction to the term "global warming" may be understandable. It might be argued, for example, that even modest reductions in the length and severity of the snow season could have real benefits to the majority of the population, though not of course to ski resort operators and others who are economically dependent on the Canadian winter.

1.14 The evidence presented to us, however, suggests that global warming is likely to have significant negative effects in Canada, as elsewhere in the world. More important, perhaps, global warming seems certain to affect all aspects of weather and climate, in ways that are at present difficult to forecast for specific areas of the country. It is, for example, misleading to think in terms merely of rises in temperature. All aspects of the Canadian climate will be affected, and the economic and social consequences may be profound. In the southern prairie provinces for example, present indications are that there would be a substantial increase in summer evapotranspiration, with only a slight increase in summer rainfall. Consequently the frequencies of drought and severe drought may increase markedly.⁸ A similar increase in evaporation rates in the Great Lakes Basin could cause marked reductions in lake levels, and therefore severely affect navigation, hydro power generation and other activities.⁹

1.15 A recent scenario of ecoclimatic provinces in Canada in 2050, developed by Environment Canada, suggests that the boreal forest climate region could be virtually eliminated in all of Canada west of James Bay (see para. 4.45).¹⁰ What this would imply for the existing forest, and the forest economy, is difficult to foresee, but the evidence from Forestry Canada was not encouraging:

The total value of exports from forestry almost equals fisheries, mines, minerals, energy and agriculture put together....[A]nything that happens to this forest resource could have far-reaching social, economic, as well as environmental consequences....

I would say generally we would not expect a major increase in productivity of total forest land because of moisture as a limiting factor. There will not be enough water...

Overall, the consensus is that moisture is going to be a limiting factor. So at best we can hope to maintain our present productivity. At worst, it could decline.¹¹

1.16 At present, forecasts of the future climate of specific regions, such as the prairies or the Great Lakes Basin, are speculative rather than reliable. Atmospheric scientists are confident that the world climate (and sea-level) will change substantially as a result of global warming, but the present state of knowledge does not permit similar confidence at the regional or local level. Four general statements can however be made to support our belief that global warming offers few benefits to Canada, and that Canada should be as active as other nations in taking action to reduce or delay such warming.

1. **Practically every facet of Canadian economy, society and environment is intimately adjusted to the present climate.** This relationship to climate is sometimes obvious, more often subtle and complex. Changes in climate are likely to force changes in our way of life that are difficult to foresee, and that may well be unwelcome and expensive.

2. **The scientific evidence clearly indicates that the world is already committed to significant change, as the delayed effect of the substantial increases in greenhouse gases during the last two centuries.** If there are benefits to be obtained from global warming, they are probably already on the way. So also are the disadvantages and problems caused by greenhouse gas emissions of the past.
3. **Canada, like the rest of the world, is not faced with a change from our present climate to another that is also relatively stable. So long as greenhouse gases continue to increase in the atmosphere, global warming will continue progressively, and so will climate change and rising sea-level.** As the Minister of Energy, Mines and Resources told us,

Based on every information I have received in the department from the scientists and others who are working on global warming within the department, I am convinced that we have to reduce emissions, that they have negative effects on climate...¹²

4. **Even if global warming could be shown to benefit Canada, which is far from being the case, there is growing evidence of its potentially severe and even disastrous implications in other parts of the world, and especially in developing countries.** Canada cannot adopt a *laissez-faire* attitude to what is happening. Many millions of people live on the margin of survival not merely in terms of nutrition and similar measures; small changes of climate or of sea-level would make their physical environment uninhabitable.

B. WE MUST CONSIDER ALL GREENHOUSE GASES, NOT JUST CARBON DIOXIDE

1.17 Global warming is caused by a number of radiatively active "greenhouse" gases, i.e. gases that can absorb and radiate heat energy in proportion to their concentrations in the atmosphere. Four of these are dominant both in terms of their overall role in global warming and in terms of human influence on their concentration in the atmosphere. These gases are carbon dioxide (CO₂), methane (CH₄), halocarbons, and nitrous oxide (N₂O). The Intergovernmental Panel on Climate Change summarized the characteristics of these gases that are important for global warming:

Carbon Dioxide: The atmospheric CO₂ concentration, at 353 ppmv* in 1990, is now about 25% greater than the pre-industrial (1750-1800) value of about 280 ppmv, and higher than at any time in at least the last 160,000 years. Carbon dioxide is currently rising at about 1.8 ppmv (0.5%) per year due to anthropogenic emissions.... The time taken for atmospheric CO₂ to adjust to changes in sources or sinks is of order 50-200 years... Consequently, CO₂ emitted into the atmosphere today will influence the atmospheric concentration of CO₂ for centuries into the future.... [E]ven if anthropogenic emissions of CO₂ could be kept constant at present day rates, atmospheric CO₂ would increase to 415-480 ppmv by the year 2050, and to 460-560 ppmv by the year 2100. In order to stabilize concentrations at present day levels, an immediate reduction in global anthropogenic emissions by 60-80 percent would be necessary.

* parts per million by volume

Methane: Current atmospheric CH₄ concentration, at 1.72 ppmv, is now more than double the pre-industrial (1750-1800) value of about 0.8 ppmv, and is increasing at a rate of about 0.015 ppmv (0.9%) per year... [It has] a relatively short atmospheric lifetime of about 10 years. Human activities such as rice cultivation, domestic ruminant rearing, biomass burning, coal mining and natural gas venting have increased the input of CH₄ into the atmosphere... However, the quantitative importance of each of the factors contributing to the observed increase is not well known at present. In order to stabilize concentrations at present day levels, an immediate reduction in global anthropogenic emissions by 15-20 per cent would be necessary.

Chlorofluorocarbons: The current atmospheric concentrations of the anthropogenically produced halocarbons CCl₃F (CFC-11), CCl₂F₂ (CFC-12), C₂Cl₃F₃ (CFC-113) and CCl₄ (carbon tetrachloride) are about 280 pptv*, 484 pptv, 60 pptv, and 146 pptv, respectively. Over the past few decades their concentrations, except for CCl₄, have increased more rapidly (on a percentage basis) than the other greenhouse gases, currently at rates of at least 4% per year.... Future emissions will, most likely, be eliminated or significantly lower than today's because of current international negotiations to strengthen regulations on chlorofluorocarbons. However, the atmospheric concentrations of CFCs 11, 12 and 113 will still be significant (30-40% of current) for at least the next century because of their long atmospheric lifetimes.

Nitrous oxide: The current atmospheric N₂O concentration, at 310 ppbv**, is now about 8% greater than in the pre-industrial era, and is increasing at a rate of about 0.8 ppbv (0.25%) per year.... [It has] a relatively long atmospheric lifetime of about 150 years... Recent data suggest that the total annual flux of N₂O from combustion and biomass burning is much less than previously believed. Agricultural practices may stimulate emissions of N₂O from soils and play a major role. In order to stabilize concentrations at present day levels, an immediate reduction of 70-80% of the additional flux of N₂O that has occurred since the pre-industrial era would be necessary.¹³

1.18 The greenhouse effect produced by different gases depends not just on the amount of the gas in the atmosphere at present, expected future emissions, and the lifetime of individual molecules of the gas. It is also dependent to a very large extent on how effective the gas is in absorbing radiation. For example, methane is about sixty times more effective as a greenhouse gas than an equivalent amount of carbon dioxide; the chlorofluorocarbon CFC-12 is almost six thousand times as effective as carbon dioxide in such "radiative forcing" (Table B).

* parts per trillion by volume

** parts per billion by volume

TABLE B: SUMMARY OF GREENHOUSE GAS CHARACTERISTICS

Parameter	CO ₂ (carbon dioxide)	CH ₄ (methane)	CFC-11	CFC-12	N ₂ O (nitrous oxide)
Pre-industrial concentration (1750-1880)	280 ppmv	0.8 ppmv	0	0	288 ppbv
Current atmospheric concentration (1990)	353 ppmv	1.72 ppmv	280 pptv	484 pptv	310 ppbv
Current annual rate of accumulation	1.8 ppmv	0.015 ppmv	9.5 pptv	17 pptv	0.8 ppbv
Atmospheric life (years)	50-200	10	65	130	150
Carbon equivalent (CO ₂ = 1)	1	5.8	3970	5750	206

Abbreviations: ppmv, ppbv, pptv - parts per million/billion/trillion by volume.

The "Carbon equivalent" row indicates that one metric ton of methane provides the same radiative forcing as about 60 metric tons of carbon dioxide; and one metric ton of CFCs provides the same forcing as several thousand metric tons of carbon dioxide.

Sources: Intergovernmental Panel on Climate Change, Working Group 1, *Report*, Table 1; World Resources Institute, *World Resources 1990-91*, p. 355.

Taking the properties and concentrations of the different gases into account, the relative contributions to global warming from increases in these major gases during the past decade are estimated to have been:

Carbon dioxide: 56%

Methane: 11%

Nitrous oxide: 6%

Chlorofluorocarbons: 24%.

1.19 Because of the significance of greenhouse gases other than carbon dioxide, and the need to have a method of comparing the global warming effects of the different gases, it is becoming customary to express the effect of the other gases in terms of carbon dioxide "heating equivalents", or "carbon equivalents". This follows the recommendation of the 1989 Noordwijk Declaration on Atmospheric Pollution and Climatic Change that

appropriate fora, including the IPCC, consider the necessity and efficiency of the introduction of the concept of CO₂-equivalence. This would provide a single parameter to describe the radiative effects of the various greenhouse gases, including CFCs.

1.20 Such a unit has, however, not yet become the normal parameter either at the international level or in Canada. The actual values to be used in determining the carbon-equivalents of other greenhouse gases remain inherently uncertain; those used in the

preceding paragraphs are only approximations. It will, for example, be necessary to have more precision if such "carbon equivalent units" are to be used in international negotiations and embodied in international (and national) agreements.

1.21 Nevertheless, it is evident to the Committee that considerable confusion exists in regard to what are often termed "carbon dioxide reductions". This phrase is used by many people with literal precision; to others, however, it implies "action to reduce global warming", including reductions in other greenhouse gases. The Committee believes that it would be desirable for Canada to adopt an approach based on carbon equivalents as soon as scientific definition of the conversion factors permits.

1.22 In the short term, and within national contexts, it may be wise to focus on each of the greenhouse gases separately, seeking substantial reductions in each of them. This is particularly so in regard to CFCs: the recent international agreement* to accelerate their phase-out was driven more by their serious effect on the stratospheric ozone layer than by their effect on global warming. Yet, for countries like Canada, it should be possible to achieve substantial overall reductions in contributions to global warming simply by phasing out CFCs. This will not, however, be sufficient, and it is necessary to look for all possible opportunities to limit emissions. (See also para. 1.34) The Committee also notes that there is need for careful assessment of the greenhouse gas characteristics of the substances that are anticipated as CFC-replacements.

1.23 By 2025, assuming broad compliance with the Montreal Protocol on chlorofluorocarbons, cumulative contributions to global warming were estimated by the IPCC to be:

Carbon dioxide: 63%

Methane: 15%

Nitrous oxide: 4%

Chlorofluorocarbons: 11%.

At that date, on this estimate, the carbon dioxide equivalent of the main atmospheric greenhouse gases would be twice the pre-industrial value (a situation usually abbreviated as "2 x CO₂").

However, as a result of the strengthening of the Montreal Protocol achieved in London in 1990, the relative role of chlorofluorocarbons can be expected to decline further. The other gases will therefore increase in relative significance, and the date when "2 x CO₂" is reached should be delayed.

1.24 It is clear from these estimates that the international agreements reached in recent years to control and then to eliminate production of CFCs are vital in reducing the impact of global warming, as well as in the protection of the stratospheric ozone layer. It is therefore essential that these agreements are implemented effectively. However, the major problems caused by carbon dioxide and the other principal greenhouse gases remain to be tackled in Canada and most other countries.

* The international Convention for the Protection of the Ozone Layer was adopted in Vienna in 1985. Subsequently a protocol to this convention, the Protocol on Substances that Deplete the Ozone Layer, was adopted in Montreal in 1987. In 1990 international agreement was reached in London to strengthen the provisions of the Montreal Protocol.

C. CANADIAN GREENHOUSE GAS EMISSIONS IN A WORLD CONTEXT

1.25 The World Resources Institute (WRI), an independent research body in Washington, D.C., published in 1990 its "Greenhouse Index": a list of the fifty countries with the highest greenhouse gas net emissions, based on the best data available for the year 1987. Three countries—the U.S.A., U.S.S.R. and Brazil—each contributed more than 10% of the world total; together they accounted for 40% of net emissions. Canada ranked 12th on the list, contributing an estimated 2.0% of the world total (Table C).

TABLE C: THE GREENHOUSE INDEX: 15 COUNTRIES WITH THE HIGHEST GREENHOUSE GAS NET EMISSIONS 1987
(CO₂ heating equivalents, thousands of metric tons of carbon)

Country	Rank	Carbon Dioxide	Methane	CFCs	Total	%
United States	1	540,000	130,000	350,000	1,000,000	17.6
U.S.S.R.	2	450,000	60,000	180,000	690,000	12.0
Brazil	3	560,000	28,000	16,000	610,000	10.5
China	4	260,000	90,000	32,000	380,000	6.6
India	5	130,000	98,000	700	230,000	3.9
Japan	6	110,000	12,000	100,000	220,000	3.9
West Germany	7	79,000	8,000	75,000	160,000	2.8
United Kingdom	8	69,000	14,000	71,000	150,000	2.7
Indonesia	9	110,000	19,000	9,500	140,000	2.4
France	10	41,000	13,000	69,000	120,000	2.1
Italy	11	45,000	5,800	71,000	120,000	2.1
Canada	12	48,000	33,000	36,000	120,000	2.0
Mexico	13	49,000	20,000	9,100	78,000	1.4
Mynamar	14	68,000	9,000	0	77,000	1.3
Poland	15	56,000	7,400	13,000	76,000	1.3

Source: World Resources Institute, *World Resources 1990-91*, Table 2.2.

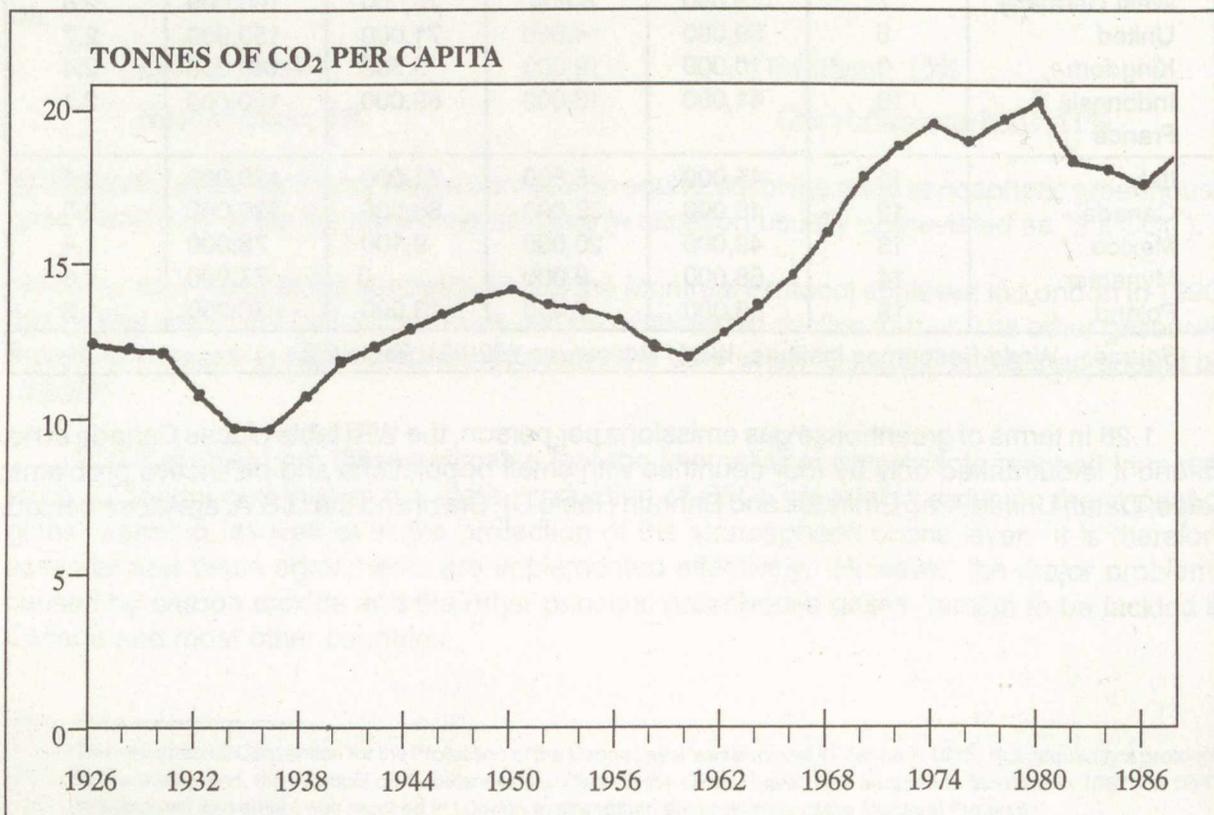
1.26 In terms of greenhouse gas emissions per person, the WRI table places Canada at no. 5, and it is outranked only by four countries with small populations and distinctive problems: Laos, Qatar, United Arab Emirates and Bahrain (Table D). Brazil and the U.S.A. are close behind.

TABLE D: PER CAPITA GREENHOUSE INDEX: 10 COUNTRIES WITH THE HIGHEST PER CAPITA GREENHOUSE GAS NET EMISSIONS 1987 (CO₂ heating equivalents, thousands of metric tons of carbon)

Country	Rank	Metric Tons per Capita
Laos	1	10.0
Qatar	2	8.8
United Arab Emirates	3	5.8
Bahrain	4	4.9
Canada	5	4.5
Luxembourg	6	4.3
Brazil	7	4.3
Ivory Coast	8	4.2
United States	9	4.2
Kuwait	10	4.1

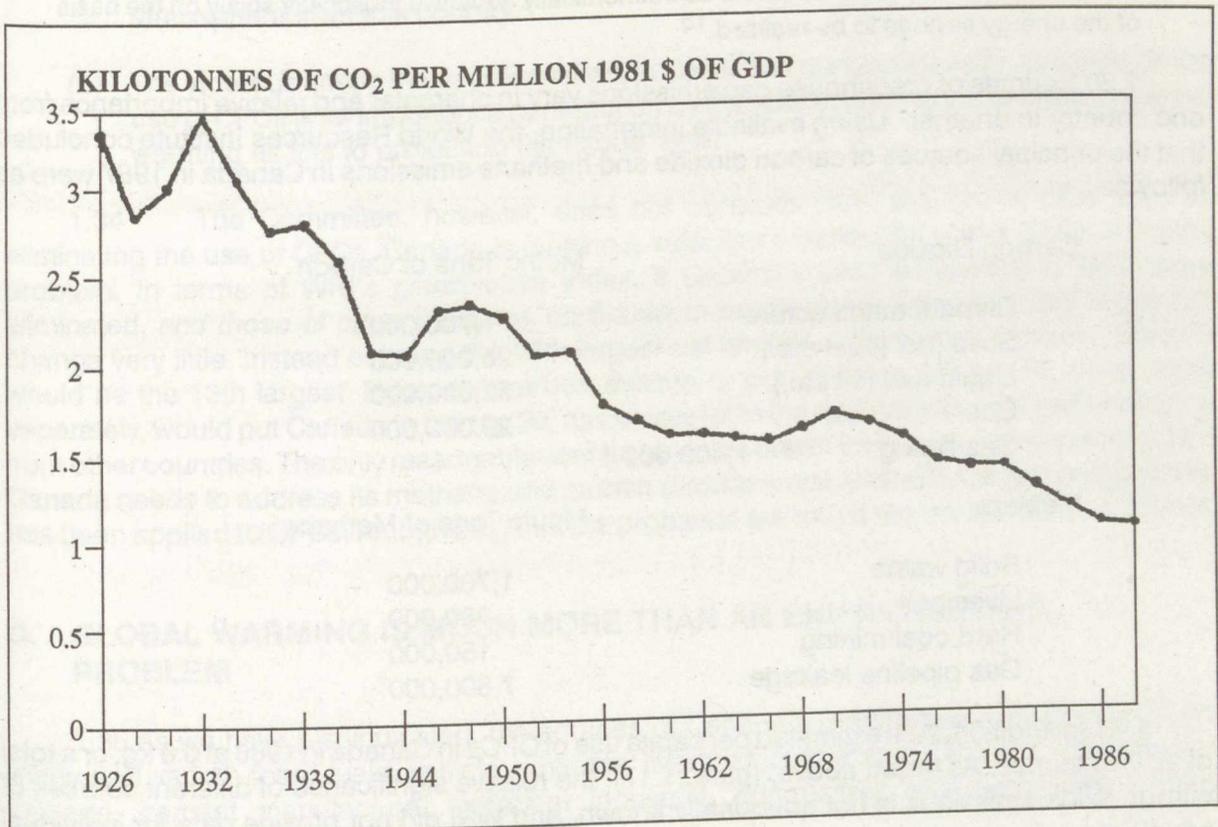
Source: World Resources Institute, *World Resources 1990-91*, Table 2.3.

FIGURE 6: PER CAPITA CARBON DIOXIDE EMISSIONS IN CANADA, 1926-1988



1.27 Only in terms of carbon emissions per unit of gross domestic product (Fig. 7) does Canada appear relatively efficient on the world scale, and then only because of the major inefficiencies encountered in most developing countries and a substantial number of economies that were centrally-planned in 1987 (e.g. China, Poland). When compared with "like" countries such as Japan, the Netherlands or even the U.S.A., Canada appears relatively inefficient in its use of energy.

FIGURE 7: CARBON DIOXIDE INTENSITY OF GROSS DOMESTIC PRODUCT IN CANADA, 1926-1988



1.28 In the evidence put before the Committee, Canada's "2%" contribution was quoted several times. Sometimes it was used to urge the point that global warming is a global problem, and action by Canada alone can have little effect. The Committee agrees. Sometimes, however, the 2% figure seems to have been advanced to support the view that the proportion is trivial and that action by Canada is unnecessary. There are at least two answers to this. One is exemplified by the comment made by a representative of the Government of the Netherlands, who had described to us the strong and comprehensive measures adopted by the Dutch Parliament to reduce greenhouse gas emissions. In the same WRI table, the Netherlands ranks 24th, contributing only 0.7% of net emissions in 1987. When it was suggested to him that therefore "you would not have a great deal of sympathy for the argument that because Canada only produces 2% we do not have to worry about it that much", the witness replied

This is simply a matter of where all the individual small contributions add up. There is simply no way one country or a small group of countries can solve this problem. We are all into it, and we all have to make our own contribution.¹⁴

1.29 The second argument is that if Canada used energy more efficiently than it does at present, this would be an economic benefit as well as a contribution to the reduction of greenhouse gas emissions. As a Task Force of the Federal-Provincial-Territorial Conference of Energy Ministers observed in 1989,

[T]here are substantial opportunities to reduce emissions of carbon dioxide in Canada. The potential reductions from improving efficiency of fossil fuel and electricity use are significant and many of these measures would be economically attractive for society solely on the basis of the energy savings to be realized.¹⁵

1.30 Sources of greenhouse gas emissions vary in character and relative importance from one country to another. Using available information, the World Resources Institute concluded that the principal sources of carbon dioxide and methane emissions in Canada in 1987 were as follows:

Carbon Dioxide	Metric Tons of Carbon
Cement manufacture	1,700,000
Solid fuel (coal etc.)	26,000,000
Liquid fuel (oil etc.)	52,000,000
Gas	29,000,000
Gas flaring	1,400,000
Methane	Metric Tons of Methane
Solid waste	1,700,000
Livestock	760,000
Hard coal mining	150,000
Gas pipeline leakage	7,800,000*

1.31 In addition, WRI estimated per capita use of CFCs in Canada in 1986 at 0.8 kg, or a total of 20,700 tonnes. As noted above, (para. 1.17), the relative significance of different sources of nitrous oxide emissions is not adequately known, and WRI did not provide data for individual countries.

1.32 Not all the greenhouse gas emissions each year represent additions to the greenhouse effect. For example, a substantial amount of carbon dioxide is absorbed by plants. WRI therefore estimated the *net* additions to the greenhouse effect, and then converted methane and CFCs to "carbon equivalents". For Canada the situation in 1987 was as follows:

Net Total Atmospheric Increase in Greenhouse Gases:

120,000,000 tons of carbon equivalent (2% of the world total of 5,900,000,000 tons), of which

* This figure is not consistent with estimates by the Canadian Gas Association; see paras. 4.9-4.16

Fossil fuels and cement manufacture:	48,000,000 tonnes (40%)
Methane emissions:	33,000,000 tonnes (25%)
CFC use:	36,000,000 tonnes (30%)

The remaining 5% is attributable to nitrous oxide, atmospheric ozone, and other greenhouse gases.¹⁶

1.33 We suggest that two important observations can be made on the basis of these data:

- (a) In Canada CFCs and (if the WRI's data are accurate) methane have been major sources of global warming, responsible for over half the net additions to the atmosphere from this country.
- (b) The vigorous action that is being taken, in Canada and internationally, to eliminate the use of CFCs is as important a contribution by Canada to solving the problem of global warming as it is to protecting the ozone layer.

1.34 The Committee, however, does *not* conclude from the above data that, by eliminating the use of CFCs, Canada is making a sufficient contribution to the global warming problem. In terms of WRI's greenhouse index, if Canada's CFC emissions in 1987 were eliminated, *and those of other countries continued to be included*, Canada's ranking would change very little. Instead of being the 12th largest net emitter of greenhouse gases, Canada would be the 13th largest. Either our carbon dioxide or our methane emissions, considered separately, would put Canada in the top 30, as compared to the *total* greenhouse gas emissions from other countries. The only reasonable conclusion to be drawn from such comparisons is that Canada needs to address its methane and carbon dioxide emissions with the same vigour that has been applied to CFCs, recognizing that the problems are much more complex and difficult.

D. GLOBAL WARMING IS MUCH MORE THAN AN ENVIRONMENTAL PROBLEM

1.35 As we have just indicated, the sources of Canada's greenhouse gas emissions are many and varied: fossil fuels, vehicle exhausts, livestock production, CFC use, gas pipeline leakage, cement manufacture, inefficient industrial, commercial and residential heating systems, and so on.

1.36 Similarly, although the regional impacts of global warming are still uncertain, they seem likely to be profound. More frequent drought on the prairies, rise in sea-level affecting low-lying coastal zones such as the Fraser delta, major reductions in sea-ice, severe stress on forest resources: these are just a few of the impacts on Canada that can be anticipated if available scenarios for "2 x CO₂" prove to be accurate.

1.37 It follows that policies and actions to counter the threat of global warming must be developed in a context that is as broad as the sources of emissions and the nature of the expected impacts. The Committee is concerned with the environment, but global warming is an issue that extends far beyond the usual definition of environment. This has already been recognized by Parliament in an imaginative and very rewarding way. Last April, Global Climate

Change was the subject of a unique Parliamentary Forum in which eight Standing Committees participated: Agriculture; Energy, Mines and Resources; Environment; Forestry and Fisheries; Health and Welfare, Social Affairs, Seniors and the Status of Women; Industry, Science and Technology, Regional and Northern Development; Labour, Employment and Immigration; and Transport.¹⁷ This Committee welcomes the interest and concern in global warming shown by the other Standing Committees, and anticipates that their contributions to finding solutions will be maintained for a long time to come.

1.38 Our report on global warming therefore necessarily involves policy options and recommended actions in many diverse fields. It also involves consideration of Canadian life-styles, and our relationship with and policies towards other countries. Though the Committee cannot claim expertise in so many diverse areas, we did have the benefit of expert testimony from a wide range of witnesses with appropriate knowledge and experience.

1.39 There is little merit in solving one problem by creating others. The Committee has therefore endeavoured to be responsible in making recommendations that clearly have wider implications beyond the problem of global warming. At the same time, however, we need to insist that the character and importance of global warming will demand significant changes in the present situation. If we do not alter our "life as usual" to reduce the threat of global warming, changes of climate and rises in sea-level will force unpleasant consequences on us. In many cases, it seems that the action that is required involves better management and wiser use of our resources. "Life as usual" has been much less efficient, more wasteful and more expensive than it need have been to achieve our objectives and, incidentally, protect our environment.

E. TACKLING THE GROWING PROBLEM OF GLOBAL WARMING REQUIRES A RECOGNITION OF FUTURE ENERGY AND DEVELOPMENT NEEDS, IN CANADA AND IN THE WORLD AS A WHOLE

1.40 Efforts to limit global warming inevitably focus on sources of greenhouse gas emissions that are linked to the activities of an expanding world population, especially in developing countries that are striving to reduce the economic disparities that separate them from countries such as Canada. Whether these efforts are expressed in increased methane emissions from feed-lots and rice paddies, or carbon dioxide emissions from the burning of larger amounts of fossil fuels, the task of reconciling emission limitations with future development needs is a daunting one.

1.41 It is clear, for example, that developing countries see increasing energy use as crucial to their development plans, as it has been and will be in the development of Canada. The problem is a global one, in that increased emissions anywhere in the world soon affect the global atmosphere and climate. The dilemma was vividly expressed to us, often in contrasting ways, by several witnesses. For example, in developing its own action strategy on global warming, the Dutch government considered the implications of limiting global carbon emissions at the 1984 level, and then allocating this level of emissions equitably among the world population as it might be in 2025. This amounts to 0.6 tonnes per capita, compared to the current emission level in North America of over 5 tonnes (Fig. 8).

1.42 Even if such reductions appear at present to be unrealistic, there can be little doubt that the world, and developing countries in particular, will seek to expand its use of energy to fuel the engine of development. The scale of the problem was sketched for us by a witness from Atomic Energy of Canada, Mr. W.T. Hancox. The following scenario can be challenged on many grounds, such as the anticipated future world population or the potential ability of different forms of energy to meet anticipated needs. Any scenario of this kind is nevertheless useful in indicating the scale of the long-term problem involved in limiting global greenhouse gas emissions, while encouraging global development.

If annual carbon dioxide emissions are to be held at 1988 levels, the world will have to reduce its energy consumption by 100 percent by the year 2050. This is a very large reduction, and it is not clear how it can be achieved.

Electricity is at a relatively stable level, but it is estimated that it will account for 100 percent of the world's energy consumption by 2050.

For solar and wind, an ambitious target is to produce 100 million kilowatts per year, equal to the output of the world's nuclear power plants. Adding all of these together, the world's energy consumption in 2050 would account for only 40 percent of the world's energy consumption today. This leaves a shortage of 60 percent of the world's energy.

1.43 Whether or not such a scenario is realistic, it is clear that the world will face a major energy shortage by 2050.

(a) There will be a major energy shortage by 2050, and this will lead to a major expansion of energy production, particularly in developing countries.

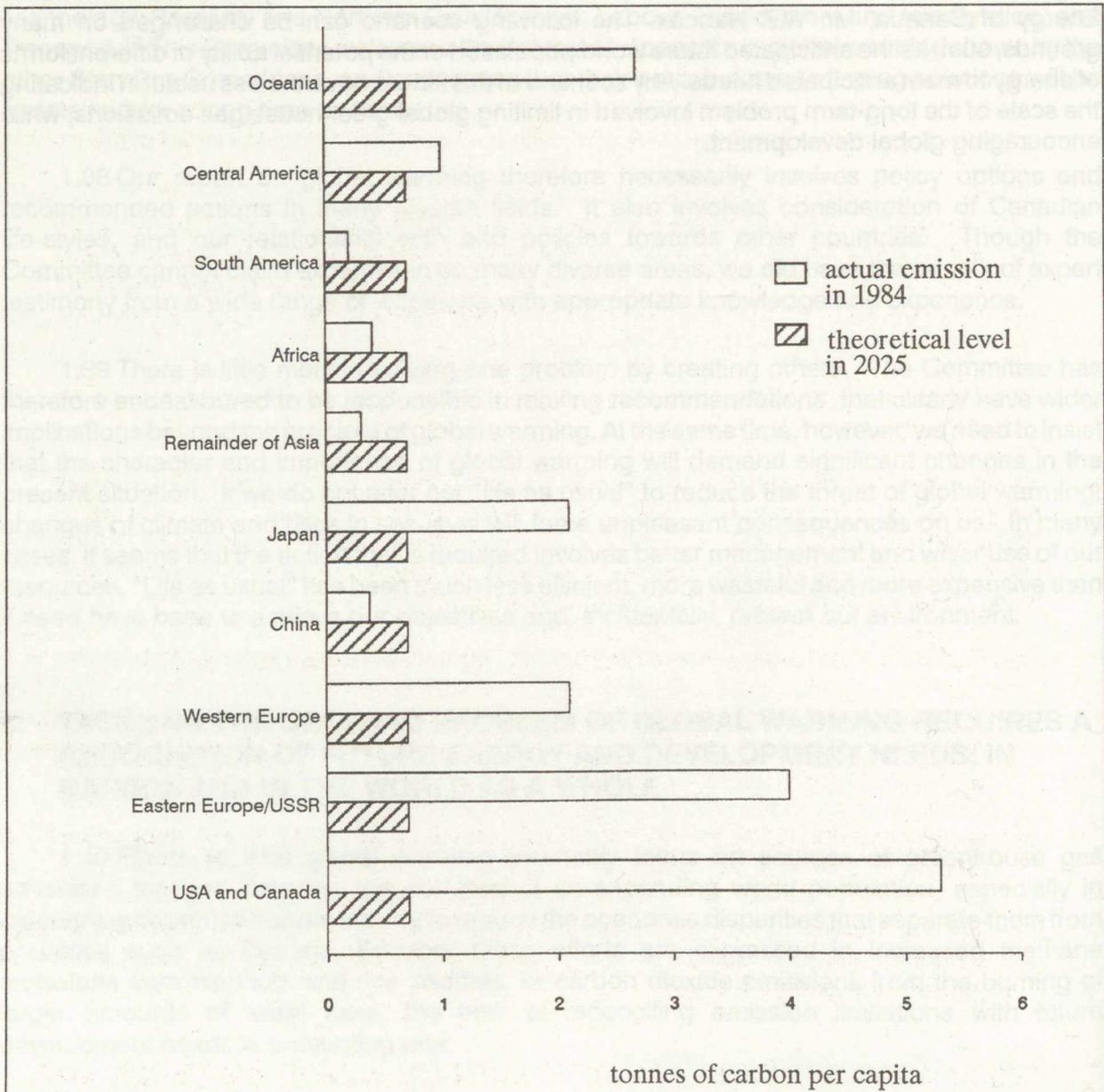
(b) Such expansion will lead to a major increase in greenhouse gas emissions, and this will lead to a major increase in global warming.

(c) The world community will have to take action to reduce greenhouse gas emissions, and this will lead to a major increase in global warming.

THE REPORT OF THE INTERNATIONAL PANEL ON CLIMATE CHANGE: THE SCIENCE OF CLIMATE CHANGE AND THE NEED FOR ADAPTING TO IT

1.44 We have already seen that the world is facing a major energy shortage by 2050, and this will lead to a major expansion of energy production, particularly in developing countries. This will lead to a major increase in greenhouse gas emissions, and this will lead to a major increase in global warming. The world community will have to take action to reduce greenhouse gas emissions, and this will lead to a major increase in global warming.

FIGURE 8: EQUAL PER CAPITA CO₂ IN 2025



Theoretical distribution of the total carbon emission of 5.2 GtC (level 1984) to equal emissions per head of world population in 2025.

GtC: gigatonnes of carbon (1 gigatonne = 1×10^9 tonnes)

Source: Evidence to the Committee from Dr. Bert Metz (Royal Netherlands Embassy)

To understand the size and nature of the challenge, I want to look briefly at a world population of 10 billion...

[L]et us assume the entire world will consume energy at a much smaller rate than the developed countries do today. Assume through energy efficiency and conservation measures we can achieve a rate that is only one-third of the current rate of North America, or one-half the rate for all the developed nations. Global energy demand resulting from a population of 10 billion people would then be about 1,000 exajoules* per year; that is, about three times today's level.

If annual carbon dioxide emissions are stabilized at 15 billion tonnes, or two-thirds of today's level, which environmental experts now believe is a level that can be tolerated, a practical limit on the use of fossil fuels is set at about 200 exajoules per year. This means a reduction of about 100 exajoules from the present level... [I]t is not unreasonable to assume hydroelectric production can be doubled to 50 exajoules per year...

Biomass is at a relatively mature stage of development, and its contribution could be reasonably doubled to 100 exajoules.

For solar and wind, an ambitious target would be a one hundredfold increase to 100 exajoules per year, equal to the sum of all the natural gas, hydro and nuclear energy produced today. Adding all of these together with what the environment could tolerate from fossil fuels accounts for only 460 exajoules per year, which is 35% higher than total energy consumption today... This leaves a shortfall of 540 exajoules per year.¹⁸

1.43 Whether or not such a scenario appears realistic, it seems undeniable that

- (a) there will be very strong pressures, especially from developing countries, for massive expansion of energy production, including sources that imply major increases in greenhouse gas emissions;
- (b) such expansion is likely to accelerate the rate of global warming, and consequently of climate change and sea-level rise;
- (c) the world community has scarcely begun to examine how the probable energy demands can be reconciled with the need to stabilize or reduce the level of greenhouse gas emissions.

F. THE REPORT IS CONCERNED WITH LIMITING GLOBAL WARMING, NOT WITH ADAPTING TO IT

1.44 We have observed already that the Earth is probably committed to a substantial amount of climate change and sea-level rise, as a consequence of the increase in atmospheric greenhouse gases that has already occurred. Since, in the foreseeable future, there seems no way of reversing such changes, it will therefore be necessary for Canadians and other inhabitants of the planet to adapt to these changes.

* 1 exajoule = 10^{18} joules

1.45 In this report, however, we are concerned overwhelmingly with *mitigation*, not with *adaptation*. Mitigation is the term used to cover measures that seek to avoid, reduce or delay global warming, by reducing those emissions of atmospheric gases that are of human origin or within human control.

1.46 We have no wish to minimize the importance of the adaptation that is likely to be necessary over the next 20 to 30 years and beyond, and this Committee may well decide to address the subject in a future report. There are, however, three main reasons why mitigation is our primary concern at present.

- (a) Mitigation is clearly the most urgent need, within Canada and at a global level. The atmospheric content of greenhouse gases already represents a carbon equivalent that is without precedent for the last 160,000 years or more, and it seems clear that, without decisive action, within a generation the global warming effect will have doubled by comparison with the pre-industrial period. As the title of our interim report declared, there is *No Time To Lose*.
- (b) Adaptation is not likely to be so easy as the word implies; the scale of the anticipated changes in climate and sea-level is potentially very disruptive. Much will depend on the speed of the changes; if mitigation measures can reduce the scale of change or extend the length of time over which it occurs, adaptation may be much easier.
- (c) Adaptation will take place primarily to local climate: individuals, communities and nations will need to adjust to the specific climatic situation in which they find themselves in the future. Scientific confidence in the character and impact of global warming is, however, at its weakest at present in regard to local climate. At present we can only speculate on the climate to which we must adapt, though it seems probable that more reliable regional climate scenarios will become available during the next 5-10 years.

1.47 It should be noted that the vast majority of the witnesses who appeared before us were also preoccupied with mitigation rather than adaptation.

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16. The preceding data are taken from Tables 24.1 and 24.2 in World Resources Institute, *World Resources 1990-91*, New York, Oxford University Press, 1990. (This source is hereafter cited as *World Resources 1990-91*.) The notes to these tables indicate the sources used, the methods used to estimate net atmospheric additions and carbon equivalents, and the reliability of the data.
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CHAPTER 2

POLICY CONSIDERATIONS

A. THE NEED FOR LEADERSHIP BY THE FEDERAL GOVERNMENT

2.1 In Toronto in June 1988, an international conference on "The Changing Atmosphere: Implications for Global Security" concluded that

Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war.¹

To avoid such consequences, national and international, will be difficult and time-consuming, but that is no reason for further delay. The longest journey begins with a single step.

2.2 On several occasions during our hearings, it was emphasized to us in very plain terms that Canadians look to the federal government for leadership on environmental matters, and especially on global issues such as protection of the ozone layer and global warming. In the Parliamentary Forum on Global Climate Change last April, the Committee was shown the results of recent public opinion polls; as we heard from Mr Miller (Synergistics Consulting Ltd.), these expectations were in marked contrast to the constitutional allocation of jurisdiction on environmental matters:

... 3 in 10 Canadians assign primary responsibility to the federal government for environmental protection. Immediately following that, however, they assign primary responsibility for environmental protection to individual Canadians...

Increasingly, Canadians are recognizing that they have a share of this responsibility. However, they are looking to the federal government for some leadership on this issue.... [W]ay down at the end of the chart are provincial governments, where only 5% of Canadians assign primary responsibility for the environment to provincial governments...

This is not saying that Canadians are looking to the federal government to do it. It is clear from quite a lot of different questions that Canadians are looking to the federal government for leadership of a collective action that involves everyone, including individual Canadians, provinces, and industry.²

2.3 A similar report came from a body that is extremely well aware of the allocation of powers, but which also sees the need for national leadership: the Federation of Canadian Municipalities. From a nationwide sampling of municipal officials on the subject of global warming, the Federation found that

There are two overall concerns, one of which is that the available information is not very good... Whether it is because Environment Canada does not have the money, they do not feel certain enough about what is going on so they do not want to publicize it, or whatever, there is just a general lack of solid information and solid prediction....

The other point that comes across from a survey of municipalities across Canada... And I do not want to get into any kind of political argument. No particular government was singled out and they were often as unflattering about provincial governments [as about] the federal government. There was a feeling that there is just an incredible lack of leadership from the top on environmental matters. Again, that may be a matter of public relations. It may be a matter of information ... The general feeling is that people in government are just not responding with the speed, diligence and determination that at least a lot of the evidence suggests would be appropriate. The problem is that lack of application, that lack of determination, is infectious. If the federal government does not seem to care whether automobile use and airplane use is increasing like crazy, why should we care? That is the feeling.³

2.4 We endorse the need for greater evidence of leadership, and we also hope that this should not get obscured by political disagreement. The 1988 conference in Toronto recommended that, as an initial global goal, carbon dioxide emissions should be reduced by approximately 20% of their 1988 levels by the year 2005. Effective action to achieve such reductions needs to be global in scope, and international negotiations to develop an effective convention and CO₂ protocol are just beginning. Meanwhile, CO₂ emissions, in Canada and many other countries, are *increasing*, not decreasing.

2.5 Other evidence from public opinion surveys reported to the Parliamentary Forum reinforces our belief that stronger and more visible national leadership on the global warming issue will be generally welcomed:

[We asked] a related question, to show you that Canada is on the leading edge of concern and willingness to pay. Only 15% of Canadians are unwilling to pay more for environmental protection, and 42% identify a surtax or personal income tax as their preferred mechanism.

That is one indicator. We also find that Canadians are increasingly expecting major change in their own lifestyles. We asked them:

To what extent do you think the way that we as individual Canadians live will have to change in order to take a more environmentally sustainable track?

... 51% of Canadians expect major change in the way they live, in their lifestyle; 4 in 10 identify that moderate change is coming. These are significant findings.⁴

B. THE NEED FOR BETTER INFORMATION

2.6 In our interim report, this Committee urged that

If Canadians are going to accept far-reaching changes in the patterns of energy use that policies to combat global climate change will require over time, they must be well informed about the need for these changes and the benefits that can accrue from such policies. Communicating information to the public is a vital element of federal policy-making.⁵

2.7 It seems evident to us that good information is not being widely disseminated in Canada. Thanks to the media—and some unusual weather situations in recent years—we suspect that practically every Canadian has heard of the greenhouse effect and global warming.

Yet there seems to be a great gap between this superficial awareness and an adequate understanding of the causes and implications of global warming. For example, we were faced at the outset of this report by the surprising situation that 3 Canadians in 10 believe at present that global warming will be beneficial (para. 1.12).

2.8 How widely is it known that Canada contributes more greenhouse gases to the atmosphere *per capita* than any other major country? How many are aware of the major contributions to global warming from methane and CFCs in Canada? How many Canadians are aware of the natural and anthropogenic sources of methane: landfills, ruminant animals, gas pipelines, muskeg, etc.? How many appreciate that global warming involves changes in climate that go far beyond simple rises in temperature?

2.9 We do not wish to appear to be suggesting that all Canadians need to acquire some basic level of knowledge on the greenhouse effect: that they should achieve a passing grade in "Global Warming 101". It is however clear to us that there is a significant demand for information that is not being met adequately at present. If municipal officials complain that they cannot find the information and advice needed to guide their professional activities, then there is little likelihood that the general public is well served. We know that the Canadian Climate Centre of Environment Canada has been active in producing fact sheets and other material on global warming, but it seems clear that this material does not go far enough, especially in terms of its distribution.

2.10 It is, after all, only natural that Canadians should have a strong desire to know more about trends that could have significant social and economic implications within the space of a generation. In our interim report, we also pointed out that

[P]ublic information and education are not ends in themselves.... [P]ublic opinion is often well in advance of government policy. A better informed populace can become a strong advocate of new policy and can pressure governments to make changes that they might otherwise be reluctant to carry forward.⁶

Therefore, as stated in our interim report,

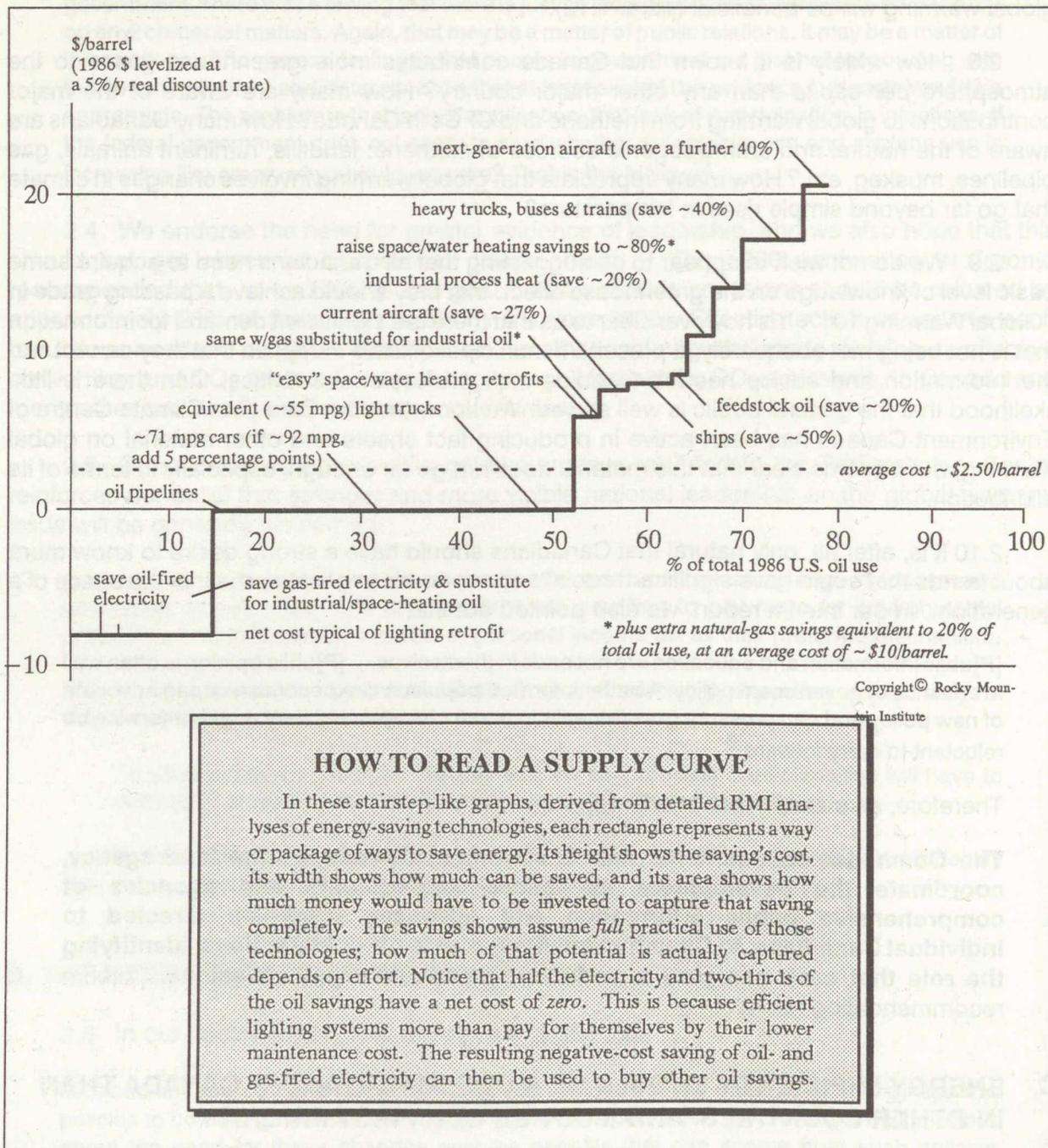
The Committee recommends that Environment Canada, as the lead agency, coordinate the development by federal departments and agencies of comprehensive public information and advocacy programs directed to individual Canadians, to Canadian business and to other institutions, identifying the role that each can play in reducing greenhouse gas emissions. (Interim recommendation no. 4)

C. ENERGY EFFICIENCY SHOULD BE MORE IMPORTANT IN CANADA THAN IN OTHER COUNTRIES, AND MUST BE OUR FIRST PRIORITY

2.11 On several occasions during our hearings, witnesses suggested to us that, although Canada's *per capita* energy consumption is very high when compared to other countries, this is understandable and necessary because of Canada's geography and climate. In other words, more energy is required than in other countries to heat our buildings, and in travel across the huge distances that separate Canadian towns and cities.

FIGURE 9: OIL EFFICIENCY SUPPLY CURVE

An estimate of the technical potential to displace U.S. oil consumption

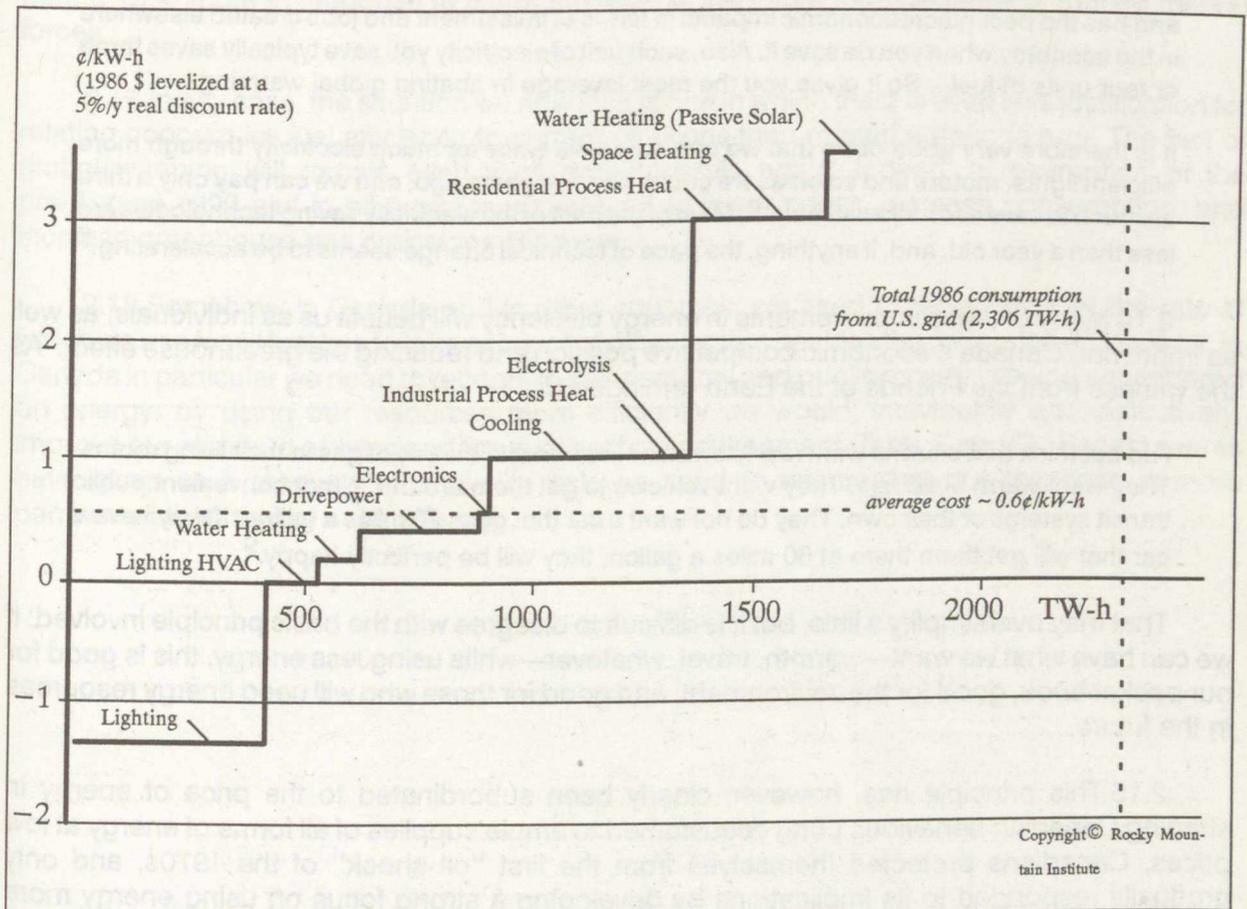


HOW TO READ A SUPPLY CURVE

In these staircase-like graphs, derived from detailed RMI analyses of energy-saving technologies, each rectangle represents a way or package of ways to save energy. Its height shows the saving's cost, its width shows how much can be saved, and its area shows how much money would have to be invested to capture that saving completely. The savings shown assume *full* practical use of those technologies; how much of that potential is actually captured depends on effort. Notice that half the electricity and two-thirds of the oil savings have a net cost of zero. This is because efficient lighting systems more than pay for themselves by their lower maintenance cost. The resulting negative-cost saving of oil- and gas-fired electricity can then be used to buy other oil savings.

Source: Rocky Mountain Institute, *Newsletter*, Fall 1989

FIGURE 10: ELECTRICAL EFFICIENCY SUPPLY CURVE
 An estimate of the full practical potential for retrofit savings of U.S. electricity



Source: Rocky Mountain Institute, *Newsletter*, Fall 1989

2.12 There is clearly some truth in this proposition, but it seems to the Committee that it obscures a much more important truth. It is precisely because of these climatic and geographical constraints that Canadians should have a strong desire to get the most use out of each unit of energy consumed: to "get the biggest bang for the energy buck". Our attempts to do this in the past have been half-hearted and intermittent. As Mr. Eric Haites told us,

Canada will need stronger and more comprehensive efficiency standards for vehicles, appliances, buildings and energy-using equipment. Canada's vehicle emission standards are below those of the United States, and Canada has not yet adopted appliance efficiency standards. Our past efforts to stimulate adoption of energy efficient facilities and equipment have not been notably successful, with the possible exception of automobiles.⁷

2.13 This view was reinforced by another witness, Mr. Amory Lovins.

I want to emphasize electricity..., because electricity is an extraordinarily capital intensive form of supply. It is therefore the costliest form of energy we use. So it is the most lucrative to save and has the best macroeconomic impacts in terms of investment and jobs created elsewhere in the economy when you do save it. Also, each unit of electricity you save typically saves three or four units of fuel... So it gives you the most leverage in abating global warming...

It is therefore very good news that we can now save twice as much electricity through more efficient lights, motors and so on as we could, say, five years ago, and we can pay only a third as much to save each kilowatt hour.... Most of the best of the electricity saving technologies are less than a year old, and, if anything, the pace of technical change seems to be accelerating.⁸

2.14 Many of these improvements in energy efficiency will benefit us as individuals, as well as improving Canada's economic competitive position and reducing the greenhouse effect. As the witness from the Friends of the Earth reminded us,

I do not think that citizens want raw kilowatt hours or cubic metres of gas in their living rooms. They want warm buildings. They want vehicles to get them around, either convenient public transit systems or their own. They do not want a car that goes 20 miles a gallon. If they have a car that will get them there at 60 miles a gallon, they will be perfectly happy.⁹

That may oversimplify a little, but it is difficult to disagree with the basic principle involved: if we can have what we want—warmth, travel, whatever—while using less energy, this is good for our pocket book, good for the environment, and good for those who will need energy resources in the future.

2.15 This principle has, however, clearly been subordinated to the price of energy in shaping Canadian behaviour. Long accustomed to ample supplies of all forms of energy at low prices, Canadians protected themselves from the first "oil shock" of the 1970s, and only gradually responded to its implications by developing a strong focus on using energy more efficiently. Ten to fifteen years ago there was a strong desire in Canada to improve our energy efficiency: we insulated our houses, insisted on more fuel-efficient cars and installed solar panels on our roofs. Then the price of oil fell, and we lost interest. We also lost a decade.

Ten years ago we were world leaders in energy efficiency in certain sectors. People came from all over the world to look at subdivisions of houses being built in Saskatoon that required 15% of the typical amount of energy of conventional mid-1970s housing. Construction of office buildings was going on that was at the leading edge world-wide in terms of energy efficiency. We had a lot of momentum and we lost it all.

We are now worse off than we were ten years ago because others have caught up and moved ahead ... We dropped the ball in energy efficiency and in reduction of energy intensity, and that correlates rather closely with the 75% reduction in federal spending on energy efficiency between 1984 and 1988. We have some catching up to do.¹⁰

2.16 Recently, energy conservation and energy efficiency have become priorities once again. This revival of interest may however be even more fragile and ephemeral than that of a decade ago, since there is no global shortfall in oil production at present, and oil prices rose during 1990 more in response to alarm and fear of the future than because of normal market forces.

2.17 In any case, the situation we now face is one in which there is even less justification for relating concern for fuel efficiency to current oil prices than existed a decade ago. The fact of global warming will remain even if oil prices tumble again. Indeed, a resumption of the pre-August 1990 glut in oil supplies would tend to lower prices, increase consumption, and increase greenhouse gas emissions still more.

2.18 Somehow, in Canada and in other countries, we need to recognize that the rate at which we use fossil fuel has to take account of other factors besides the spot price of crude oil. In Canada in particular we need to recognize that personal and public money is being squandered on energy: by using our resources more efficiently we would, individually and collectively, improve our standard of living and the quality of our environment (Table E and F). Recent events have given us a renewed incentive to act; we need to ensure that our response is more permanent than that of a decade ago.

TABLE E
Some Key Areas of Potential for Increased
Energy Efficiency in Canada

Sector	End-Use	Measures	Sample Technologies	Efficiency Potential*
RESIDENTIAL	Space Heating & Cooling	- building shell improvements - heating system efficiency improvements	- insulation - seating - superwindows	53%
	Appliances	- more efficient appliances	e.g.- insulation - bulbs - motors	30%
COMMERCIAL	Space Conditioning	- building shell improvements - better controls	- insulation - seating - integrated control systems	53%
	Lighting	- improved lighting systems	- bulbs	60%
	Motors	- improved motors	- drives, controls efficient motors	35%
INDUSTRIAL	Process Heat	- heat recovery - improved heating systems	- insulation - cascading - advanced heating systems - cogeneration	32%
	Mechanical Drive	- improved motors	- variable speed drives - linkage systems - more efficient motors	22%
TRANSPORTATION	Auto/Bus		- weight and size reductions	45%
	Trucks		- improved aerodynamics	35%
	Rail	- vehicles efficiency	- improved engine efficiency	38%
	Air	- higher load factors	- reduced rolling resistance	40%
	Marine		- variable speed transmissions	35%

* Rough estimates, averaging across new and existing buildings, processes and activities

Source: Evidence to the Committee from Prof. John Robinson (University of Waterloo)

TABLE F
Energy Efficiency and CO₂ Reduction in Canada

Sector	End-Use	Efficiency Potential (%)	Contribution to CO ₂ Emissions (%)	Weight	Weight as Percentage
RESIDENTIAL	Space Heating and Cooling	53%	20%	11	26
	Appliances	30%	2%	1	1
COMMERCIAL	Space Conditioning	53%	11%	6	14
	Electricity Specific*	48%	1%	0	1
INDUSTRIAL	Process Heat	32%	26%	8	21
	Mechanical Drive	22%	9%	2	5
TRANSPORTATION	Auto/Bus	45%	19%	9	21
	Trucks	35%	7%	2	6
	Rail	38%	1%	0	1
	Air	40%	2%	1	2
	Marine	35%	1%	0	1
TOTAL			100%	40	100

Notes 1. $Weight = Efficiency\ Potential \times Sectoral\ Contribution\ to\ CO_2\ Emissions \times 100.$

2. Excludes energy supply sector.

Source: Evidence to the Committee from Prof. John Robinson (University of Waterloo)

D. IN ASSESSING EXISTING ENERGY AND ENERGY ALTERNATIVES, KNOWLEDGE OF THE FULL COSTS INVOLVED IS ESSENTIAL

2.19 One of the significant changes that has taken place during the last decade or so, apparent in much of the evidence presented to the Committee, has been a growing confidence that new and sustainable energy systems, like energy conservation, can compete successfully with traditional forms of energy based on fossil fuels. This confidence is, however, matched by a widespread recognition that successful competition is prevented by an array of visible and hidden subsidies to traditional energy systems.

2.20 There is no doubt that proponents of alternative energy technologies, and organizations that see these technologies as environmentally desirable, have a much greater confidence in market forces than was evident in the past. As one of our witnesses, Amory Lovins, has written,

[T]he biggest evolution in my thinking over the fifteen years since the first modern oil shock has been an increased respect for how well even very imperfect markets can work. Efficiency and renewables have swept the U.S. energy market *despite* a formidable array of officially erected obstacles meant to achieve the opposite result...

Today... it is we former "technological pessimists" who are pointing out that new technologies ...have indeed proven far more powerful than anyone, including us, thought possible.¹¹

And, as one of the witnesses from Friends of the Earth told us,

... in the area of energy supply I think you would find that environmentalists are very much in favour of the free market. We would like energy to be provided at the least cost to society.¹²

2.21 Unfortunately, we heard much evidence which indicated that alternative energy systems, which could contribute to reducing global warming, are at a disadvantage in the present situation in Canada. There seem to be at least five different types of inequity.

- (a) *Encouragement of major fossil fuel developments through federal and other subsidies.* The consortium of environmental, conservation and aboriginal groups which prepared the *Greenprint for Canada* document urged that existing and proposed subsidies to such projects as Hibernia, Lloydminster Upgrade and OSLO (Other Six Leases Operation) should be reconsidered:

On the one hand they are environmentally destructive in numerous ways, not just contributing to the global warming problem but in other ways as well, and in addition they are basically unfair from a free market point of view. They are unfair to energy conservation corporations that want to achieve energy efficiency but cannot because the supply side is being so heavily subsidized.¹³

2.22 Several witnesses who commented on subsidization of these supply megaprojects recognized that they had regional development and other implications as well. However, as Professor Robinson observed,

I do not have a lot of trouble with a strategic decision by the government that a certain project should be supported for a whole bunch of non-economic reasons. I do have trouble when it is combined with an adherence to a kind of market-based philosophy used to exclude the same kind of treatment for other options, like demand side...

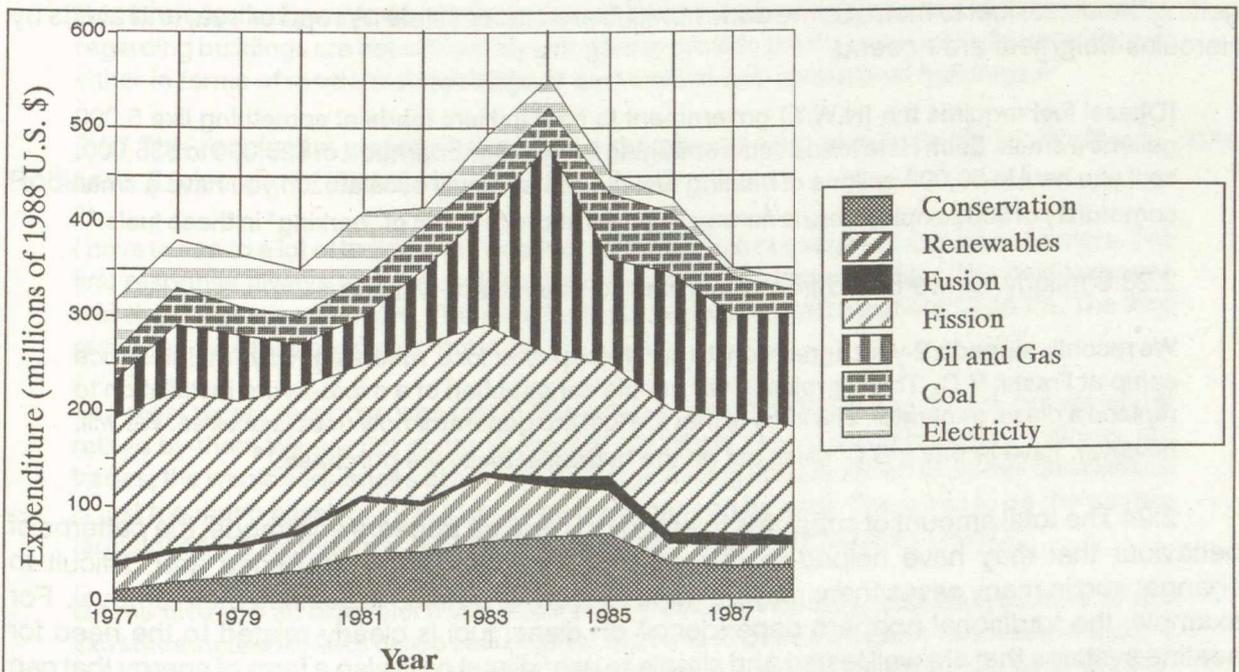
I would just like to see a little more symmetry.... We know the demand side will be faster, cheaper, easier and better for the environment. So it is the asymmetry that bothers me more than the mere fact of subsidization.¹⁴

(b) *Hiding the true cost of energy decisions by the consumer.* It was argued, for example, by a witness from the Solar Energy Society of Canada that a 20-kilowatt electric system for domestic heating would cost a Nova Scotia homeowner about \$2000, but that this will necessitate a much greater expenditure by the electricity utility at the margin to provide the supply capacity needed. In contrast, those who heat by oil or by solar systems pay all or most of the costs associated with the provision of these systems.

(c) *Attitudes and managerial decisions that favour fossil fuels.* As Mr. Jeff Passmore told us,

If a utility is going to build a power plant, the power plant is financed publicly. If an individual wants to put energy efficiency into his home, he is expected to pay for it himself. Simultaneously, the power plant is depreciated over 40 years, but Ontario Hydro, for example, depreciates energy conservation initiatives over 5 years.... So there are all kinds of areas where the incentives—and I am not talking about financial incentives here, I am just talking about institutional incentives—are contrary to going the efficiency route.¹⁵

FIGURE 11: GOVERNMENT EXPENDITURES ON ENERGY R,D&D IN CANADA BY TYPE, 1977-1988, MEASURED IN CONSTANT 1988 U.S. DOLLARS



Note: The category "Electricity" includes electricity conversion and transmission R,D&D, energy storage and energy systems analysis.

Source: Organisation for Economic Co-operation and Development, International Energy Agency, *Energy Policies and Programmes of IEA Countries: 1988 Review*, Paris, 1989, p. 97-105.

(d) *Declining support for energy research, development and demonstration (R,D&D) in general, and proportionately greater cuts in support for conservation and renewables.* As indicated in Figure 11 reproduced from our interim report, governmental support for conservation and alternative energy R,D&D in Canada waned after the mid-1980s, as the price of oil fell. As we stated in our interim report, this complacency was short-sighted; it stemmed from a failure by policy-makers to take a strategic, long-term and holistic view of the environmental, economic, social and political impacts of global energy development. The need to restore a vigorous R,D&D program in energy conservation and alternative energy development remains manifest.

(e) Finally, there are inequities that seem *accidental or inexplicable*. Two of the examples offered to us concerned the high energy costs facing northern communities and activities. Mr. Passmore again:

Solar electricity goes head-to-head with diesel fuel in remote communities in northern Canada. Diesel fuel is tax exempt for the generation of electricity and photovoltaics is not. Automatically photovoltaics in 13.5% more expensive.¹⁶

This occurs in situations where (as we were told by the witness from the Government of the Northwest Territories), the price paid by northern residents may bear no relation to the cost of getting the diesel fuel to them. Some communities are inaccessible by road or sea, and airlifts by Hercules freighters are needed.

[D]iesel fuel requires the [N.W.T.] government to haul in Herc loads at something like 5,000 gallons a crack. Each Herc load costs something in the neighbourhood of \$25,000 to \$35,000, so if you haul in 50,000 gallons of heating fuel the costs rapidly escalate... If you have a small community of 300 people, there is no way they can afford the cost of "herking" in these fuels.¹⁷

2.23 Similarly, as we heard from the Yukon Government witness:

We recently signed a 2-year agreement to purchase power for a Yukon highways maintenance camp at Fraser, B.C. This .. project .. will enable construction of a micro-hydro installation to replace a diesel generator. The irony is that the fuel the generator now uses is tax-free. We will, however, have to pay a B.C. sales tax on the hydroelectricity we purchase.¹⁸

2.24 The total amount of subsidies to energy in Canada appears enormous; the patterns of behaviour that they have helped to bring about are often long-established and difficult to change; and in many cases there may be good reason for caution in seeking their removal. For example, the traditional northern dependence on diesel fuel is clearly related to the need for heating systems that are well tested and simple to use; diesel oil is also a form of energy that can be stored indefinitely.¹⁹ Similarly, there may be good grounds for encouraging research and development in energy systems of different kinds, in view of the task that lies ahead: how to reconcile national and global trends in energy use with the need to reduce greenhouse gas emissions. Nevertheless, there do seem to exist substantial and unnecessary inequities which hinder the use of energy systems that could help to reduce global warming. Choices about energy use are made, both by society and by individuals, without taking into account the full costs of those decisions on either the economy or the environment. There is an obvious need for energy accounting that recognizes both internal and external costs of different systems.

E. WE CAN MAKE SUBSTANTIAL PROGRESS IN REDUCING GREENHOUSE GAS EMISSIONS IF WE UNDERSTAND HOW PEOPLE BEHAVE

2.25 A large number of witnesses, with very different interests and experience, concurred in the view that public responses to incentives to reduce greenhouse gas emissions (e.g. by reducing residential energy consumption) could not be estimated using normal cost-benefit methods. Even when non-economic considerations, such as comfort and convenience, are taken into account, consumer behaviour may appear irrational or perverse. Our witnesses were extremely helpful in explaining the logical reasons that frequently shape such behaviour, and in showing how novel approaches could satisfy the consumer and achieve environmental objectives.

2.26 The broad problem was identified early in our hearings by Mr. Eric Haites, the author of an influential study on opportunities for controlling carbon emissions in Canada. When asked why few people chose to benefit from the experience already gained in building low-energy houses, he replied:

The phenomenon of those demonstration projects not being adopted more widely is one that has been studied in some depth. The main conclusion I am aware of is that people are somewhat reluctant to change unless they are forced to change or they have some strong incentives to change. We are still in that situation where the energy prices and the regulations regarding buildings are not sufficiently stringent to provide the incentive for builders to change either in terms of residential dwellings or commercial and institutional buildings.²⁰

2.27 The residential energy aspect was developed very convincingly by Professor John Robinson (University of Waterloo):

I have talked to a lot of builders in Waterloo, and there is a sequence of attitudinal barriers. The first response always was that it does not work. That was ten years ago. The next response was that it was too expensive. Then you point out that you are talking about 5% to 7%. The third response was that people do not want it.

The most recent response was that in 20 years we are going to have to do this, but we will be retired by then. We are not going to change our whole way of doing business, training, our trades, the whole sequences of how we do things, telling the electrician to do this differently. It is just too much hassle..... It is just not going to happen by itself. There has to be the push in terms of codes, standards, etc., for things to really happen in housing I think...

Let me give you an example. If you build energy-efficient housing, basically you have to use 2x6 studs instead of 2x4s or two sets of 2x4s. You have to use 6 mil vapour variance instead of 2 mil and you have to overlap from stud to stud and use acoustic [sealant]. You have to put in special outlet vapour barrier boxes and so on. This means that all of your trades have to be re-educated. The electricians have to do things differently; the drywall guys have to do things differently—everything. Why would any builder go through that if he does not have to?²¹

2.28 It is not merely a problem of the suppliers of housing being unwilling to supply a more energy-efficient product. There is also good evidence that the purchaser is often reluctant to pay the additional 5% to 7% required to cut energy consumption down to 10% to 20% of what is typical at present. As the witness from the Department of Finance pointed out

One of the things we know about private consumers—it is different with companies and with larger users who are more skilled at doing the analysis on the real economics of their purchases—who are buying cars, building houses and so on, is that they typically give far too much emphasis to the up-front capital cost of something as opposed to its lifetime cost. So people will tend to underinvest in insulation, energy efficiency, or lighting systems even if the message is there...²²

2.29 As Amory Lovins reminded us, the consumer is not necessarily being illogical in this decision. Buying a house is typically an occasion when personal finances are stretched to the limit, and making an additional investment in energy saving can well be considered “a difficult, risky use of very scarce discretionary capital.”²³

2.30 Our witnesses also indicated ways in which this apparent *impasse* could be circumvented. Professor Robinson pointed out that it was normal in Canada for mortgage payments to include PIT—principal, interest and local taxes. A mortgage that also included energy payments—PITE—would mean only a small addition to the mortgage payments in an energy-efficient home, and a much smaller payment each year than the homeowner would pay for PIT plus energy costs in a typical residence today.

2.31 Several witnesses also drew the Committee’s attention to recent experience in the United States, where it has been recognized that electrical utilities have a strong financial incentive to reduce the growth in energy demand. The utility can then become the agent for retrofitting, and not just in regard to electricity use.

I wonder how you would feel if your utility company...came in and said not to worry about what switch you should have on your furnace, not to worry about whether you should put more insulation in the walls or in the ceiling or if you should be sealing your windows, just leave it to them. They will install it all: you do not have to pay a penny. They will monitor it afterwards and will provide some follow-up guarantee: we are your utility company; we are not a fly-by-night operation; we are going to be around. Now that is a fairly big incentive because your bill goes down next year and you do not pay a penny. That is exactly the kind of program that a bunch of utilities are already doing around North America. That is the kind of program that is irresistible.²⁴

2.32 There are, of course, significant differences between Canadian and United States electricity utilities, especially in regard to the sources of energy used to generate electricity, and their costs. As indicated later (paras. 5.13-5.14) there are also substantial differences within Canada. Nevertheless, the suggestion that electrical utilities could play a much greater, and more comprehensive, role in energy conservation does seem “irresistible”, and the Committee returns to this suggestion in the context of its own recommendations (paras. 4.35-4.40).

2.33 The Committee is more doubtful about whether electric utilities and other energy suppliers in Canada have reached a similar stage in re-evaluating their contemporary role as those in the United States that were mentioned by witnesses. The electric utilities that gave evidence to us seemed to see their mandates as limited primarily to providing supply adequate for demand:

The philosophy that gears the company is still one that says when someone goes to the light switch and turns it on, the lights will come on. It is one of meeting customer needs and we do not have any control over those...²⁵

The Committee recognizes that Ontario Hydro, the utility just quoted, does nevertheless have an expanding demand management program. However other utilities seemed to doubt both the desirability or potential effectiveness of demand management, and they would have liked to doubt the reality of global warming.

2.34 Mr. Haites is clearly correct: people are reluctant to change unless forced to do so or unless they have some strong incentives. What this Committee finds disturbing is that what seems to be required most is not a change in the lifestyles of all Canadians, but a change in the way that some key sectors and institutions—such as energy suppliers, mortgage institutions, builders—interpret their missions. Meanwhile, in the words of Professor Robinson,

We are building sieves. They are going up, and the day they are built they are obsolete from an energy point of view.²⁶

F. CANADA'S ENVIABLE INTERNATIONAL REPUTATION ON ENVIRONMENTAL ISSUES IS THREATENED BY AN APPARENT RELUCTANCE TO ACT ON CARBON DIOXIDE EMISSIONS

2.35 Canada has long been a vigorous and respected advocate of action on international environmental issues, especially since the Stockholm Conference on the Human Environment in 1972. On issues such as marine pollution, acid rain, ozone layer protection and urbanization, Canada has taken strong and enlightened positions, and has backed them up with national action.

2.36 In regard to global warming, our role has seemed less consistent. In terms of research, especially on the potential impacts of global warming and through the development of Environment Canada's global climate model, our national effort has more than matched those of other countries. The 1988 international conference in Toronto drew national and worldwide attention to the problem, and gave strong encouragement to the subsequent work of the Intergovernmental Panel on Climate Change. And yet, faced with the uncomfortable fact that Canada's *per capita* contribution to greenhouse gas emissions is higher than that of any other major country, the national action that has been taken so far is widely perceived to be tentative and inadequate. Our Committee was told this in fairly blunt terms by two Canadians who have recently returned from international vantage points. First, the former secretary-general of the Brundtland Commission, Jim MacNeill:

I attend a lot of international meetings. I am often reminded by my foreign friends that we are the energy guzzlers of the world. North Americans consume more than twice as much energy per capita and per unit of product than Japan and most west European countries. In the process, we produce more acid rain and more global warming. On atmospheric pollution ... we are the environmental bad boys of the industrialized world, and the rest of the world knows it. When I hear statements that we in Canada are world leaders on the environment, I cringe with embarrassment.²⁷

Secondly by Jim Bruce, recently returned from the World Meteorological Organization in Geneva:

Canada has for a number of years been a respected international leader on environmental issues...

What made us leaders on these issues? I think there are two main factors. First of all we had excellent science.... We brought to the table the best scientific understanding based on sound environmental measurements and research, and practical solutions for addressing the issues....

Secondly, we had wise and defensible policies at home to address the issues....

On the issue of global warming and the protection of the global atmosphere how does Canada stand?...

On the scientific side we are in a respectable but, I would think, underfunded position, with some excellent work going on, but generally inadequate support and inadequate contributions internationally. But we are not in too bad shape.

On the second requirement, having wise and defensible policies at home, my impression is that we are in serious disarray. The trends are ominous. First of all, we have no target or commitment to CO₂ emission reductions; secondly we seem to be pursuing policies leading to ever-increasing wasteful burning of hydrocarbons, with our industry becoming less and less energy efficient and competitive. We are followers and not leaders on auto emission controls; we appear to have turned our backs on supporting promising technologies for alternative renewable energy sources, and in doing these things are essentially ignoring our responsibility to protect the planet's atmosphere and planet for ourselves and future generations.²⁸

2.37 Foreign witnesses conveyed a similar message, although in more diplomatic language. The representative of the Government of the Netherlands has already been quoted (para. 1.28); the following comments are those of the witness from the Worldwatch Institute in Washington, D.C.

I do know that in Canada as well as in the United States, many of the very good energy conservation and renewable energy programs during the 1970s and 1980s have dwindled or in some cases disappeared. As I have already indicated, that is definitely turning around in the United States. We will in a period of two years see a 30% to 50% increase in budgets for both renewables and energy conservation in the United States....I would hope to see Canada moving in that direction as well. I realize it may be politically uncomfortable to revive something so soon after you have eliminated it, but I just do not see how you are going to develop energy efficiency and renewable energy sources without getting those kinds of programs going and indeed making them even stronger than they were during their peak period in the 1980s....

The reason I say that Canada has apparently sat on the sidelines is that I do not see either in the internal cable traffic that I have seen or certainly in any public pronouncements by key Canadian officials any indication that Canada has firmly joined one camp or another. Maybe there is one foot in each camp.²⁹

2.38 If that is how Canada appears at present from an international perspective, there are some other considerations that need to be kept in mind. The Committee emphasized in Chapter 1 that effective action on global warming involves much more than adoption of a specific target; it

will involve substantial commitments across Canada's economy and society and at all levels of government, especially in regard to energy use. The work currently being undertaken, through federal, provincial and territorial consultative mechanisms by both energy and environmental ministries, may appear time-consuming, but it is unavoidable.

2.39 Another reason for linking Canada's commitments to those achieved internationally was provided by the representative of the Government of Sweden:

In environmental policy I think for many years it has been thought that before we go out internationally we have to do something ourselves, otherwise not very many people will believe in this policy. That was done when it came to sulphur dioxide, nitrous oxides, and in other areas. So we were prepared to take action in Sweden before we advised somebody else to do something...

The issue of global warming is somewhat different.... You have to do it together with other people. To do something on your own just for show, I do not think that would have any meaning. In my view at least, you must say that you are prepared to do it, but it has no meaning if nobody else does it.³⁰

2.40 The moment when Canada must make clear which camp it belongs to is now at hand. International negotiations have begun on an international convention on global warming, and on the protocols to make it effective. Canada's delegates need to say what Canada is prepared to do.

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TARGETS FOR EMISSIONS REDUCTIONS

- 23. Vol. 38, p. 55.
- 24. Vol. 24, p. 54.
- 25. Vol. 25, p. 68.
- 26. Vol. 24, p. 59.
- 27. *Parliamentary Forum*, p. 53.
- 28. Vol. 30, p. 36.
- 29. Vol. 31, pp. 11-12, 43.
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THE NEED FOR EFFECTIVE, REALISTIC, AND SPECIFIC TARGETS

The Commission believes that a 20-year period for Canada would be a just and realistic period for the implementation of these targets and emissions by specific dates. One option would be to have the targets implemented in 10-year increments, with the first 10-year period starting in 1990. A second set of targets should be implemented in 1995, and a third set in 2000. The Commission is particularly concerned with targets and emissions for the period 10-15 years, because it is the period that these markets should effectively be responding to.

- 2.1 The targets that Canada adopts should therefore be effective, realistic, and specific, in that the emission limitations adopted by Canada would make a significant and appropriate contribution to solving the global problem.
- 2.2 In that there are grounds for believing that the targets adopted by Canada can be achieved within the period specified.
- 2.3 The targets should be defined in unambiguous and measurable terms, so that progress can be made in and eventual success or failure can be clearly identified.

2.4 A comparison for targets that most have a target is a target of 100% reduction in greenhouse gas emissions, and a target of 100% reduction in greenhouse gas emissions. The Commission believes that the target of 100% reduction in greenhouse gas emissions is a target that is realistic and achievable. The Commission believes that the target of 100% reduction in greenhouse gas emissions is a target that is realistic and achievable. The Commission believes that the target of 100% reduction in greenhouse gas emissions is a target that is realistic and achievable.

B. TARGETS FOR ALL GREENHOUSE GASES

2.5 As a result of the ambiguity was identified in Chapter 1, the Commission believes that the Commission should also consider whether the targets set out in the report, in Canada and elsewhere. The Commission believes that the targets set out in the report, in Canada and elsewhere. The Commission believes that the targets set out in the report, in Canada and elsewhere.

CHAPTER 3

TARGETS FOR EMISSIONS REDUCTIONS

A. THE NEED FOR EFFECTIVE, REALISTIC, AND SPECIFIC TARGETS

3.1 The Committee believes that it is self-evident that Canada needs to adopt specific targets for limitation and reduction of greenhouse gas emissions by specific dates. One target, or set of targets, should be determined in terms of what can feasibly be achieved on a short- to medium-term perspective: say, 10 to 15 years into the future. A second set of targets should be determined in terms of what is needed in the long term to arrest or reverse the process of global warming. In this report the Committee is primarily concerned with targets and strategies for the next 10-15 years; however, we recognize that these must contribute effectively to achieving the long-term goal.

3.2 The targets that Canada adopts should therefore be *effective, realistic, and specific*:

- effective, in that the emission limitations adopted by Canada must make a significant and appropriate contribution to solving the global problem;
- realistic, in that there are grounds for believing that the targets adopted by Canada can be achieved within the period specified;
- specific, in that they are defined in unambiguous and quantitative terms, so that progress can be monitored and eventual success or failure can be clearly determined.

3.3 A prerequisite for targets that meet these criteria is a system of measurement that is accurate, unambiguous, and adequate in terms of both spatial coverage and time series. The need for this might seem to go without saying; it is, however, easy to forget that discovery of the "ozone hole" in the antarctic stratosphere was almost accidental. Similarly, much of the incentive to investigate global warming came from observations of atmospheric CO₂ concentrations at only two sites, in Hawaii and the Antarctic. As the Committee notes later (paras. 4.9 - 4.16) there is a major discrepancy in estimates of methane emissions by the Canadian oil and gas industry that has substantial implications for Canada's strategy to limit greenhouse gas emissions. The Committee strongly **recommends** that Canada implement immediately a National Program of Greenhouse Gas Emissions Measurement and Source Identification, and that the data be tabled annually in Parliament.

B. TARGETS FOR ALL GREENHOUSE GASES

3.4 Another source of ambiguity was identified in Chapter 1 (paras. 1.19 to 1.21); it was latent in much of the testimony that the Committee received and is also evident in much of the literature on proposed targets, in Canada and elsewhere. Frequently it is not easy to determine whether a proposed target refers to reductions in carbon dioxide emissions, or to reductions in carbon equivalents, i.e. considering all major greenhouse gases.

3.5 The Committee has no doubt that targets should be set in terms of carbon equivalents. Carbon dioxide is only one of the main greenhouse gases, although at present it is the largest single contributor to global warming, both in Canada and worldwide. Efforts to limit global warming should be directed at all the greenhouse gases that cause this warming. Successful measures in response to one or more gases should not be used as a reason for reduced efforts in regard to other emissions.

C. DEFINING THE TASK: A CHOICE AMONG SCENARIOS

3.6 Before considering possible targets for Canada, it is necessary to define the scale of the effort required, globally and during the next 30-50 years, if the atmospheric concentrations of greenhouse gases are to be stabilized and then perhaps to be reduced. The Intergovernmental Panel on Climate Change (IPCC) reported to the World Climate Conference in 1990 that:

Even if we were able to stabilise emissions of each of the greenhouse gases at present day levels from now on, the temperature is projected to rise by about 0.2°C/decade for the first few decades.

The rates of change of global temperature predicted from a Business-as-Usual case is in the range 0.2 - 0.5°C/decade. These are global mean estimates; on a regional level, changes could be substantially larger (and smaller) than this. In addition, the natural variability of climate could considerably enhance or reduce this rate of change.¹

3.7 A report prepared by the U.S.A. and the Netherlands for the Response Strategies Working Group of IPCC contained five scenarios for the future, based on various economic, demographic and emissions control assumptions.

(a) The 2030 High Emissions Scenario*

... depicts a world in which few or no steps are taken to reduce emissions... [I]ncreases in emissions yield increases in atmospheric concentrations of greenhouse gases with an equivalent greenhouse effect of a doubling of CO₂ concentrations from pre-industrial levels by 2030 and continued increase throughout the rest of the century.

(b) The 2060 Low Emissions Scenario

... portrays a world in which a number of environmental and economic concerns result in steps to reduce the growth of greenhouse gas emissions.... These steps reduce growth in emissions by 50 to 75 per cent and significantly slow down the growth in atmospheric concentrations of greenhouse gases. CO₂ emissions do not double until 2100, but the equivalent greenhouse effect of a doubling of CO₂ concentrations over pre-industrial levels is achieved by 2060 and continues to grow, albeit at a slower rate than in the first scenario.

* In the IPCC reports, this scenario is also referred to as the "Business-as-Usual" situation (see, for example, the quotation in para. 3.6 above).

(c) The Control Policies Scenario

... reflects a future where concern over global climate change and other environmental issues, such as stratospheric ozone depletion, motivate steps over and above those taken in the 2060 Low Emissions Scenario.... As a result, emissions of CO₂, N₂O, and CH₄ grow slowly through the middle of the next century, then start to decline. Emissions of CO and NO_x* decline sharply along with emissions of CFCs. These emission trends yield increases in atmospheric concentrations of greenhouse gases equivalent to slightly less than a doubling of CO₂ from pre-industrial levels by 2090 with concentrations stable after 2090.

(d) Two Accelerated Policies Scenarios

... are similar to the Control Policies Scenario but feature much more rapid development and penetration of renewable energy sources ... The results of these two scenarios differ only in emissions of CO₂ and primarily in the short run.... In both scenarios, atmospheric concentrations of greenhouse gases continue to increase but stabilize by the middle of the next century at levels 25 per cent greater than current levels but well below an equivalent doubling of CO₂ over pre-industrial levels.²

3.8 These of course are only scenarios, based on present knowledge of the relationship of greenhouse gas emissions to global warming, and on assumptions about future world population and economic growth. They are, however, the most authoritative and generally accepted perspectives that are available.

3.9 It is clear that the world has already begun to move away from a situation leading to the 2030 High Emissions Scenario. That scenario does not contemplate the strengthening of the Montreal Protocol on CFCs that took place in 1990. Nor does it include the growing international consensus that collective action must be taken to limit global warming.

3.10 In both Canada and the world as a whole, our present attitudes—not our actions—seem to lie somewhere between the 2060 Low Emissions Scenario and the Control Policies Scenario. For example, the need to stop tropical deforestation and begin a global reforestation effort is generally accepted (2060 Low Emissions requirement), and most countries have accepted the need for a complete phase-out of CFCs (Control Policies requirement).

3.11 It is clear, however, that neither of these is likely to be sufficient. The 2060 Low Emissions scenario still envisages that greenhouse gas concentrations in the atmosphere will continue to increase after 2060, and even the Control Policies scenario does not envisage stabilization until the carbon equivalent has doubled by comparison with pre-industrial levels, a century from now.

3.12 Apart from the phase-out of CFCs, which Canada plans to achieve by 1997³, most of the elements of the strategy that the Committee suggests in Chapter 4 are relevant only to achieving the 2060 Low Emissions Scenario. The Committee does not believe that Canadians, or the world community as a whole, will be prepared to accept such a modest effort, although there is no doubt that it is with these improvements in energy efficiency that we and many other countries have to begin. We **recommend** that Canada, together with other countries, should

* Carbon monoxide and nitrogen oxides.

make a major effort to achieve the goal of the Accelerated Policies Scenarios, i.e. stabilization of greenhouse gases by the middle of the next century, at levels that may be higher than at present but will be "well below an equivalent doubling of CO₂ over pre-industrial levels." We **recommend** also that the Government of Canada develop and publish a strategy for the Canadian component of such a global target. In our interim report, we suggested that the federal government should consider adopting a 50% reduction of CO₂ emissions from 1988 levels by the year 2020. This may appear a more stringent target than indicated by the Accelerated Policies Scenario. Figure 8 is however a reminder that major efforts will be required by countries like Canada, if global warming and economic development are to be reconciled.

D. PROSPECTS FOR THE NEXT 10-15 YEARS

3.13 In the short-term, several actual and possible targets exist that are relevant to Canada, including the following:

- The 1988 Toronto Conference recommended that Canada and other countries should "Reduce CO₂ emissions by approximately 20% of 1988 levels by the year 2005".⁴
- At the Second World Climate Conference, the federal government committed Canada to stabilize emissions of CO₂, and other greenhouse gases not controlled by the Montreal Protocol, at 1990 levels by the year 2000.⁵ This commitment is consistent with the draft "Recommendations for National Action Strategy", circulated for discussion in November 1990 by federal and provincial environment and energy ministers.

3.14 In the Committee's interim report, we expressed our belief that "Canada's support of the objective of stabilizing carbon dioxide emissions at 1990 levels by 2000 is not a sufficient response." If, as appears to be the case, the Canadian commitment is to stabilize emissions of methane, carbon dioxide and perhaps also nitrous oxide and other minor greenhouse gases, and at the same time to phase out the production and new consumption of CFCs by 1997, then a start will have been made.

3.15 This start will, of course, not be sufficient to achieve the type of long-term goals suggested in para. 3.12. Indeed, it is our view that, well before 2000, Canada should have revised its own short-term target and most members of the Committee continue to believe that the Toronto target—a 20 per cent reduction in 1988 CO₂ emissions by 2005 — is feasible without disruptive effects on the Canadian economy or lifestyles. We note that other countries are committing themselves to this target. Australia, for example, aims to reduce emissions of all greenhouse gases not controlled by the Montreal Protocol by 20%, based on 1987 levels, by the year 2005. Like Canada, Australia will phase out CFCs and halons by 1997.⁶ Therefore, as stated in our interim report,

The Committee recommends that the Toronto target of a 20% reduction in human-sourced CO₂ emissions by the year 2005, compared to the 1988 level of emissions, be adopted by the federal government as its minimum interim objective in reducing Canadian CO₂ emissions. (Interim recommendation no. 2)

The Committee recognizes that there is an urgent need in Canada for quantitative analysis of the economic and social implications of this and the other targets that have been recommended. Such studies are particularly needed because the regional incidence of reduction measures across Canada could be very uneven.

E. THE NEED FOR A GLOBAL COMMITMENT

3.16 Canada's targets need to be viewed in a wider international context. On the one hand, Canada needs to be seen to be acting as vigorously as other nations in tackling what is a planetary problem: Canada's targets therefore need to measure up to those of other comparable countries. On the other hand, if there is no general agreement to take coordinated and vigorous action, strong action by Canada, or even by Canada in concert with a number of similar countries, would have little significant effect on global emissions of greenhouse gases. Some countries, such as the Netherlands and Germany, have already adopted strong and unilateral commitments to reduce emissions. Others, such as the United Kingdom and Australia, echo the Swedish witness to our Committee quoted in para. 2.39: they define targets that they will adopt if other countries take similar action. Australia, for example, has said that

While recognising the need to restrict emissions and to aim for a 20% reduction, the Government will not proceed with measures which have net adverse economic impacts nationally or on Australia's trade competitiveness in the absence of similar action by major greenhouse gas producing countries.⁷

3.17 The crucial period for gaining this international commitment is during the next 12-15 months. The negotiations on an international convention to limit greenhouse gases (other than those covered by the Montreal Protocol) that have just begun are designed to have the convention ready for signature by national governments at the World Conference on Environment and Development in 1992. In the Green Plan, the federal government has declared that

Canada will aggressively pursue an International Framework Convention on Climate Change and development of any necessary protocols. The Government will also press for the conclusions on the Framework Convention and appropriate binding protocols by 1992. In pursuing the Convention, Canada will be seeking a comprehensive international agreement on targets and schedules for the reduction of CO₂ and other greenhouse gas emissions.⁸

3.18 The Committee **recommends** that, in implementing this commitment, the federal government should accept the Toronto Conference target of a 20% reduction from 1988 levels of CO₂ emissions by 2005. At present, the federal government has undertaken only to examine the feasibility and implications of this target.⁹ However, not merely is it desirable that Canada show strong leadership in action on global warming, it evidently makes good economic sense to do so. As Mr. Haites told us,

If Canada were to implement the most cost-effective measures to achieve the Toronto Climate Conference targets, we would achieve a net benefit of \$100 billion to \$150 billion in energy savings alone.¹⁰

After reviewing the study from which this estimate was derived, the federal-provincial-territorial Conference of Energy Ministers agreed that

... by implementing measures which would not entail major economic costs under current economic conditions, Canada could move a long way in the direction of meeting this illustrative target [20% reduction in CO₂ emissions from 1988 levels] but could not fully achieve it.¹¹

F. START NOW

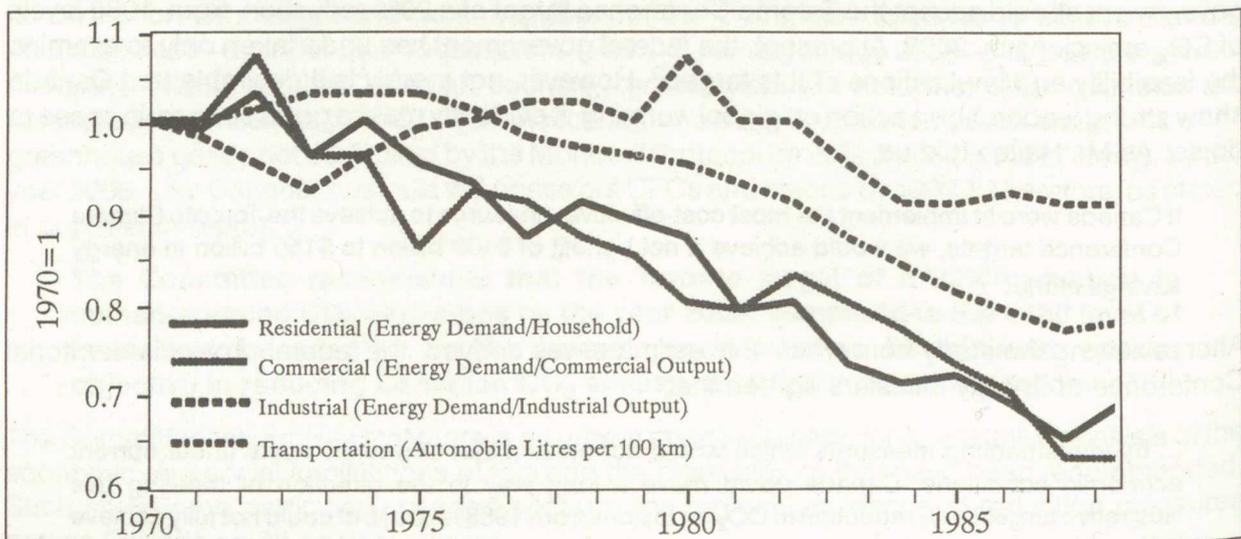
3.19 In our interim report, the Committee recommended that

Canada adopt the target of reducing the intensity of energy use in the Canadian economy by 2% annually, until our emissions of carbon dioxide are reduced to a level which does not contribute to the further accumulation of CO₂ in the atmosphere.¹² (Interim recommendation no. 3.)

3.20 In reiterating this target, the Committee emphasizes that it is particularly important in the very short run: right now. More than a year and a half has elapsed since the "20% reduction by 2005" target was proposed by the Toronto Conference. It is more than a year since the Committee began its hearings on the subject of global warming. Meanwhile, the situation continues to deteriorate rapidly. According to the report published in August 1990 by the Carbon Dioxide Information Analysis Center, total CO₂ emissions (other greenhouse gases not included) in Canada increased by 4.6% in 1987 and 6.6% in 1988.¹³ There seems no reason to doubt that emissions have continued to increase in 1989 and 1990. If Canada is to be serious about achieving either the 2000 target already adopted by the federal government, or the Toronto Conference target that we recommend, action must be immediate, not in another year or two. In a recent discussion paper on "Energy Use and Atmospheric Change", the Department of Energy, Mines and Resources (EMR) noted that

Energy consumption per dollar of GDP dropped about 18 per cent between 1973 and 1988 with much of the improvement coming in the 1980s. During the 1970s, the residential, commercial and transportation sectors experienced modest reductions in energy intensity. These improvements were in response to rising energy prices and the implementation of information and incentive programs. In the industrial sector, energy intensity rose slightly (see figure 12). Since 1980, there have been marked energy intensity improvements in the transportation sector—reflecting improved vehicle design and changes in purchasing habits; in the residential sector—reflecting better insulation and more efficient furnaces, water heaters and windows; and in the commercial sector—reflecting better automatic heating, ventilation and air conditioning controls and lighting systems.¹⁴

FIGURE 12: CANADIAN ENERGY INTENSITY BY SECTOR



The discussion paper noted, however, that a reference projection of energy demand developed by EMR and Environment Canada in 1990 suggested only "a moderate decline in energy intensity of about 0.5 per cent per year... between 1990 and 2010."¹⁵ "Life as usual" is evidently not good enough.

3.21 What is implied for Canada in the interim targets that we recommend—2% annual improvement in energy efficiency and a 20% reduction on 1988 CO₂ emission levels by 2005—ought to be the easier to achieve because Canada's use of energy is so wasteful by comparison with other advanced industrial countries. Yet several of these countries have set themselves much more ambitious targets than those suggested for Canada by the Committee. In the Netherlands, for example, the 1989 National Environmental Policy Plan adopted a target of stabilizing CO₂ emissions by 2000 at the average level of 1989 and 1990: i.e. a target comparable to that adopted by the federal government in Canada. As the representative of the Netherlands Government told us,

Given the already modest CO₂ emission per capita in Holland compared to other countries... this implies already a major effort, since the CO₂ emissions are currently growing at a rate of about 2% per year.¹⁶

However, the Dutch government has already accelerated this rate of reduction, so that

... stabilization at 1989/1990 levels will be reached by 1994/1995, with additional potential for reductions after that... Assuming a real 1% reduction after 1994, a 5% reduction in the year 2000 might be reached.¹⁷

3.22 The Committee suggests that Canada should not be in the position of studying and debating whether significant reductions in greenhouse gas emissions can be achieved, at the same time as other countries with similar problems are actually achieving such reductions.

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4. *Proceedings of the World Conference on The Changing Climate: Implications for Global Security*, WMO 710, World Meteorological Organization, Geneva, 1988, p. 296.
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7. *Ibid.*
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17. *Idem.*

CHAPTER 4

ACHIEVING THE TARGETS: A STRATEGY FOR THE 1990S

A. INTRODUCTION

4.1 In this chapter the Committee expresses its views on the priorities and means that should be adopted in Canada during the next decade, in order to make substantial progress in achieving the targets identified in the previous chapter. Many of the Committee's suggestions appeared as recommendations in our interim report, *No Time To Lose*. As promised in that report, we now explain in more detail the bases for those recommendations.

4.2 Our focus in this chapter is on the next 10 years. It seems to us that the term "strategy" becomes almost meaningless if it is extended beyond that time-frame. The strategy for succeeding decades will need to be developed in the light of experience during the 1990s, and even during the present decade it can be anticipated that new needs and opportunities will be identified, requiring modifications to the strategy. In the next chapter, we deal with options and approaches that do not yet appear ready for incorporation into a strategy for the 1990s, or that seem unlikely to have a significant impact on greenhouse gas emissions during this decade. They nevertheless need to be investigated and developed urgently, if they are to be useful in maintaining progress after the turn of the century.

4.3 At the beginning of Chapter 3, we suggested that one test of a proposed target is whether it is likely to be effective: will it make a significant and appropriate contribution to solving the problem? This is clearly also a valid question to be raised about the components of our proposed strategy. In making its recommendations, the Committee cannot affirm from its own knowledge that the strategy will be effective. We are not meteorologists expert in the relationship of emissions to global warming, nor are we energy experts. Similarly, we cannot be definitive about the costs and other implications of the measures that we propose. We have heard from a large number of witnesses who do possess the necessary expertise and experience in these matters, and in other relevant considerations such as the acceptability of various emissions reductions options by the Canadian public. We have confidence in their testimony. The Committee also believes that the alternative of "doing nothing until we can be certain about everything" is quite unacceptable. We do however return to a specific problem concerning effectiveness at the end of this chapter.

4.4 In the previous chapter, we also noted the confusion that exists at present about whether official or recommended targets for emissions reductions concern the combined effect of all greenhouse gases, or just carbon dioxide: "20% reduction in what?" The Committee assumes in this chapter that Canadians should be seeking significant reductions as soon as

possible in all the major greenhouse gases. We recognize the federal government's intention, as expressed in the Green Plan¹, to phase out CFCs by 1997, and to stabilize ("cap") emissions of each of the other main greenhouse gases at its 1990 level by the year 2000. The Committee's proposed target is more ambitious, but we also believe that the strategy during the 1990s should include all greenhouse gases. Now that decisive action has been taken in regard to CFCs, the Committee believes that the main emphasis should be on carbon dioxide, and it is to reductions in CO₂ emissions that we devote most of this chapter. We begin, however, with brief comments on how limitations or reductions in emissions of the other gases are likely to be achieved during the 1990s.

B. CHLOROFLUOROCARBONS AND HALONS

4.5 *Deadly Releases: CFCs*, our report on chlorofluorocarbons and similar substances such as halons was presented to Parliament and published in June 1990. Most of the recommendations made in that report, which focused on stratospheric ozone depletion, are relevant also to the pernicious effects that CFCs have on global warming. The Committee reaffirms its recommendations on CFCs and welcomes the announcement by the federal government that production and new consumption of CFCs in Canada will be phased out by 1997.² This is consistent with our recommendation 1(a) in *Deadly Releases: CFCs*. We also welcome the statement that the use of CFCs in car air conditioners will be phased out by the 1995 model-year, although we **recommend** that this provision should apply to all vehicles, not just to cars, and that, as Recommendation 6 in our earlier report suggested, air conditioning units in vehicles should be required to be leak-proof by model-year 1992.

4.6 The Committee does wish to refer again to the need for adequate and effective means of removing CFCs from existing installations: the so-called "vampire units". Large amounts of CFCs at present exist in refrigerating and other units; they will remain as a potential threat to the atmosphere long after production of new CFCs ends in 1997. If effective substitutes are not readily available, there will be a demand for vampire units that can extract and recycle existing CFCs. If, however, adequate substitutes are readily available, as seems very probable, market-driven interest in extracting and recycling old CFCs is likely to diminish.

4.7 The latter situation would be similar to that at present, when new supplies of CFCs are readily available, and there is little incentive to recycle. By the end of January 1991, only two provinces, Ontario and Nova Scotia, had issued regulations requiring the recovery and recycling of CFCs. The Committee is therefore concerned that there appear to be both regulatory gaps and bureaucratic barriers that are unnecessarily deterring the safe extraction of used CFCs at present. Until recently, the problem appeared to be primarily technical in character: we heard evidence that portable recovery pumps were not commercially available. That situation has now changed, and it is now up to regulatory bodies to ensure that CFCs are routinely extracted from refrigerators and other appliances before these are discarded or replaced.

4.8 Meanwhile, the ozone layer continues to deteriorate and global warming is accelerated. The Committee **recommends** that the Government of Canada, in co-operation with provinces and municipalities, strongly encourage the introduction of a requirement that CFCs be removed from used equipment before disposal.

C. METHANE

4.9 As indicated in para. 1.30, the World Resources Institute data suggest that, in carbon equivalent, methane accounts for one quarter of net greenhouse gas emissions by Canada, or 33 million tonnes of carbon equivalent in 1987.³ Of Canada's total emissions of methane (excluding gas combustion or flaring) the WRI estimates that three-quarters (74.9%) is due to leakage from natural gas transmission and distribution pipeline leaks.⁴ If this proportion is anywhere near correct, it suggests strongly that Canadian efforts to stabilize or reduce methane emissions should focus on pipeline leakage.

4.10 In its evidence to the Committee, the Canadian Gas Association did not address the WRI data directly. However, the president of the association commented that

We have carried out a study within the Canadian gas industry which ... concludes that an estimate of methane emissions from gas industry operations in Canada is about 0.3% of gas produced...

Our estimate is that on the transmission side ... the range would be from 0.018% to 0.082%; on the distribution side, ..., it would be 0.03%; and on the production side 0.25% is the range.⁵

4.11 In a subsequent communication to the Committee, the Canadian Gas Association indicated that the 1989 total of 3.3 trillion cubic feet was equivalent to 92.4 billion cubic metres, or 66 million tonnes of methane. Using the Association's figure of 0.3% for total leakage, the CGA estimates that leakage in Canada amounted to 198,000 tonnes of methane.

4.12 This CGA estimate is so different from the WRI estimate for 1987 of 7,800,000 tonnes that the Committee believes it needs further investigation. The WRI estimate, for Canada and other countries, is based on U.S. Government sources⁶; in his evidence to our Committee the president of the Canadian Gas Association commented that

Recently there have been some quite misleading and inaccurate assertions made about the extent of methane leakage from natural gas operations. Figures as high as 4% to 10% of produced gas have been suggested, and in the extreme there have been allegations that the further use of natural gas would have a negative rather than positive effect on the greenhouse effect because of this leakage. Fortunately, a number of studies are correcting these inaccuracies.⁷

4.13 The Committee cannot resolve these disparities, but it does emphasize that this is not simply a case of "my numbers are better than your numbers". The difference has important implications for Canada's position as an emitter of greenhouse gases, for its stance in international negotiations to limit emissions; and for its domestic policies and actions.

4.14 The WRI tables, and its "greenhouse index" are the most widely available, comprehensive and up-to-date comparative analysis of greenhouse emissions by all countries: they are widely used throughout the world. The Committee relies on the data in *World Resources 1990-91*, which was published by WRI in collaboration with the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP). Yet the difference between WRI's view of leakage losses and that of the industry itself in Canada alters significantly the total net emissions of greenhouse gases by Canada and the relative significance of the different greenhouse gases, as the following comparison⁸ indicates:

	WRI Tables	CGA Methane Data
	(tonnes of carbon equivalent)	
Fossil Fuels & Cement	48,000,000 (40%)	48,000,000 (50%)
CFC Use	36,000,000 (27.5%)	36,000,000 (38%)
Methane	33,000,000 (30%)	8,700,000 (9%)
Other sources	3,000,000 (2.5%)	3,000,000 (3%)
TOTAL	120,000,000	95,700,000

This change would not alter Canada's position at no. 12 on WRI's global "greenhouse index", since total emissions from the 13th ranked country (Mexico) are estimated at 78 million tonnes of carbon (Table C). It would, however, alter Canada's position in terms of *per capita* emissions, from 4.5 tonnes to 3.6 tonnes (Table D).

4.15 Such alterations in comparative tables are not significant, especially as it may well be the case that similar leakages are overstated for other countries besides Canada. It is, however, a matter of considerable significance that:

- (a) a major source of Canada's contribution to global emissions of greenhouse gases may be seriously overstated, and the industry concerned may be much more efficient than the WRI tables make it appear;
- (b) national priorities on actions to reduce greenhouse gas emissions are likely to be substantially different if methane losses from anthropogenic sources represent less than 10% of net emissions, instead of 30% as indicated by WRI.

4.16 The Committee **recommends** therefore that the federal government investigate urgently the data offered to us by the Canadian Gas Association, preferably through an independent survey of the leakage problem. In addition to clarifying important problems of domestic priorities, we believe that independent evidence on this issue will materially assist Canada in international negotiations on a global warming convention.

D. CARBON DIOXIDE

4.17 Many of the following strategy recommendations were included in our interim report *No Time To Lose*, and are so identified. In this report we indicate in more detail the reasons why these recommendations were made, and some additional recommendations are also added.

4.18 Given that human-sourced carbon dioxide emissions are the principal contributor to increasing atmospheric levels of greenhouse gases, and given that society's use of energy is the largest factor in this CO₂ generation, the Committee concludes that Canadian energy policy-making must have as its most

immediate focus the more efficient and conserving use of energy. Coupled with the more effective use of energy is the need for fuel substitution away from high-carbon fuels and for the commercial availability of technologies for exploiting carbon fuels with less environmental impact. (Interim recommendation no. 1)

4.19 Not surprisingly, organizations and individuals concerned with environmental protection focused on the need for greater energy efficiency and energy conservation. As the *Greenprint for Canada* document submitted on behalf of a large number of environmental, conservation and aboriginal organizations urged

Canadians produce a lot of carbon because Canada's economy is the most energy intensive in the world, using the most energy to produce a dollar's worth of goods and services... We recommend a new national energy conservation program to reduce Canada's energy use and, along with it, carbon emissions.⁹

4.20 The view from environmental organizations was echoed by experts from the academic community, as for instance during the Parliamentary Forum on Global Climate Change:

We must develop a viable, long-term energy policy that is not only technically and economically efficient, but also socially acceptable.

For several years now, analysts have started looking at the energy issue by examining both sides of the equation, not just an increase in the supply of megawatts, but also demand management, expressed as negawatts. Thanks to this approach, analysts determine the famous potential for improving energy efficiency. The approach has also led us to least-economic-cost planning, including tendering mechanisms, which allows us to have a freer energy market and has produced very encouraging results where it is already in use.¹⁰

4.21 It was also reassuring to learn from witnesses in energy-consuming industries that efficiency and conservation are effective, realistic and timely priorities. Here, however, there were obvious differences in attitude. From electricity utilities, for example, we heard enthusiasm from Alberta:

In summary ... we would like to see means come forward that Canada can maximize its contribution globally [to emissions reductions]. In that respect, we see conservation and efficiency improvement as key, and technological development to apply within the globe as key...

On the conservation side, ... I believe the company has been very effective in demand-side management of the load-shifting kind...

However, I think it is very important for us to recognize environmental costs in the future, and they have to be incorporated into our cost structure... As we do that, that will mean our marginal cost, our incremental cost of new capacity, will become greater than the average embedded cost our rates are set upon.... Right now in Alberta the reality is that our marginal cost is pretty much equal to our embedded. So to get into a demand-side management program such as B.C. Hydro and Ontario have started, where rebates and money or cash are actually given to customers to buy reductions in load, would put a burden on our other customers...

... The one thing we are missing in our marginal cost is the degree to which we recognize real environmental costs.¹¹

This enthusiasm did not appear to be evident in the utility serving the neighbouring province of Saskatchewan:

[D]emand-side management, as we see it, is not a solution to this problem, and we firmly believe that...

If the decision is that we in Canada want to change our lifestyle—and I mean a significant change in lifestyle—then, yes, you can do this. But the assumption we at Saskatchewan Power make is the only assumption we believe we can make. We have a mandate to serve our customers. That is what our job is. Our job is not to change the lifestyle of our customers. And we believe we must meet the load-growth. As industry develops, energy is required. If we want to stop development in the country, then in our view the solution of conservation is the one you look to.¹²

4.22 Similarly, a marked lack of enthusiasm for new vehicle fuel-efficiency (CAFE) standards in the evidence from the Motor Vehicle Manufacturers' Association was countered by the consumer view presented by the Canadian Automobile Association:

[W]e should really give motorists the tools they need and want, automobiles which run on lower polluting energy... There are several options now available, many of which may become practical over the next few years.... The federal government in particular should show the leadership necessary not only to develop alternate fuel technology but equally to develop markets and distribution infrastructure...

[I]n Canada we do not have ... formalized CAFE standards. What we would suggest is we do have voluntary standards that industry has agreed to live by. If those are not being lived up to, then we would recommend formalizing the standards...

Without qualification, we have a consumer base out there willing to contribute significantly to environmental preservation, conservation and protection...

You can also go one step further and suggest that experience has shown... that people have downsized their vehicles. People have driven less as a result of their ecology-mindedness. It certainly has a relationship also to economic-mindedness as well as social-mindedness.... There is a willingness on the consumer's part to be environmentally conscientious to the point of paying more for a vehicle that is more environmentally friendly.¹³

4.23 In the Green Plan, the federal government has accepted that

The immediate emphasis ... must be on improving energy efficiency across a broad spectrum of uses, from consumer products to buildings, transportation and our major industrial sectors.¹⁴

The government also plans to introduce a National Energy Efficiency and Alternative Energy Act, to raise the fuel-efficiency targets for new vehicles, and to take other steps in the direction of our recommendation. The Committee welcomes these initiatives, and attaches importance to the fact that they are set within an environment and sustainable development context, rather than in

response to short-term rises in fossil fuel prices as was the case a decade ago. We hope that this will ensure that energy efficiency and conservation remain continuing commitments. Canada's standards certainly should be no weaker than those required in other comparable jurisdictions. The evidence presented to our Committee makes it clear that such initiatives are necessary, are achievable, will be welcomed by the Canadian public, and will be welcomed also by the most forward-looking and vigorous elements of Canadian industry and business.

4.24 The Committee recommends that federal and provincial strategies to combat human-induced global climate change combine strong regulatory systems with a careful utilization of market forces to develop economically efficient programs for reducing greenhouse gas emissions in Canada. (Interim recommendation no. 5)

4.25 There seemed general agreement that both market forces and government regulation will be necessary if the targets for emission reductions are to be achieved. Understandably, there is debate on where the emphasis should be, and the extent to which government actions should be prescriptive, rather than providing a set of requirements that industry and business can satisfy by means that they determine. We have already quoted the confidence in market forces expressed by Friends of the Earth and by Amory Lovins (para. 2.20). It is relevant also to mention that a blend of regulatory and market forces is considered desirable by important elements of the private sector. The Canadian Gas Association told us that:

In general we believe that after consultation with all the stakeholders the government has the responsibility, of course, to set overall standards and emission limits and then to establish the new playing field and to keep it as level as possible, with penalties and rewards if that is appropriate. But we believe that it should be left to the private sector and the marketplace to develop the most cost-effective way of meeting those standards; in other words, that government should not mandate the precise means of solution, in our opinion, but set the standards.¹⁵

4.26 The witness from the Institute for Research on Public Policy looked back to the experience of a decade ago in the U.S.A. and Canada:

The fact is that when we actually had major increases in energy prices in the mid to late 1970s we got an enormous explosion of technological innovation in the private sector....[W]e reduced energy use substantially during that period; we got all sorts of new ways of doing things, and the market, to an extent, worked well.

On the other hand, the market is not a perfect instrument...

If it [were], it would obviously be levying a much higher charge on energy production, particularly on coal use, because in fact coal use is costing us an enormous amount in terms of air pollution, in terms of sulphur dioxide and in terms of carbon dioxide. The market does not adequately levy that charge, so we have to find a way to help the market to levy that sort of charge.¹⁶

4.27 Mr. Eric Haites, the author of a study for federal and provincial energy ministers that took an optimistic view of the benefits to society from energy savings, reminded us that the market did not necessarily act in the interests of society as a whole, and that incentives might be needed:

By doing everything technically possible to reduce CO₂ emissions without regard to cost, the Toronto Climate Conference goals can just be achieved. The measures economically attractive to society achieve only about 75% of the target. Market penetration alone achieves less than 15% of the CO₂ emission goals.¹⁷

4.28 These conclusions accord with common sense: let the market do as much of the task as possible, but do not expect the market to define a task like reduction of greenhouse gas emissions, and do not expect that the market is all that will be necessary. At present Canada and other countries appear to be entering a period of partnerships rather than ideologies, and the Committee believes that federal and provincial emission reduction strategies should be based on a framework of partnership.

4.29 The Committee believes also that successful implementation of this recommendation requires federal and provincial governments to ensure that the playing field occupied by competing energy systems is as level as possible. Markets may never be perfect, but strongly asymmetrical markets are no basis on which to rely in achieving emission reduction and similar targets. It may well be that some of the complaints we heard were unjustified or of minor significance; in the absence of hard evidence on the true costs of different energy forms (see para. 2.22), this is difficult to determine. We recommend that the federal government sponsor such a study. We also suggest that the proposed National Energy Efficiency and Alternative Energy Act should incorporate provisions that eliminate many of the existing inequities and that ensure a level playing field is maintained in the future.

4.30 The Committee recommends that all federal departments and agencies, as part of their budget submissions, report on the direct and indirect impacts of their operations on global warming, and set annual targets for reductions in greenhouse gas emissions. (Interim recommendation no. 17)

4.31 This recommendation needs little justification: the Green Plan states the situation very clearly:

The federal government is the largest single "business" in Canada, with expenditures of \$125 billion and over 585,000 public servants and employees of Crown corporations. As the largest commercial landlord, it owns or leases 25 million square metres of office space. There are more than 50,000 buildings and facilities in its inventory, ranging from office buildings to laboratories, parks and military bases. Government purchases from the private sector total more than \$9 billion each year from thousands of consumer, commercial and industrial goods...

[T]he Government of Canada is ready to move as quickly as possible to ensure that it becomes one of the most environmentally sensitive jurisdictions in the developed world.¹⁸

4.32 The opportunity in regard to greenhouse gas emissions is here and now; as the Committee keeps insisting, there is "No Time To Lose". Clearly the main burden is on the Department of Public Works (DPW), which is responsible for most of those 50,000 buildings and facilities, and the energy they consume. The Committee also suggests that departments such as DPW and Supply and Services Canada should have the additional responsibility of identifying emission reduction strategies relevant to typical government activities that are beyond their direct control, but that can be adopted by individual departments and agencies.

4.33 The enthusiasm expressed in the Green Plan is welcome. However, the Committee notes that some of the evidence it heard indicated that in the past the federal government has been neither enthusiastic nor innovative in regard to energy efficiency. It appears to us that the federal government should be in the vanguard of efforts to improve energy efficiency and reduce emissions. In this context, we suggest action of the kind that we were told was taken a few years ago by the Toronto District Heating Corporation:

[W]e had a funny kind of auction. We went out to the engineering community and said we want you to bid on energy improvements on our main heating plant for \$1 million; what are you going to give us for \$1 million. We will give you \$1 million... If you do not meet what you say you are going to do, there will be a penalty.

The best one, and the one that was awarded the contract, came in with a \$980,000 per year saving in energy use in that main plant. Actually by the time it was implemented natural gas prices went down and it finished up—it has been in place now for three years—with an average of over \$800,000. It did not quite meet the target, but the energy price went down, which is stupid in this day and age...

It is enormously easy, really, compared with other things, to reduce the energy use for buildings and for building systems. All you need is for someone to take charge and do it.... That is a good role for the federal government—cut energy use in Canada's buildings by 60% in the next 10 years. It is achievable.¹⁹

4.34 The Committee concludes that Canada's electric utilities are a key element in reducing greenhouse gas emissions and urges provincial, territorial and municipal governments to direct utilities to take the lead in developing programs for electricity demand management and for introducing new technologies which improve—in both an energy and an environmental sense—the production, transmission and consumption of electricity. (Interim recommendation no. 9)

4.35 On the evidence presented to us, the most urgent need is for new attitudes in many of the electricity utilities themselves. This may require a formal change in their mandates, but the Committee doubts this. What seems more relevant is for senior management to take a new and expanded view of their existing mandates. Members of the Committee, like other Canadians, expect that when we turn the switch, the light will come on, but we do not think this is incompatible with a strong interest in demand management by electric utilities. It seems clear that attitudes are changing, but apparently not fast enough. As Mr. Lovins commented,

Most Canadian hydros—and I think in terms of senior management I would say all of them except B.C. Hydro—are still at an early stage of reforming their mission and culture to reflect the realities of the competitive energy service marketplace. That is, most of them still believe they are in the business of selling kilowatt hours...

But we are now in an era of relatively costly electricity and relatively very cheap efficiency ... It is therefore logical to expect that customers want to buy less electricity and more efficiency...

I therefore suggest it is high time to redefine the hydros' mission not as the production and sale of kilowatt hours, but as the production—I hope profitable—of customer satisfaction, delivering the energy services customers want, such as hot showers and cold beer, reliably and at least cost, whether that means investing in supply or on the customer's side of the meter.²⁰

4.36 The Committee, indeed, would like to go beyond the recommendation that we made in our interim report, which was limited to the electricity utilities' role in electricity supply and demand. We believe that the structure of electricity supply in Canada, and the examples in the United States that were drawn to our attention, suggest that electricity utilities have a broader role to play in promoting energy efficiency, especially in regard to individual consumers and residences.

4.37 Canadians have several choices in home heating, the main ones being natural gas, oil, and electricity. Oil is typically supplied by small retailers, whereas natural gas and electricity are supplied by regulated monopolies. However, whereas not everyone has an oil or gas furnace, essentially every Canadian has an electricity supply, whether or not it is the primary form of home heating. Electricity utilities are therefore well-positioned to provide the type of energy efficiency retrofitting suggested by Dr Robinson (para. 2.31), i.e. the utility assesses the opportunities, undertakes the work, and monitors and guarantees the results. In the situation suggested by Dr Robinson, there need be no financial outlay by the consumer, since the marginal cost of supplying unnecessary energy is greater than the cost to the utility of carrying out the work. Both utility and consumer benefit. However, it is easy to envisage a pricing mechanism that would allow the utility to be reimbursed for its expenditures in a house that used another form of heating.

4.38 Such a pricing mechanism should not involve a substantial upfront payment by the consumer: the Committee heard a good deal of evidence which emphasized that this is exactly the situation that will not lead to widespread improvement. Individuals typically and logically attach a much lower present value to future benefits than businesses and money markets. What the Committee has in mind is a version of the PITE mortgage payments advocated by Dr. Robinson (para. 2.30). The PITE type of mortgage incentive makes excellent sense in regard to new construction, and the Committee **recommends** that Canada Mortgage and Housing Corporation should take the lead in introducing it in Canada. In regard to retrofitting a gas- or oil-heated residence, the Committee could similarly envisage the electricity utility being repaid over time from the money saved by the consumer in energy costs.

4.39 It may reasonably be asked: why should this task be undertaken by a public utility? Why not by specialist firms that can also be repaid through a portion of the energy savings to the consumer? The prospects for this were examined in 1988 in a report for the International Energy Agency, entitled *Contracts for Energy Management: A New Approach to Energy Efficiency*. This report concluded that, although energy performance contracting was developing in the U.S.A. and Canada, and the Government of Canada was "playing an exemplary role" in communicating its advantages,

The **residential sector** is unlikely to form a significant market for energy performance contracting...[T]he concept is not likely to make a major impact in single family dwellings because [of] the importance of lifestyle and behaviour in determining energy use, and thus the difficulty of predicting and attributing savings.

4.40 We recognize such difficulties, but we believe that the possibility of such a program should be actively explored by electricity utilities. The type of improvements we have in mind should not lead to significant changes in lifestyle or behaviour; in Canada, for example, there is much less chance than there is in some European countries that improvements in insulation, etc. will be taken in the form of higher indoor temperatures rather than energy savings.²¹

4.41 The Committee recommends that fuel efficiency standards be legislated for cars and trucks. (Interim recommendation no. 10)

4.42 Since, in the Green Plan, the federal government has indicated its intention to act on this recommendation, little comment is necessary here. The Committee believes, however, that these standards should be set in more ambitious terms than in the past, and that Canada should not necessarily continue to follow the overall vehicle fuel-efficiency standards adopted in the United States. We were encouraged, for example, by the general support expressed by the Canadian Automobile Association for adoption in Canada of the stringent vehicle emission standards now being introduced in California.²² The Committee recognizes that the market in new cars is a global one, and that the market share of the U.S.A. will always be much larger than that of Canada. We suggest, however, that Canada should take the initiative in proposing higher standards; we believe that this would be welcomed and supported by many Americans.

4.43 Recognizing that Canada's forests are a major reservoir for atmospheric carbon and that the losses of forest stands through commercial harvesting, wildfire, insects and disease have resulted in a rate of harvesting of Canada's commercial forests and wild lands exceeding the rate of restocking, the Committee recommends that:

- (a) the federal government expedite negotiations with the provinces on federal-provincial agreements for the management of Canada's forests;
- (b) provincial governments be urged to ensure that NSR ("not sufficiently or satisfactorily restocked or revegetated") lands are adequately forested through replanting programs or through natural regeneration of the forest cover, and in a reasonable period of time;
- (c) the losses to wildfire, insects and disease be reduced wherever possible; and
- (d) future forest resource development agreements be linked to prompt regeneration and protection of all deforested areas, whether harvested commercially or depleted naturally. (Interim recommendation no. 12)

4.44 The vast forested areas in Canada are a significant element of the global carbon balance. It is difficult to provide accurate estimates of the balance, especially on a year to year basis. Insects, disease and wildfires are responsible for the removal of about 4 million hectares per year, compared to a commercial harvest of about 1 million hectares. These natural removers are, however, extremely variable from one year to the next: in 1989, for example, over 7 million hectares were lost to fire alone. The most recent estimate by Forestry Canada is that there is a net carbon accumulation over emissions of 116 million tonnes. However, since the carbon accumulated in Canada's forests is estimated at 226 billion tonnes, the net accumulation is relatively small.²³ Reductions in wildfire and other losses could make a substantial contribution to carbon storage.

4.45 In January 1990, Environment Canada published maps of the ecoclimatic provinces of Canada as they are at present and as they may be by the middle of the next century, only 60 years from now, if global warming proceeds at the present rate (Figs. 13 and 14).²⁴ They show a boreal

forest zone reduced from 29% of Canada's land area at present to only 15% in 2050. Still more important, the maps suggest that the boreal forest zone west of James Bay practically disappears by 2050; it is reduced to three small and widely separated remnants.

FIGURE 13: ECOCLIMATIC PROVINCES OF CANADA 1990

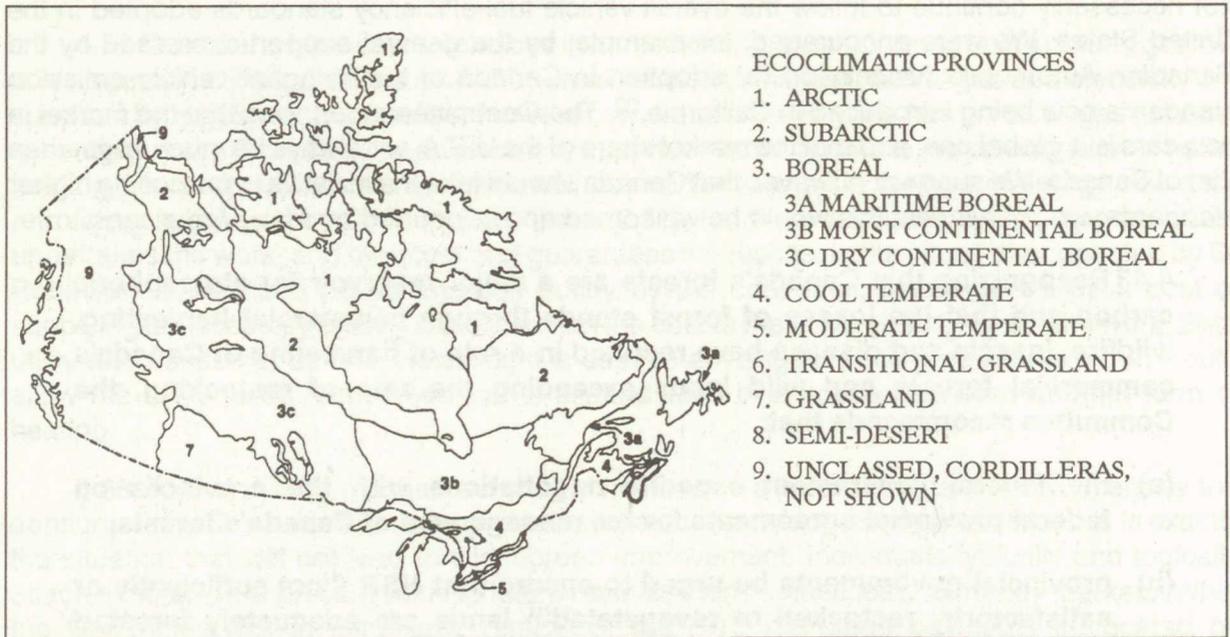
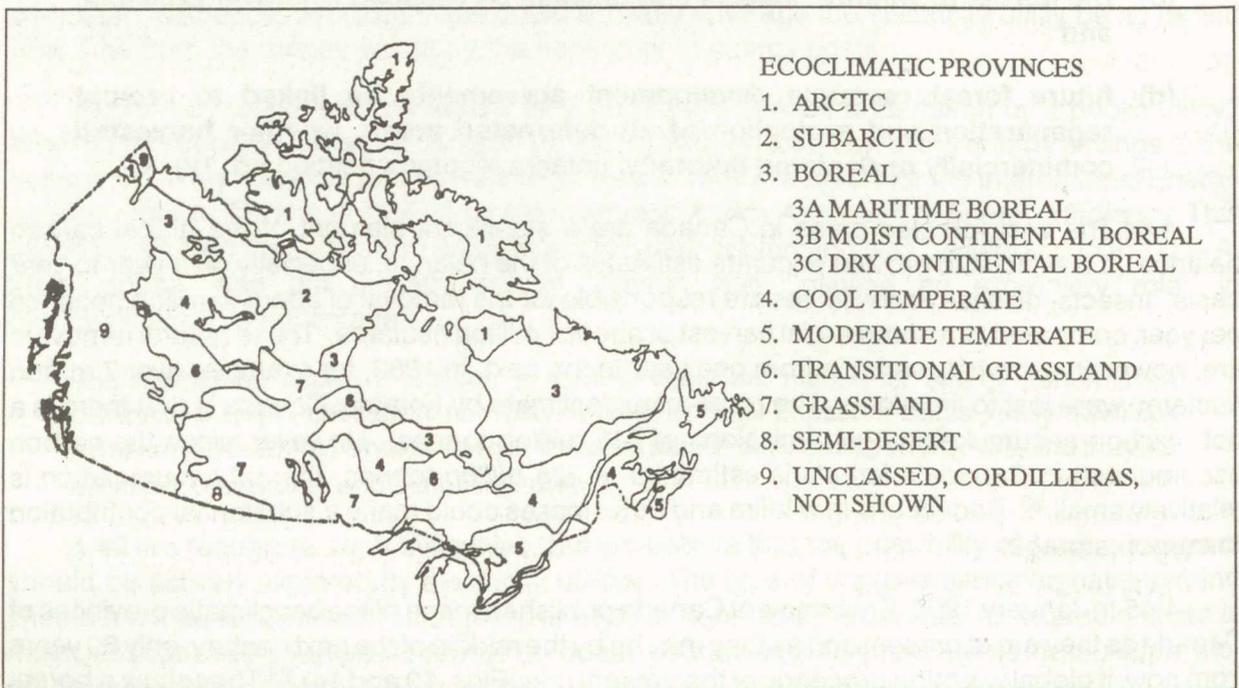


FIGURE 14: ECOCLIMATIC PROVINCES A 2050 SCENARIO



4.46 There can be few more graphic illustrations of the potential impact of global warming on Canada. In economic terms, the forest products industry is the largest single industrial sector in Canada. Canada accounts for 21% of total world trade in forestry, producing an annual trade surplus of \$20 billion a year. As Dr. Maini of Forestry Canada reminded the Committee,

The total value of exports from forestry almost equals fisheries, mines, minerals, energy and agriculture put together.²⁵

4.47 Of course, a significant part of the Canadian forest industry does not depend on the boreal forest, and the Environment Canada maps do not suggest that the boreal forest will have been eliminated from these areas by 2050, merely that the climate will have changed to one favouring another type of climax vegetation. Neither of these considerations provides much basis for reassurance, however. It has also been pointed out that the productive Douglas fir stands below 300 m in southern British Columbia are vulnerable to a warming of climate, since it may be difficult to meet the winter "chilling requirement" of the species.²⁶ In the boreal forest, a working group of the Intergovernmental Panel on Climate Change noted that

[C]limate will probably change faster than tree species can naturally respond (eg through migration). Second, new sites may not be edaphically hospitable, having evolved over thousands of years under other climatic and vegetative regimes.... Forests in areas of large climatic changes over the next 50 years will likely display massive readjustments, with concomitant large reductions in the area of healthy forests...²⁷

4.48 The Committee believes, therefore, that Dr. Maini was being very conservative when he told us that

... at best we can hope to maintain our present productivity. At worst, it could decline.²⁸

4.49 It seems clear that both the threat of global warming and the demands of sustainable development will force major changes in the way that Canada administers its vast forest areas. In 1990 the Green Plan announced Canada's intention to manage our forest resource "without prejudice to its future productivity, ecological diversity and capacity for regeneration": i.e. for sustainable development rather than merely for sustained yield.

4.50 The specific items indicated in our recommendation would contribute to improved management of Canada's forests and at the same time make a significant contribution to fixing carbon dioxide in growing trees. As Dr. Maini commented, "Forests can be an important part of developing a balanced carbon budget"²⁹, and nowhere more so than in Canada.

4.51 Given that vigorously growing trees are an effective means for extracting CO₂ from the atmosphere, the Committee recommends that the federal government take the lead in establishing federal-provincial-municipal programs to encourage development of forests on otherwise unused lands, dedicated to sequestering atmospheric carbon as an intermediate term strategy for reducing CO₂ levels in the atmosphere. (Interim recommendation no. 13, slightly amended)

4.52 In the Green Plan, the federal government has announced that it will initiate a community tree-planting program, designed to plant 325 million trees in the period 1991-1996.

One hectare of forest can absorb and store between 150 and 300 tonnes of carbon. In addition, in urban areas, trees can lower peak energy demands by 20 to 40 per cent simply by providing shade and windbreaks.³⁰

4.53 In addition to conventional approaches, the Committee heard evidence on a more novel approach:

Tree farming ... using rapid growing trees having a two- to five-year maturity. They might be planted on marginal farm land... This is by far the fastest and most efficient way to remove carbon dioxide. We in Canada can grow trees significantly more rapidly than natural trees can be grown in the tropics....

These rapid-growing trees have been growing on the basis of pulling carbon dioxide out of the atmosphere and are extremely efficient in doing so. They grow something in the order of 10 times faster than natural trees in Canada.³¹

4.54 But what happens to the trees, and the carbon they contain, when they reach maturity? Our witnesses (from Techrol Inc. and Logen Corporation) saw this resource as the basis of an ethanol-from-biomass program, substituting for fossil fuels. The implications of this (not least for the vast areas of planting that are envisaged) go well beyond the 1990s that are the focus of this chapter. Nevertheless, the Committee feels that experiments may be encouraged during the 1990s using such fast-growing species, within the context of the tree-planting program announced by the federal government.

4.55 The Committee recommends that the federal government use environmental considerations as a filter for its foreign aid and trade initiatives, encouraging programs and technologies which convey environmental benefits and ending or modifying those that are environmentally unacceptable. (Interim recommendation no. 8)

4.56 This is clearly an issue that goes well beyond the subject of global warming and the reduction of greenhouse gas emissions. Nevertheless, it is difficult to ignore the significance of global warming, since so many of Canada's aid and trade initiatives have greenhouse implications (e.g. coal exports, power development, assistance for agriculture, forest product industrial development in the tropics.)

4.57 The Committee observed a clear distinction between the witnesses who gave evidence from a foreign trade perspective and those who represented Canadian aid channels. The witness from the Canadian International Development Agency (CIDA), although she recognized the need to respect the sovereignty of the countries with which Canada has dealings, made it clear that the type of filter the Committee has in mind is already in place in the Agency:

Since 1986 the Canadian International Development Agency has been conducting an environmental assessment on all projects that we have abroad. This is a commitment we will pursue, and we have definitely made environment a top priority...

We are basically, in most of these projects, but a tiny participant in an activity. Very often that activity is being funded by a great number of nations, or partly by the recipient countries. We are requested to join in a project. Before we join in the project, we do an environmental assessment to determine whether we want to associate ourselves with that project.³²

4.58 That is not the situation which exists in regard to Canada's international trade, when CIDA is not involved. The Committee was told by the witness from the Export Development Corporation (Mr. R.L. Richardson) that a requirement for such an assessment would seriously damage the ability of Canadian business to compete in the international market:

Mr. Fulton: ...Do you not think we should in fact be enacting amendments to the legislation under which you operate that do provide direction not only to the EDC, not only to those Canadian firms who are using you as a financial instrument, but also to the buyers so that they know we are involved in some kind of screening, be it related to the best available technology or serious global environmental protection?

Mr. Richardson: No. My answer is "definitely not". To notify our buyers in other countries that we have a constraint placed upon us that will prevent us from offering similar financing to that which all the other major creditor countries offer would be a signal to all the buyer countries not to consider Canadian exporters for their products and services. I think it would be an announcement to the world that Canada wishes to be left aside in the international trade business.³³

4.59 The Committee recognizes that it is one thing to have such a filter in regard to public funds used as development assistance, and perhaps something else when it is a matter of supporting Canadian entrepreneurial activity. We recognize also that, even in the aid context, environmental considerations such as global warming may be evaluated differently in regard to a situation of abject poverty or ill-health in the recipient country. Nevertheless, it seems neither morally right nor in Canada's own self-interest that we should turn a blind eye to one set of activities while at the same time we insist on a more rigid set of standards in regard to activities that differ primarily in regard to the method of financing. If, for example, Canada found it impossible on environmental grounds to provide aid for the construction of a mill that would devastate an area of tropical forest, is it acceptable for a similar mill to be financed with Canadian entrepreneurial capital? And should the Canadian government provide export guarantees for the latter enterprise?

4.60 These are hard questions, but ones which the fact of global warming is forcing us to face as a nation. More positively, the Committee suggests that more could be done, in both trade and aid contexts, to "encourage programs and technologies which convey environmental benefits." This leads to our next recommendation.

4.61 The Committee recommends that the federal government develop policies and programs which encourage Canadian companies to commercialize and export technologies and equipment that are effective in reducing greenhouse gas emissions, particularly to developing countries which are striving to build their domestic economies. (Interim recommendation no. 7)

4.62 This is clearly a matter of Canada's own self-interest, not merely in terms of trade development opportunities but because of the global threat represented by the potential growth in fossil fuel emissions as developing countries industrialize rapidly. China and India are already among the largest emitters of CO₂ from coal burning and their development plans envisage enormous expansion of coal use. The need for environmentally-benign alternatives to present energy use will be immense. As Mr. Haites noted in his evidence,

Resources that are currently available include hydro and nuclear electricity generation. Resources currently under development, such as thermal and photo-voltaic solar, wind, tidal, geothermal and biomass move more quickly into the marketplace if they are competing against higher priced fossil fuels.³⁴

4.63 Meanwhile, Canada is among those industrialized countries that are attempting to develop such alternatives, and to improve its use of carbonaceous energy sources. In Alberta, for example, TransAlta Utilities Corporation is attempting to adapt the integrated gasification combined cycle (IGCC) process to achieve substantial reductions in CO₂ emissions. As the Corporation's witness pointed out,

If we can develop technology that means China and India will burn coal more efficiently in the future, because they surely will burn coal, then we can make a greater contribution to the globe that way. They will burn vast quantities compared to us.³⁵

4.64 Given the interconnectedness of the global environment and the necessity of assisting the developing world in protecting our common environmental heritage, the Committee recommends that the federal government, through its own agencies and through Canada's membership in multilateral organizations, advocate programs to reduce deforestation and to encourage reforestation and the planting of forests in developing countries. Support for these activities by the federal government must not reduce current and planned Canadian support for other development assistance programs. (Interim recommendation no. 14)

4.65 The Green Plan commits Canada

to participate actively in the development of the proposed international convention on forests... This will help to promote the sustainable development and conservation of the world's forests.³⁶

4.66 Canada, we were told by the CIDA witness, is already active in regard to our recommendation:

We are involved in a number of projects that are trying to enhance the management of the tropical forests. We have been leaders in trying to regroup donor countries to address the entire issue of the management of the tropical forests...

We require replantation programs for projects with which we are associated. I cannot say... that always might have been the situation in the past, but it was not in Canada as well. We are all learning. The practices of the past should not be the practices of the future ...³⁷

4.67 The Committee supports such initiatives, although we wonder whether Canada's activities in this area are at all commensurate with the scale of the problem, whether that problem is considered from a development or a global warming perspective.

E. CAN THESE SHORT-TERM OBJECTIVES BE ACHIEVED?

4.68 At the beginning of this chapter, the question was raised: will this strategy for the 1990s be effective? Is it likely to achieve the federal government's goal of capping greenhouse gas emissions at their 1990 level by the end of the century, or keep Canada on target to meeting the Toronto Conference target of a 20% reduction from 1988 emission levels by 2005?

4.69 The Committee cannot guarantee success, nor can it predict failure: we do not have either the competence or the chutzpah to make such an assessment. It is clear, however, that success or failure will depend to a very large extent on "the more efficient and conserving use of energy" and we heard from both Canadian and foreign witnesses who had grounds for believing that the target could be achieved. Mr. Haites, for example, suggested that the Toronto Conference target could be achieved through

... 75% conservation - improved efficiency is a more accurate term - and 25% switching fossil generation effectively to hydro.³⁸ (See also para. 5.8)

4.70 It was disturbing therefore to learn from a senior official of Environment Canada, Mr. Robert Slater, that there appears to be a significant division of opinion about the efficacy of such measures between Canadian experts on the one hand and European experts on the other.

[T]he sorts of [energy efficiency] measures ... listed... are exactly the same sorts of measures contained in the German proposals that are working their way through the system, the same sorts of measures the Swedes.. Netherlands.. and Norwegians have talked about. The big difference is in the results people expect to achieve from what seem like very similar sets of measures they propose to take....[T]he Germans believe they could achieve a 25% reduction in energy consumption by the year 2005 based on 1990 emission levels.

[O]ur colleagues in the Department of Energy, Mines and Resources .. have taken that same array of measures and have said it would give rise to somewhere between a 10% and 12% reduction in the growth rate by the year 2005, but still implying a substantial growth...

So we are clearly faced with a huge difference in our forecasting...

Quite frankly, we do not understand why that should be the case...

One final point is the Germans told us, when we met with them in the last few days, that during the last year they achieved a 4.4% increase in gross national product and a 1.9% reduction in energy consumption. I am equally advised that in Canada, since 1988, our carbon dioxide emissions have gone up by some 10% or 11% or so.³⁹

In its August 1990 discussion paper on "Energy Use and Atmospheric Change", Energy, Mines and Resources Canada suggests that a broad package of efficiency and alternative energy initiatives ("intended to achieve energy savings at no net economic cost to society") would reduce Canadian carbon emissions by 35 to 50 megatonnes in 1990. Since "life as usual" was expected to lead to emissions of 596 megatonnes by 2000, an additional reduction of 38 to 53 megatonnes would be required if total emissions in 2000 were to be stabilized at the expected 1990 level of 508 megatonnes.⁴⁰

4.71 The Committee believes that this is an issue that should be resolved as decisively and as rapidly as possible. In principle, since Canada is more profligate in energy use than the European nations mentioned, efficiency measures should be quantitatively more effective, not

less. Certainly, it would be difficult to envisage success in such measures, or their vigorous prosecution, if the federal department that would be most concerned with implementation is convinced that their effect will be modest.

4.72 In his evidence on this matter, Mr. Slater suggested that the International Energy Agency might be asked to convene a technical workshop so that those responsible for evaluating the measures in the various countries could compare their assumptions and methods, and if possible reconcile their differences. The Committee would endorse such an initiative by Canada, and any other necessary action. We reiterate that this issue is both urgent and of vital importance.

NOTES AND SOURCES

1. *Green Plan*, p. 100.
2. *Green Plan*, p. 108.
3. *World Resources 1990-91*, Table 24.2.
4. *Ibid.*, Table 24.1.
5. Vol. 38, pp. 36, 42.
6. *World Resources 1990-91*, p. 352.
7. Vol. 38, p. 36.
8. WRI data have been used throughout, except that the value for Canadian "pipeline leakage" in the WRI Table 2.1 (7,800,000 tonnes of methane) has been changed to 198,000 tons (CGA estimate). WRI methods of calculating the *net* emissions to the atmosphere, and the carbon equivalent, have been followed (see notes to Table 24.2 in the WRI volume).
9. Vol. 24A, p. 24.
10. *Parliamentary Forum*, pp. 109-110.
11. Vol. 28, pp. 11, 13.
12. Vol. 30, pp. 10, 16.
13. Vol. 38, pp. 14, 15-16, 22.
14. *Green Plan*, p. 103.
15. Vol. 38, p. 41.
16. Vol. 19, p. 56.
17. Vol. 22, p. 32.
18. *Green Plan*, p. 159.
19. Vol. 41, pp. 28-29.
20. Vol. 38, pp. 54-55.
21. See the discussion on this topic in Jackson, C.I., ed., *Human Settlements and Energy*, Pergamon Press, Toronto, 1977, pp. 97-98.
22. Vol. 38, p. 15.

23. Forestry Canada, personal communication, March 1991.
24. Rizzo, Brian, "The Ecosystems of Canada in 2050: A Scenario of Change", *State of the Environment Reporting*, newsletter no. 5, Environment Canada, January 1990.
25. Vol. 22, p. 7.
26. Lavender, Denis P., "Predicted Global Warming and the Chilling Requirement of Conifers", pp. 30-32 in Spittlehouse, D.L. and D.F.W. Pollard, eds., *Climate Change in British Columbia - Implications for the Forest Sector: Developing a Framework for Response*, FRDA report no. 075, Forestry Canada, Victoria, B.C. 1989
27. Intergovernmental Panel on Climate Change, draft report of Working Group 2 (*Likely Impacts of Climate Change*), Chapter 2, sect. 3.4.1.
28. Vol. 22, p. 13.
29. Vol. 22, p. 12.
30. *Green Plan*, p. 107.
31. Vol. 27, pp. 10-11.
32. Vol. 39, pp. 6, 9.
33. Vol. 46, p. 51.
34. Vol. 22, p. 35.
35. Vol. 28, p. 11.
36. *Green Plan*, p. 65.
37. Vol. 39, pp. 9, 10.
38. Vol. 22, p. 41.
39. Vol. 41, pp. 64-65.
40. "Energy Use and Atmospheric Change, A Discussion Paper", 10 August 1990, Chapter 6.

BEYOND 2000: STABILIZING GLOBAL GREENHOUSE GAS EMISSIONS AT A SUSTAINABLE LEVEL BY 2050

A. WHAT DO WE HAVE TO DO TO STABILIZE GREENHOUSE GAS EMISSIONS?

5.1 In our discussion of targets (para. 3.12), the Committee suggested the basic global objective should be to achieve stabilization of greenhouse gases by the middle of the next century, at levels that are well below the equivalent of doubling atmospheric carbon dioxide by comparison with the situation before the industrial era. Canada intends to stabilize its emissions by the year 2000, but we need to remember that this will only be a partial solution to what is a global problem. It is unreasonable to expect developing countries to place similar limits on their current emissions. This would be tantamount to saying: "We in Canada and other industrialized countries have achieved our level of development by a heavy reliance on fossil fuels for the last two centuries or more. But this has caused the crisis of global warming, and therefore the developing countries must not anticipate similar use of their energy resources."

5.2 Fig. 8 can be regarded as an "equity graph": it takes the total estimated carbon emissions throughout the world in a recent year (1984), and then allocates this on an equal *per capita* basis over the expected world population in 2025. It says, in other words, "Let us agree to limit global carbon emissions at their 1984 level, and accept that every human being in 2025 has an equal right to emit his or her share of this total." It is evident that this would mean an enormous reduction by those parts of the world that are already industrialized. The graph was prepared to assist in developing a national strategy for the Netherlands, and the Dutch government's witness remarked to our Committee that

[T]he target I initially mentioned of 80% reduction from a sustainability point of view was derived simply from looking at what the world emissions are, assuming you have to achieve an equitable distribution amongst the citizens of this world. If you do it at a level that is a little bit higher than what we have today, then you see that western Europe has to go back to 0.6 tonnes of carbon per capita. Given the fact that we [in Europe] are somewhat up to 2.6 or so, for us it would mean 80% reduction. I am afraid for Canada it would mean more.¹

Indeed it would.

5.3 In any case, limitations on emissions do not equate to a limitation on concentrations in the atmosphere. As the Intergovernmental Panel on Climate Change reported,

Atmospheric concentrations of the long-lived gases (carbon dioxide, nitrous oxide and the CFCs) adjust only slowly to changes in emissions. Present day emissions of these gases are committing us to increased concentrations for decades to centuries. The longer emissions continue at present day levels, the greater reductions would have to be to stabilise at a given concentration.

The long-lived gases would require reductions in man-made emissions of 60-80% to stabilise their concentrations at today's levels; methane would require only a 15-20% reduction.²

5.4 Capping Canada's greenhouse gas emissions at the 1990 level will therefore not be an adequate contribution to the ultimate solution of the global warming problem. Nor will achievement of the Toronto Conference target of a 20% reduction from 1988 levels by 2005. The Conference itself recognized that the latter could only be "an initial global goal".³ The IPCC working group's assumptions in regard to stabilization of greenhouse gases by the middle of the next century included the following:

- Full phase-out of CFCs throughout the world and freezes on methyl-chloroform and carbon tetrachloride.
- Reductions in emissions of greenhouse gases from enteric fermentation in domesticated animals, rice paddies and fertilizer.
- Annual rate of improvement in energy intensity declines from an initial value of between 1.5% and 2.5% to a range of 1.1% to 1.8% during the last quarter of the next century; the average rate from 1985 through 2100 ranges between 1.2% and 1.9% per annum.
- Rapid development and penetration of renewable energy sources, encouraged in part by the global adoption of "carbon fees". Biomass energy represents 10 to 25 per cent of primary energy supply by 2025, depending on economic growth assumptions.
- Tropical deforestation ends by 2025, and about 1,000 million ha are reforested by 2100.⁴

5.5 These scenarios and assumptions are of course highly speculative. The indications of what may be required are nevertheless useful in guiding the research, development and policy formulation that will be needed in Canada and other countries in the years ahead.

B. REDUCING EMISSIONS FROM FOSSIL FUEL USE

5.6 It is evident that, in the words of the Green Plan,

Canada's ability to meet its longer-term goal to reduce greenhouse gas emissions depends upon our ability to move to less carbon-intensive fuels.⁵

Canada needs to do this for other reasons as well: to reduce air pollution and, in the longer perspective, to move towards a sustainable pattern of resource use.

5.7 In achieving such changes, Canada is unlikely to "go it alone". For example, the Canadian Automobile Association's objective (para. 4.22) of automobiles that use alternate fuels is likely to involve vehicle fleets in the United States and the world as a whole. But Canada, as a major developed nation and also a major source of greenhouse gas emissions, has to be one of the pacesetters in altering our dependence on fossil fuels. We also have some problems in this regard that other countries do not share to the same extent, and that need to be addressed.

5.8 In the evidence given to us, the Committee heard much about the prospects for alternative energy sources that was visionary, exciting, and potentially very relevant. It is clear to us that most of these sources are unlikely to make a significant contribution to reducing

greenhouse gas emissions before the turn of the century. But vigorous pursuit of such options is essential if Canada is to be ready for the next phase of emissions reductions. As noted in para. 4.69 we learned from Mr. Haites that in order to achieve the Toronto target of a 20% reduction from 1988 levels by 2005, energy efficiency and conservation could get us three-quarters of the way, and alternative fuels the rest. After 2005, however, to achieve a 50% reduction from 1988 levels, more than half the task may need to be accomplished by alternative fuels.⁶

5.9 What we do during the next decade to research, evaluate and develop new and sustainable energy technologies will be crucial for Canada's future. In view of the anticipated growth in global energy demand, they may also be crucial for developing countries' needs, and in the achievement of sustainable development throughout the world.

5.10 As stated in our interim report

The Committee recommends, for the purpose of attaining integrated environmental and economic objectives, that the federal government considerably increase its support for research, development and demonstration directed to:

- (a) the more efficient and conserving use of energy;**
- (b) fuel substitution leading to reduced greenhouse gas emissions; and**
- (c) technologies for producing and using fossil fuels in less environmentally-damaging ways.** (Interim recommendation no. 6.)

5.11 This clearly involves a reversal of the trend during the last ten years. As our witness Mr. Passmore reminded us, the signals given by declining expenditures, termination of programs, research centres and delivery mechanisms, and similar actions may be as important as the loss of research funding:

Basically the signal to official Ottawa was that efficiency and renewable energy is an area that this government is not interested in...

[S]ignals are important, and basically that signal to the Canadian private sector is this: well, okay, this is not an area we should be doing R & D in, this is not an area the private sector should be actively involved in....

The level of contribution of efficiency, renewables... it does not matter what technology you choose—fossil fuels, nuclear—the level of contribution of these sources is not policy independent. In fact, policy is far more important than programs, and indeed, far less expensive for governments.⁷

The signals that were given by government policy and research expenditures during the last decade need to be changed, for the sake of the global environment, global sustainable development, and Canada's own economic self-interest.

C. REGIONAL CONTRASTS IN EMISSIONS FROM FOSSIL FUELS

5.12 In a nation as vast as Canada, it is scarcely surprising that there are huge differences in the levels of greenhouse gas emissions from one part of the country to another. The most obvious contrasts depend on population density. As the witness from the Government of the Northwest Territories reminded us, in the Territories

[O]ur annual per capita production of CO₂ from the combustion of fossil fuels was estimated at 26.1 tonnes, relatively high in comparison with southern Canada. This is primarily a reflection of the distance between our communities, our long, cold winters, and our reliance on diesel fuel to produce electricity...

Although our per capita production of greenhouse gases is high, our total contribution is low.....[I]f a national carbon dioxide emission reduction target is established, we would like to see options developed to determine what share of such a market would be the responsibility of each jurisdiction.⁸

5.13 If the North emits disproportionate amounts of CO₂ from diesel fuel, it avoids the urban smog associated with nitrous oxide and other greenhouse gases in the Windsor-Quebec axis. Less apparent, but perhaps even more important, are the potential problems arising from the major differences in electricity generation across the country. Figure 15 summarizes the main forms of electricity generation, by percentage of total gigawatt hours (GWH) generated in 1986 in each province and the territories.

5.14 The potential differences in impact of efforts to limit global warming on the individual Canadians who are served by the electrical utilities is considerable. Newfoundland, Quebec, Manitoba and British Columbia are all heavily reliant (>90% of electricity consumption) on hydropower. Alberta generates over 90% of its electricity from coal, and Nova Scotia and Saskatchewan are also heavily coal-dependent. New Brunswick (and therefore Prince Edward Island which imports its electricity from New Brunswick) and Ontario depend on nuclear sources to meet a substantial proportion of their electricity needs (more than half in Ontario in the near future).

5.15 It is easy to see from Figure 15 why the prospects of strong policies to shift Canadian energy use away from fossil fuels get a different reaction in different parts of the country, and it is also easy to see that the issue could be a divisive one. As the president of TransAlta noted

[W]e are very concerned about talk of a carbon tax because it could fall disproportionately on Alberta. .. We would think that taxes, if introduced, should be applied to all greenhouse gas emissions and perhaps to waste from other energy forms as well, including perhaps even spent uranium fuel, to keep the total social costs in front of utility managers.⁹

5.16 It is clear that, in regard to electricity generation, a carbon tax would indeed fall disproportionately on Alberta, and on the other provinces that rely heavily on coal as a source of electricity. How is this dilemma to be resolved equitably? TransAlta's recommended approach, a much more enlightened one than we heard from other fossil fuel users in similar positions, put heavy stress on technical methods, but also envisages tradeable emission permits and emission taxes.

5.17 Another regional contrast that needs to be considered in developing global emission policies is that between Alberta and Nova Scotia. Both are heavily coal-dependent in electricity generation, but whereas electric residential heating is common in Nova Scotia, it scarcely exists in Alberta.¹⁰

5.18 The Committee is not in a position to evaluate the implications of these and other regional contrasts for emissions reductions policy. We suspect indeed that many Canadians are unaware that the contrasts are as great as they are. We note that "due recognition [of] the

importance of *regional differences*" is one of four basic principles underlying the National Action Strategy on Global Warming,¹¹ but it is not clear to us how this is reflected in the strategy itself. The Committee **recommends** that a study of the regional implications of proposed greenhouse gas limitation measures be included as a vital part of the National Action Strategy on Global Warming. This does not, of course, mean that we recommend preservation of the status quo: quite the opposite. It is evident, however, that some measures may be vital in one part of the country and irrelevant in another. What is economically attractive may also have significant social costs in certain parts of the country, and these costs need to be known.

D. CARBON TAXES, TRADEABLE EMISSION PERMITS, AND OTHER REGULATORY MECHANISMS

5.19 Perhaps understandably, the evidence we heard on the subject of carbon taxes as a means of reducing fossil-fuel emissions seemed more reactive, "knee-jerk", than informed. Several environmental organizations expressed themselves in favour; most larger users of fossil fuel, such as TransAlta, were anxious to avoid the imposition of such taxes. The organizations responsible for producing the *Greenprint for Canada*, for example, agreed on a recommendation

That by 1991 the government introduce a national carbon tax on fossil fuels to raise up to \$40 billion over 15 years to fund a national energy conservation program to reforest two million acres of NSR lands and to complete the national parks system.¹²

5.20 We also heard two witnesses who, while endeavouring to be less dogmatic on whether or not a carbon tax would be good or bad, nevertheless doubted that it would have the desired effect. First, the witness from the Department of Finance:

We are somewhat sceptical about the use of the tax system. The history of using the tax system on the incentive side is that it has not always been very effective, and if you look at it in terms of creating penalties, you want to choose very carefully where you put your penalties...

Let me give you an example of the sort of thing I am talking about. The IEA [International Energy Association] did a study recently of a hypothetical carbon tax. It is just a first cut, ...but at a carbon tax equivalent to \$8 a barrel of oil, which is a fairly significant rise, they found we would reduce the growth in emissions in the OECD countries to the year 2005 only from 25% to 13%, so you do not get a great response to that particular message going through the price system...

Let us assume there was an objective of reducing CO₂ emissions. The question is, how do you go about it? The regional implications of trying to dramatically change our energy consumption will be the same, whether you do it through taxation or regulation or any other method....[I]t is not obvious that the tax system is the best way to do it.¹³

5.21 A rather similar view had been expressed earlier by an independent consultant, Mr. Ralph Torrie.

One of the ideas for dealing with global warming is to put a tax on carbon-burning fuels. On the surface this would seem to make sense, but I have just finished a comprehensive analysis of what has really happened to energy demand in Canada since the early 1970s. The central finding ... is that the price impact on energy demand has been grossly over-estimated.

It is understandable why it happened. Prices went up at the same time demand went down, and that was enough for the economists to conclude there was a causal relationship...

[However] we estimated that somewhere between 40% and 50% of the improvement in energy efficiency that took place in this country between 1973 and 1987 would have happened anyway due to structural changes in the economy characteristic of all advanced industrial economies....

Quite frankly, whether or not the money is raised by a carbon tax or another point on the GST really is not going to affect the overall level of energy demand in this country very much. This energy demand, per dollar of GDP, has dropped over 30% since 1973 and it is still going down, and it is going down in all the industrial economies.¹⁴

5.22 In our view the case for a carbon tax has not yet been proved, but neither has it been disproved. In regard to the findings just quoted, it is not the overall level of energy demand that needs to be affected to reduce greenhouse gas emission, what is needed is a shift in the forms of energy used. The Committee would be against the imposition of a carbon tax (or similar device) in the present state of knowledge of its potential direct and indirect effects. The Committee believes that it would be worthwhile for Canada to acquire that knowledge, and to monitor carefully the effects of such taxes in those countries that are imposing them.

5.23 The Committee takes a similar view of tradeable permits on greenhouse gas emissions, such as those suggested by the TransAlta witness. In principle these represent assets that can be used as a market-driven incentive to industrial firms, electricity utilities, and other major emitters to reduce their emissions, and sell the unneeded portions of their permits. Again we believe that this option merits serious study, especially as a potential way of reducing the regional disparities in emission patterns that we have emphasized. The Committee regards it as axiomatic that any permit system should provide for a declining total level of emissions over time, consistent with the need to achieve substantial reductions from contemporary levels. The Committee notes that, in the Green Plan, the federal government anticipates the introduction of emissions trading as a means of reducing urban smog.¹⁵ We think this will be a valuable and relevant pilot for the possible use of such permits in regard to greenhouse gas emission limitations.

5.24 More broadly, it seems evident to the Committee that the time is ripe for some new thinking, and especially some new Canadian thinking, on novel mechanisms to achieve the emission reduction targets that we seek. Some of these will be technical, others will involve taxation, regulation, incentives, and the like. There is much we can learn from other countries, and especially the innovations taking place in United States energy supply and demand management. But, as we have endeavoured to show, the Canadian situation is distinctive, and more specific attention to the Canadian situation seems to be needed.

E. ALTERNATIVE ENERGY TECHNOLOGIES

5.25 Through many months of hearings, members of the Committee gained an acquaintance with alternative energy technologies, and consequently the possible shape of Canada's energy future, that we value highly. We recommend the minutes of the evidence presented to us to all those who share our concern for our energy future, and who have a desire

to see Canada move into a sustainable development pattern. We heard from experts on hydrogen, fast-growing trees, fuel cells, integrated gasification combined cycle systems, and several others. Our witnesses communicated their enthusiasm as well as their expert knowledge, and we are grateful.

5.26 However, as with regional issues and carbon taxes, the Committee cannot make a judgement as to the efficacy of these systems or their long-term prospects. In most cases, we believe that no one is able to make that type of judgement, since the technologies are still in the development stage and their economic and social implications have scarcely been examined. In this respect they differ substantially from the methods of improving energy efficiency and conservation that we believe will dominate the 1990s. The next decade will be crucial in bringing these systems and technologies to the stage where they can make a significant contribution to meeting Canada's energy needs. We will need them very quickly if atmospheric greenhouse gas concentrations are to be stabilised by the middle of the next century; many people would say that their introduction is already overdue. In reiterating both the recommendation in para. 5.10 and the following one, we have these alternative energy technologies particularly in mind:

5.27 The Committee recommends that the federal government introduce a major research, development and demonstration program with its objective being the commercial development of transportation fuels and systems that result in the lowest economically and technically feasible emissions of greenhouse gases.
(Interim recommendation no. 11)

F. GREENHOUSE GASES AND NUCLEAR ENERGY

5.28 Although nuclear power represents a major source of electricity for a large number of Canadians, its future expansion, in both Canada and the world, is uncertain, and it arouses strong passions, both pro and con, among many members of the public. These differences of view exist also within the Committee.

5.29 The Committee recognizes that energy conservation is the most rewarding strategy to reduce greenhouse gas emissions for the near-term future, and must represent the first line of attack. It is clear that in limiting or reducing emissions between now and the end of the century, nuclear power will have little role to play. To quote Prof. Robinson once more:

[I]f you want to spend a buck on reducing carbon dioxide emissions, and you do a conservation supply curve, nuclear power is way up at the expensive end of the options. It gets relatively little carbon dioxide abatement per dollar spent. By spending all that money there, you do not have that money to spend on the really cheap conservation that would be very profitable in a financial sense and that would get you much larger amounts of efficiency.¹⁶

My own view is that given scarce resources, what you should be spending your money on is what is giving you the most bang for the buck. Right now, that is not any new supply source. We could afford to divert all our marginal investment capital and energy onto the demand side for some time to come, and we would be better off for it socially. That is not going to happen, of course. We are not going to simply stop investing in energy supply, but we should at least redirect as much as we can at the margin.... Whether in the end we have to go nuclear or not, I think, is essentially a political question that will have to be faced, but we do not have to now.

Global warming does not provide a rationale for a massive nuclear expansion. It provides a rationale for a massive increase in efficiency, and then we can decide the nuclear case on its own merits later.¹⁷

5.30 The question nevertheless arises as to whether increased use of nuclear energy should be included as part of Canada's longer-term strategy to reduce greenhouse gas emissions after the turn of the century. This is a question that does not at present arise in most other "like" countries; as we were told by our final witness, a Canadian who serves on the International Energy Agency in Paris:

Canada is one of three countries in the OECD that still has a nuclear program. It is probably the only country that is proposing to go ahead and continue to build nuclear, along with aggressive energy efficiency programs in the Canadian utilities....

The CANDU technology is excellent, and it is the only technology out there in the world other than the American PWR system.¹⁸

5.31 A dispassionate view of the role of nuclear energy in global warming control was provided by a witness with impeccable environmental credentials, Dr. James Bruce:

Instead of policies leading to ever more hydrocarbon use Canada must reduce energy demand and must change fuels to use more renewables, more natural gas, and, yes, where economically warranted, more nuclear...

Where the nuclear option looks to be a reasonable option from the economics of the situation, then I think it is probably preferable from the point of view of the world's atmosphere to building a fossil fuel plant.¹⁹

5.32 The costs of nuclear energy are still in dispute, as we were told by Mr. Haites:

There was an independent review done in Ontario that said the costs of nuclear, including the environmental cost of disposal and decommissioning, are quite competitive with thermo generation. Then, when you look at cost estimates produced in the States, they are three times as high. Frankly, that puzzles me as a non-expert. I do not know what the resolution is there.²⁰

5.33 Other reservations about nuclear energy aside, when new energy supply must be considered, nuclear energy may or may not prove to be much more expensive than alternative fuels that can also reduce greenhouse gas emissions substantially. Some members of the Committee believe that nuclear power will be essential in meeting the world's future energy needs while limiting emissions, and that Canada's CANDU technology may have a major role. Other Committee members endorse the view expressed by witnesses that nuclear power will remain a high-cost mechanism for reducing greenhouse gas emissions.

5.34 Obvious questions still arise, in both national and international contexts, concerning site safety and security, proliferation, and waste disposal at all stages, including decommissioning of nuclear plants. If these concerns can be effectively addressed, in the continuing development of the CANDU system, and if similar encouragement is given to

alternative energy sources over the next decade, Canada will be then able to choose its future forms of energy supply on an adequate basis of knowledge about the economic, environmental and other criteria involved in the choice.

NOTES AND SOURCES

1. Vol. 29, p. 49.
2. Intergovernmental Panel on Climate Change, Working Group 2, Policymakers Summary, p. 1.
3. *Proceedings of the World Conference on The Changing Climate: Implications for Global Security*, WMO710, World Meteorological Organization, Geneva, 1988, p. 296.
4. Based on *Emissions Scenarios*, Report of the IPCC Expert Group on Emissions Scenarios, pp. E3 - E4 and Table 5.
5. *Green Plan*, p. 105.
6. Vol. 22, p. 47.
7. Vol. 23, pp. 8, 14.
8. Vol. 42, pp. 7, 9.
9. Vol. 28, p. 10.
10. Vol. 28, p. 23.
11. *Green Plan*, p. 102.
12. Vol. 24, p. 7.
13. Vol. 42, pp. 43, 44, 45.
14. Vol. 23, p. 18.
15. *Green Plan*, pp. 54-55.
16. Vol. 24, pp. 18-19.
17. Vol. 24, p. 58.
18. Vol. 51, p. 28.
19. Vol. 30, p. 39, 41.
20. Vol. 22, p. 40.

MONITORING PROGRESS AND REVISING THE STRATEGY

6.1 Our final chapter is brief but, the Committee believes, essential and important. Efforts to reduce greenhouse gas emissions, such as those embodied in the National Action Strategy on Global Warming, must be sustained over several decades. Priorities, and public and governmental attention, are apt over time to move to other issues. We have the "lost decade" of the 1980s as evidence of this in regard to energy conservation. Not merely is the present concern over global warming likely to diminish, especially if initial efforts appear to be bearing fruit, the strategies and options themselves will necessarily vary over time. In the Committee's view, an essential ingredient of success will be the existence of a continuing mechanism (or, preferably, several mechanisms) for monitoring the progress that is made and the opportunities that will arise for revising and improving the strategy for limiting greenhouse gas emissions.

6.2 To some extent this need has already been recognized and accepted by the federal government. The Green Plan indicates that the Action Strategy will include the following:

- an annual report to Parliament on progress in meeting energy efficiency objectives
- publication of detailed information on Canadian energy consumption by end-use
- publication of a discussion paper in spring 1991 on the use of economic instruments to achieve environmental objectives, including tax and emissions-trading options
- an inquiry into the environmental impact of electricity generation options
- annual reports on the state of the Canadian climate, beginning in 1991
- a volunteer network across the country to detect climate change, in place by 1996.¹

6.3 The relevance of, and need for, these commitments should be evident from the preceding chapters of our report. They do not, however, go far enough. It is not difficult, for example, to envisage a situation in which, whatever political party is in power, the enthusiasm of Environment Canada for an effective limitation strategy is not shared equally by other key departments. It was with this in mind that we made, and now reiterate, two recommendations in our interim report. The Committee believes that they have a wider relevance beyond the immediate issue of global warming, as Canada endeavours to move to a sustainable development path. Global warming is, however, by its diversity and enduring character an excellent demonstration of the need for these recommendations.

6.4 The Committee recommends that the Minister of Environment have the responsibility and authority to develop policies, programs and regulations that span the full range of activities of the federal government, analogous to the

Minister of Finance for financial and economic affairs, and that the Environment Minister report to Parliament annually on the environmental impact of all federal activities. (Interim recommendation no. 15.)

6.5 The Committee recommends that the Auditor General, working in conjunction with the Departments of Environment and Finance, establish an environmental audit function to assure that all federal departments and agencies have implemented environmental assessment processes, and to monitor the effectiveness of environmental programs. Specifically, the Auditor General should monitor the progress of all federal departments and agencies in setting and attaining targets for greenhouse gas emissions. (Interim recommendation no. 16)

6.6 The National Action Strategy on Global Warming is being developed on a federal-provincial basis; it will depend for its success, however, on action by municipalities, by the private sector, and by individuals, as well as by senior governments. Yet, more may be needed.

6.7 In order to develop a truly comprehensive response to global warming, a long-term energy policy is needed as a framework for the wide array of necessary initiatives. The policy would give priority to energy efficiency (from transportation to buildings to electricity generation to agriculture to manufacturing and production), and to alternative or renewable energy sources. In addition, such policy would provide a means of ensuring that all government actions and policies — fiscal, taxation, regional development, forestry, foreign aid, trade, agriculture, etc. — are coordinated towards the single goal of reducing the emission of greenhouse gases, particularly CO₂, and slowing the rate of global warming.

“But the threat to our world comes not only from tyrants and their tanks. It can be more insidious though less visible. The danger of global warming is as yet unseen, but real enough for us to make changes and sacrifices, so that we do not live at the expense of future generations.”

— Margaret Thatcher, then Prime Minister of the United Kingdom,
Geneva, 6 November 1990.

NOTES AND SOURCES

1. Green Plan, pp. 107, 109, 110.

The Honourable David Richardson, P.C., M.P.
Chairman
Standing Committee on Environment
House of Commons
Room 309, East Block
Ottawa, Ontario
K1A 0A6

Dear Mr. Chairman:

Pursuant to Standing Order 107 of the House of Commons, I am pleased to forward to you the enclosed Government's response to the recommendations of the report of the Standing Committee on Environment, tabled in the House of Commons on March 23, 1991 entitled "Our Common Future: The Risks of Irreversible Climate Change".

The response to the threats posed by increasing concentrations of greenhouse gases in the atmosphere has become one of the most difficult and central global environmental issues being addressed by the international community. The Government is pleased that the House of Commons Standing Committee on Environment has recognized this, and devoted the time and energy to investigate the issue and make the recommendations contained in this report.

In December 1990, the Government announced Canada's Green Plan which forms the basis of national policy dealing with Canada's environmental and environmental issues of concern, including global warming. I am pleased to see that the Green Plan and other Government policy responds positively to the recommendations of the Standing Committee's report.

For your reference, the Government's response to the Standing Committee's report contains an appendix that outlines the proposed National Action Strategy on Global Warming, and reports each recommendation followed by the Government's response to each recommendation.



SEP 20 1991

The Honourable David MacDonald, P.C., M.P.
Chairman
Standing Committee on Environment
House of Commons
Room 309, East Block
Ottawa, Ontario
K1A 0A6

Dear Mr. Chairman:

Pursuant to Standing Order 109 of the House of Commons, I am pleased to forward to you the enclosed Government response to the recommendations of the report of the Standing Committee on Environment, tabled in the House of Commons on March 25, 1991 entitled Out of Balance: The Risks of Irreversible Climate Change.

Response to the threats posed by increasing concentrations of greenhouse gases in the atmosphere has become one of the more difficult and central global environmental issues being addressed by the international community. The Government is pleased that the House of Commons Standing Committee on Environment has recognized this, and devoted the time and energy to investigate the issue and make the recommendations contained in this report.

In December 1990, the Government announced Canada's Green Plan which forms the basis of Canadian policy dealing with Canada's environment and environmental issues of concern, including global warming. I am pleased to see that the Green Plan and other Government policy responds positively to the recommendations of the Standing Committee's report.

For ease of reference, the Government response to The Standing Committee's report contains an introduction that outlines the proposed National Action Strategy on Global Warming, and repeats each recommendation followed by the Government's response to each recommendation.



In closing Mr. Chairman, I would like to thank the members of the Standing Committee for their contribution in the development of approaches to the global warming issue. I look forward to working with you and your colleagues on the development of measures that will assist in preserving and enhancing the state of our environment.

Yours sincerely,

Jean J. Charest

INTRODUCTION

Since the main thrust of the Standing Committee's report deals with policies to limit Canadian emissions of carbon dioxide, one of the major greenhouse gases, it seemed appropriate to outline as an introduction, the framework that the government's response to the 25 recommendations of the report is based on. This includes *Canada's Green Plan* and the proposed *National Action Strategy on Global Warming*. Readers will be familiar with the Green Plan. They may not be as familiar with the National Action Strategy which is summarized in the following.

The National Action Strategy on Global Warming

In recognition of the need for a coordinated and consultative approach, the federal departments of Energy, Mines and Resources and of the Environment, in cooperation with their provincial and territorial counterparts, developed the National Action Strategy on Global Warming. The Strategy was reviewed by federal and provincial Environment Ministers at the November 1990 meeting of the Canadian Council of Ministers of the Environment. Ministers agreed to release the Strategy for public discussion. They also transmitted the document to their Energy colleagues for their review.

This Strategy, which involves a comprehensive and phased approach, provides a framework for Canadian initiatives to reduce emissions of greenhouse gases. The initial set of initiatives will involve efficiency measures which are economically or socially attractive in their own right. It is also proposed that federal, provincial and territorial governments commence examination of more aggressive and far-reaching measures that may become necessary to meet the goal of stabilization or other objectives. These could address the use of tax and other fiscal measures, electricity pricing structures, incentives provided for more efficient electricity and gas use/conservation as compared to supply expansion, lifestyle changes, and changes in the way our cities function.

According to the proposed National Action Strategy, Canada's limitation strategy on climate change would be based on the following fundamental principles. Comprehensiveness; importance of international agreements; and, flexibility.

Comprehensiveness: The principle of a comprehensive approach means that a response to the problem of global warming must address all of the major greenhouse gases, addressing sinks as well as sources.

International Agreement: This second principle recognizes that the problem of global warming is, by definition, a global one, and cannot be resolved by any one country or group of countries. It requires a concerted international response. There are some measures that can be taken to

reduce greenhouse gas emissions which are judged to be desirable in their own right — it makes sense for countries to take such measures unilaterally. Other measures, however, could entail significant costs, or could confer a competitive disadvantage. Before introducing such measures, countries must be assured that the burden is being shared, and that they will not be penalized in terms of international competitiveness. This principle is particularly relevant in the case of Canada, which is an extremely open economy and highly dependent on international trade for its economic well-being.

Flexibility: The principle of flexibility includes several aspects. It recognizes that scientific and socioeconomic understanding of the problem of global climate change and its solutions is not complete. Thus, a National Action Strategy should be allowed to evolve as new information or technologies become available. It also recognizes that different jurisdictions and sectors may wish to address the problem in different ways. Building a high degree of flexibility into the Canadian Strategy will ensure that the problem of global warming is addressed in a least-cost fashion which should minimize adverse economic impacts for any one region.

RECOMMENDATION 1 (Paragraph 1.11)

We also recommend that action should be taken now, not 3 to 5 years from now, to reduce substantially the rate of greenhouse gas emissions throughout the world and specifically in Canada.

Response:

- The National Action Strategy on Global Warming and the Green Plan call for a phased, progressive approach towards limiting emissions of greenhouse gases. This will involve first doing those things which make sense in their own right, either because they are economic or because they also help to achieve other policy and environmental objectives, starting with those measures that have shorter lead times.
- The consumption of fossil fuels is the primary source of Canada's CO₂ emissions, and it is an important source of other greenhouse gases. CO₂ emissions can be limited by reducing overall energy demand and by switching to less carbon-intensive energy sources. In the short term, there is limited scope for substitution away from fossil fuels or to less carbon-intensive fuels. Therefore, the federal government's immediate emphasis, in terms of measures to reduce CO₂ emissions, will be on energy efficiency improvements. The federal government will also encourage provinces and municipalities to do likewise.
- Chlorofluorocarbons (CFCs) are best known as substances which deplete the ozone layer. CFCs, however, are also an important group of greenhouse gases. Measures to reduce the consumption of CFCs play a dual environmental role.
- Under the 1987 Montreal Protocol, Canada is committed to a 50 per cent reduction in consumption of five CFCs by 2000. Regulations implementing these obligations came into effect in July 1989. Canada will achieve the first 20 per cent reduction in CFC consumption this year, almost two years before the 1993 date specified in the Protocol.

- In June 1990, the Parties to the Montreal Protocol agreed to accelerate the phase-out of the five types of controlled CFCs to a 100 per cent phase-out by 2000. Canada and 12 other countries issued a separate declaration committing to eliminate these CFCs no later than 1997. Regulations will be introduced to achieve these more rigorous targets and schedules.
- Land fill sites are an important source of methane emissions. The federal government and the provinces have taken a major step towards reducing emissions from this source through the adoption of a national target of reducing waste generation by 50 per cent by the year 2000. Under the aegis of the Canadian Council of Ministers of the Environment, packaging waste will be reduced by 20 per cent by 1992 and by 35 per cent by 1996.

RECOMMENDATION 2 (Paragraph 2.10)

The Committee recommends that Environment Canada, as the lead agency, coordinate the development by federal departments and agencies of comprehensive public information and advocacy programs directed to individual Canadians, to Canadian business and to other institutions, identifying the role that each can play in reducing greenhouse gas emissions.

Response:

- An informed population is essential in addressing and adapting to climate change. Actions by individual Canadians are part of the problem and must be part of the solution. Therefore, beginning in 1991 the government will launch a major public information campaign, in order to stress the importance of individual action and to put Canadians in a position to make more informed decisions.
- The Green Plan and the National Action Strategy on Global Warming clearly acknowledge the critical role of environmental education. At present, many departments develop and produce public education materials which contribute to increased public understanding of the climate change issue, its causes, impacts and possible solutions. It is important that relevant departments continue to draw on their expertise and knowledge and that of their clients and partners in industry to ensure that education programs become effective instruments for reducing greenhouse gases.
- Under the Green Plan's Environmental Citizenship Program (ECP), Environment Canada will seek to coordinate and integrate public information and advocacy programs directed to individual Canadians, to Canadian business and to other institutions, identifying the role each can play in reducing greenhouse gas emissions. The Government of Canada must act as a catalyst. The necessary expertise and capacity for improving the environmental literacy of Canadians lies largely outside of government. Wherever possible, therefore, ECP will seek to enter into partnership arrangements with other organizations and institutions.
- The development of some policies and response strategies to address certain aspects of the climate change issue necessitate shared responsibilities. This is particularly true where energy is involved as a source of greenhouse gas emissions. The Green Plan

makes specific reference to the expansion of Energy, Mines and Resources, Canada's existing programs for encouraging energy efficiency, alternative energy and technology development to deal with the energy component of greenhouse gas emissions.

- The Minister of Energy, Mines and Resources will issue a challenge to take advantage of all opportunities to save on energy consumption. Under this challenge program:
 - agreements will be reached with major energy-using organizations in Canada on performance and/or prescriptive energy-saving initiatives they will undertake;
 - an annual report will be made to Parliament on progress in meeting energy efficiency objectives; and
 - detailed information on Canadian energy consumption by end-use will be conveyed to the public.

RECOMMENDATION 3 (Paragraph 3.3)

The Committee strongly recommends that Canada implement immediately a National Program of Greenhouse Gas Emissions Measurement and Source Identification, and that the data be tabled annually in Parliament.

Response:

- Environment Canada and Energy, Mines and Resources have developed an initial inventory of sources and emissions of the four principal greenhouse gases in Canada for base year 1987 (more recent data are available for carbon dioxide).
- Expressed in terms of CO₂ equivalents, these data indicate that CO₂ accounted for about 56 per cent of Canada's known man-made greenhouse gas emissions in 1987, while CFCs, methane and nitrous oxide accounted for 14 per cent, 10 per cent and 5 per cent respectively.
- Energy consumption and agricultural land use are two principal man-made sources of CO₂ emissions in Canada. A preliminary estimate of emissions from agricultural land use is that these amount to about 85 million tonnes of CO₂ per year but this estimate is highly uncertain. Fossil fuel energy use accounts for over 450 million tonnes of CO₂. Non-energy sources, such as cement and ammonia production and incineration, account for about 12 million tonnes per year.
- In the case of CFCs, emissions in 1987 were about 19,000 tonnes or the equivalent of 112 million tonnes of CO₂. CFCs are principally used commercially in foam, refrigerants, air conditioners, aerosols and solvents. Canada will eliminate non-essential use of five designated CFCs by 1997.
- Data on emissions of other greenhouse gases are not as fully developed as for CO₂ and CFCs. Preliminary estimates of our 1987 emissions of methane and nitrous oxide are 3800 kilotonnes and 141 kilotonnes respectively. In the case of methane, about 50 per cent of anthropogenic emissions come from landfill sites, while about 25 per cent come from large animals. In the case of nitrous oxide, about 55 per cent of emissions are from fossil fuel combustion, about 25 per cent from the use of nitrogen fertilizers and about 20 per cent from nitric acid production.

- Under the Green Plan, the federal government, in cooperation with the provinces and industry, plans to establish a comprehensive greenhouse gases inventory and reporting system. This system will be incorporated in federal/ provincial agreements which will establish regular reporting procedures and schedules.

RECOMMENDATION 4 (Paragraph 3.12)

We recommend that Canada, together with other countries, should make a major effort to achieve the goal of the Accelerated Policies Scenarios, i.e. stabilization of greenhouse gases by the middle of the next century, at levels that may be higher than at present but will be "well below an equivalent doubling of CO₂ over pre-industrial levels." We recommend also that the Government of Canada develop and publish a strategy for the Canadian Component of such a global target.

Response:

- At the Second World Climate Conference in Geneva in the fall of 1990, Ministers and other representatives from 137 countries agreed "that the ultimate global objective should be to stabilize greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with climate". Representatives affirmed that "in order to reduce uncertainties, to increase our ability to predict climate and climate change on a global and regional basis, including early identification of as yet unknown climate-related issues and to design sound response strategies, there is a need to strengthen national, regional and international research activities in climate, climate change and sea level rise". The representatives also maintained that "there is a need to intensify research on the social and economic implications of climate change and response strategies."
- Permanent and lasting solutions to the threat of global warming will take years to develop and implement and will require coordinated international action. While there are similarities between the issues involved in reaching international agreement on a coordinated approach to global warming and other environmental issues, such as stratospheric ozone depletion, the difficulties are likely to be more severe in the case of global warming. This is because activities giving rise to greenhouse gas emissions are deeply integrated in the economic structures of countries, and are widespread throughout the economy.
- Canada is participating with its international partners in seeking a coordinated approach to solving the global warming problem. Despite the difficulties in developing an international consensus, substantial progress has been made in a relatively short time. The 1988 Toronto Conference on the Changing Atmosphere was the first major conference at which policy-makers and scientists came together to consider the implications of human activity on the atmosphere. In February 1989, Canada and 23 other countries signed the Hague Declaration, which recognized the need for an international convention on climate change. At a subsequent meeting in November 1989, at Noordwijk, the Canadian Environment Minister and Ministers from 75 other countries emphasized the importance of establishing quantified targets and schedules to limit or reduce emissions of greenhouse gases. Ministers also

recognized the need to stabilize atmospheric concentrations of greenhouse gases while ensuring stable development of the world economy. In May 1990, at a meeting of the United Nations Economic Commission for Europe in Bergen, Norway, 34 member countries (including Canada) committed to establish national strategies and/or targets and schedules, no later than the start of negotiations on an international framework convention on climate change, to limit or reduce emissions of CO₂ and other greenhouse gases as much as possible and to stabilize them. At the Second World Climate Conference, Ministers and other representatives welcomed the commitments by Canada and other countries "to take actions aimed at stabilizing their emissions of CO₂, or CO₂ and other greenhouse gases not controlled by the Montreal Protocol, by the year 2000 in general at 1990 levels." Representatives also urged developed countries "to analyze the feasibility of and options for ... a staged approach for achieving reductions of all greenhouse gas emissions not controlled by the Montreal Protocol" over the next two decades and beyond.

- Negotiations on an International Framework Convention on Climate Change commenced in February. The negotiations are aimed at producing an umbrella agreement among nations of the world to reduce human-induced climate change, and will be accompanied, either simultaneously or through subsequent agreements, by protocols with binding commitments to specific actions to achieve the objectives of the Convention. The Convention could be ready for signature at the 1992 U.N. Conference on Environment and Development.
- Under the Green Plan, Canada is actively participating in the negotiations of the International Framework Convention on Climate Change and the development of implementing protocols. The federal government believes that to be effective, the Convention must be designed to attract the maximum number of countries as well as a balance between developed and developing countries. The special concerns of the developing countries must be addressed so that they can fully participate in the negotiations. To this end, Canada has committed \$1 million to the World Meteorological Organization to assist developing countries understand the issue of climate and climate change and how to respond to it.
- As a first step towards solving the global warming problem, Canada is committed to stabilize national emissions of CO₂ and other greenhouse gases, not controlled by the Montreal Protocol, at 1990 levels by the year 2000. The federal government believes that further reductions in emissions are required and that they should be based on a program of targets and schedules agreed upon internationally. In this context, the technical feasibility and the cost and trade implications of further reductions in emissions will be examined including the 20 per cent reduction in CO₂ emissions called for by the Toronto Conference.
- There is undoubtedly some scope for reducing emissions without incurring major economic costs, and some reductions can result in economic benefits. Canadian efforts to reduce emissions can increase production efficiency, make our firms more competitive on world markets, and help promote the development of a Canadian environmental service industry which would be well placed to take advantage of overseas opportunities.

- It must be recognized, however, that some measures being examined as having potential to reduce emissions could affect the competitiveness of Canadian businesses, particularly if Canada's major trading partners, including the United States, do not undertake similar actions. For this reason, policies and programs to reduce emissions must be developed through consultation with all interested parties, and must be sensitive to the policies and programs of our major trading partners.

RECOMMENDATION 5 (Paragraph 3.15)

The Committee recommends that the Toronto target of a 20% reduction in humansourced CO₂ emissions by the year 2005, compared to the 1988 level of emissions, be adopted by the federal government as its minimum interim objective in reducing Canadian CO₂ emissions.

Response:

- Canada committed to stabilize its emissions of CO₂ and other greenhouse gases other than those already controlled by the Montreal Protocol, at 1990 levels by the year 2000 at the Ministerial Conference on Sustainable Development in Bergen (May 1990). This commitment was reinforced at the Second World Climate Conference in Geneva (November 1990) and is a central element of the Government's Green Plan.
- The Government of Canada believes that further reductions in greenhouse gas emissions are required and that these should be based on a program of targets and schedules agreed upon internationally. In this context, the technical feasibility and the cost and trade implications of further reductions in emissions will be examined, including the 20 per cent reduction in CO₂ emissions called for by the 1988 Toronto Conference. This would require consultation and cooperation among all levels of government and stakeholders as well as education programs to encourage action by all Canadians; an approach that is essential to the development of a credible strategy to limit emissions — one which is capable of achieving stated goals for reductions of emissions.

RECOMMENDATION 6 (Paragraph 3.19)

Canada adopt the target of reducing the intensity of energy use in the Canadian economy by 2% annually, until our emissions of carbon dioxide are reduced to a level which does not contribute to the further accumulation of CO₂ in the atmosphere.

Response:

- Energy intensity is a measure of a country's dependency on energy and is usually estimated in terms of energy consumption per capita or per unit of economic output (GDP). Using either of these measures, Canada is one of the most energy intensive countries in the world. This does not mean, however, that Canada is the most, or even one of the most energy inefficient countries in the world.
- There are several reasons why Canadian energy intensity is so high: the Canadian climate is harsher than that of many other countries; Canada has a relatively low population density leading to greater use of energy per capita in transporting both

people and goods; many of Canada's industries such as aluminium, and pulp and paper are energy intensive requiring a large amount of energy per unit of output; and in part because of our rich endowment of energy resources, energy prices in Canada are low relative to other countries, which does not encourage an individual conserving lifestyle.

- This is not to say that there are not opportunities to improve the efficiency of energy use in Canada. For this reason the Government has introduced measures to improve Canada's energy efficiency, via the Green Plan. Initially the focus will be on initiatives to increase efficiency and the use of alternative energy sources that are economically or socially attractive in their own right. The Government will seek industry's commitment to help achieve energy efficiency gains as well as to share information on new energy efficiency technologies and practices. Government-industry cooperation will take place on several fronts: The Minister of Energy, Mines and Resources will establish a National Advisory Council to promote industry-government cooperation and to establish energy efficiency targets for each of Canada's industrial sectors.
- Reductions in energy intensity will depend on many factors, such as the structure of the economy which is variable and not readily predictable. There are other factors to be considered, as well. For example, the assumption given in the recommendation is that energy intensity reflects CO₂ emission levels. In actual fact, energy intensity could remain unchanged or even increase, but emissions of CO₂ could be reduced if the energy source shifted from those that did not result in the emissions of CO₂.

RECOMMENDATION 7 (Paragraph 4.5)

We also welcome the statement that the use of CFCs in car air conditioners will be phased out by the 1995 model-year, although we recommend that this provision should apply to all vehicles, not just to cars, and that air conditioning units in vehicles should be required to be leak-proof by model-year 1992.

Response:

- Canada has in place domestic regulations, under the Canadian Environmental Protection Act (CEPA), to implement the Montreal Protocol's CFC control obligations. Draft regulations under CEPA were proposed in the spring of 1989. The final regulations came into effect in July 1989.
- The federal government recently announced its intention to ban the use of CFCs in automobile air conditioners and other products. The target dates for these bans, which go beyond the requirements of the amended Montreal Protocol, are
 - 1993 for their use as blowing agents in flexible foams
 - 1994 for their use as solvents for sensitive electronic equipment
 - 1994 for their use as hospital sterilants
 - 1995 for their use as blowing agents in poured and sprayed plastic foam insulation, and
 - the 1995 model-year for use of CFCs in automobile air conditioners; in 1997, all air conditioners in new vehicles will be CFC-free.

- Given the lead time required for engineering, it is not feasible to make leakproof air conditioning systems mandatory by the 1992 model-year.
- The government is preparing regulations aimed at achieving the 1997 phase-out. In addition, it plans new regulations to ensure that the 19 per cent reduction in CFC use already achieved in Canada is taken as a starting point for the more stringent reductions agreed to at the London Conference in June 1990. Further measures to help Canada achieve its goal are being pursued with the 'provinces.

RECOMMENDATION 8 (Paragraph 4.8)

The Committee recommends that the Government of Canada, in cooperation with provinces and municipalities, strongly encourage the introduction of a requirement that CFCs be removed from used equipment before disposal.

Response:

- The federal government, in cooperation with the provinces, is developing a national action plan for the recovery and recycling of CFCs. Pilot studies to determine the feasibility of CFC recovery from used equipment before disposal are being carried out by several provinces and municipalities.

RECOMMENDATION 9 (Paragraph 4.16)

The Committee recommends therefore that the federal government investigate urgently the data offered to us by the Canadian Gas Association, preferably through an independent survey of the leakage problem. In addition to clarifying important problems of domestic priorities, we believe that independent evidence on this issue will materially assist Canada in international negotiations on a global warming convention.

Response:

- In 1990, the World Resources Institute published information which suggested that methane losses from pipelines in Canada could be as high as 16 per cent of total natural gas production.
- At a workshop with American officials last year, there was consensus that in Canada and the United States, methane losses from natural gas transmission and distribution are less than 0.5 per cent. The Institute has recently recanted and agrees that losses are less than 0.5 per cent.
- Further verification of methane emissions from natural gas transmission and distribution will be undertaken as part of the joint work by Environment Canada and Energy, Mines and Resources on greenhouse gases emission inventories.

RECOMMENDATION 10 (Paragraph 4.18)

Given the human-sourced carbon dioxide emissions are the principal contributor to increasing atmospheric levels of greenhouse gases, and given that society's use of energy is the largest factor in this CO₂ generation, the

Committee concludes that Canadian energy policy-making must have as its most immediate focus the more efficient and conserving use of energy. Coupled with the more effective use of energy is the need for fuel substitution away from high-carbon fuels and for the commercial availability of technologies for exploiting carbon-based fuels with less environmental impact.

Response:

- The objectives of Canadian energy policy are varied and far-reaching. Among others they are to ensure that Canadian consumers and industry make informed decisions on energy-related matters so that they use and produce energy in an environmentally responsible fashion. As a result of concern for climate change and other energy/environment concerns, the focus of implementing this objective is shifting to the conserving and efficient use of energy.
- The National Action Strategy on Global Warming and many of Canada's Green Plan initiatives present examples of this focus. For example, a *National Efficiency and Alternative Energy Act* should result in meaningful improvements in energy efficiency at end-uses. New fuel efficiency targets should substantially improve the performance of new vehicles, while a concerted effort will be made on the development and introduction of lower carbon-intensive and alternative fuels into the market place. Efforts to improve the efficiency with which carbon based fuels are combusted are increasing both through government agencies such as CANMET and through private sector initiatives; it is realized that there is a need to increase efficiency to remain competitive and to deal with other energy related environmental concerns.
- In this regard, the federal government supports the use of a comprehensive and staged approach to reducing greenhouse gas emissions. Initially, the focus will be on energy efficiency and alternative energy initiatives which are economically attractive in their own right or that meet multiple policy objectives. If this is insufficient to meet declared objectives, more far-reaching and tougher federal and provincial measures would be considered. These could include: the use of fiscal instruments, restructuring of energy pricing, and more regulatory intervention. Before such second-step measures would be implemented full consultation and an in depth understanding of their economic costs and benefits would be necessary. For example, full consideration of the "Citizens Code of Regulatory Fairness" including consultations and regulatory impact analysis would be required, before any regulatory initiatives would be implemented.

RECOMMENDATION 11 (Paragraph 4.24)

The Committee recommends that federal and provincial strategies to combat human-induced global climate change combine strong regulatory systems with a careful utilization of market forces to develop economically efficient programs for reducing greenhouse gas emissions in Canada.

Response:

- Measures for reducing greenhouse gas emissions in Canada will combine the use of regulatory systems and market forces, in addition to other means such as suasion, public information and education. The Government is also committed under the Green Plan to building and strengthening partnerships with Canadian industry and consumers to achieve environmentally responsible decision-making.
- The Government recognizes that action may be required to provide information on the availability and benefits of measures to overcome market barriers. The need for such measures is part of the rationale for some regulatory initiatives such as labelling. An example of this will be found with the introduction of a *National Energy Efficiency and Alternative Energy Act* which would deal with:
 - regulation of minimum energy efficiency levels in energy-using equipment;
 - labelling of products to convey information on energy use; and
 - collection of statistics on energy use.
- The Government also recognizes the potential effectiveness of market forces. In this regard the Green Plan commits to the release of a discussion paper in 1991 on the use of economic instruments to achieve environmental objectives. This will include an analysis of taxes and the possible use of an emissions trading system in attaining reductions in greenhouse gas emissions.
- Under the National Action Strategy on Global Warming, the Federal Government has indicated its support for the use of a comprehensive and staged approach to reducing greenhouse gas emissions in consultation and conjunction with the provinces. If the initial focus on energy efficiency and alternative energy initiatives which are economically or socially attractive in their own right appear not to be sufficient to meet declared objectives, more far-reaching and tougher federal and provincial measures would be considered. These could include: the use of fiscal instruments, such as taxes; restructuring of electricity pricing to encourage conservation versus supply expansion; changing electric and gas utility incentive structures; and more regulatory intervention that could result in lifestyle changes. Before such second-step measures were implemented, however, it would be necessary to have a full understanding as to their economic costs and benefits.

RECOMMENDATION 12 (Paragraph 4.30)

The Committee recommends that all federal departments and agencies, as part of their budget submissions, report on the direct and indirect impacts of their operations on global warming, and set annual targets for reductions in greenhouse gas emissions.

Response:

- The Government had adopted a national target of stabilization at 1990 levels by the year 2000, and the Federal Government is committed to putting its own house in order. In this regard Goal 6 of the Green Plan indicates:
 - assurance that the operations and procedures of the Federal Government exceed national targets and schedules for sustaining our environment.
- An example of initiatives in this regard is that, in conjunction with Ontario Hydro's "Power Savers" electrical demand side Management Program, Energy Mines and Resources Canada, with the cooperation of Environment Canada and Public Works Canada is engaged in the development of an energy efficiency program for existing and planned federal installations.
- To date all of EMR's buildings have received comprehensive energy audits by specially trained Ontario Hydro personnel and work is proceeding on the retrofit of all EMR's holdings, per the results of the audit. A similar plan is being developed for 1300 federal installations during the forthcoming fiscal year and for 20,000 installations by the end of the project (forecast as 1995). An energy savings of approximately 15% is expected from this initiative.
- Reductions in greenhouse gas emissions will result from the specific energy efficiency targets under the Code of Environmental Stewardship. If specific commitments to greenhouse gas emission reduction targets for federal departments and agencies were to be made the Code of Environmental Stewardship would likely provide the appropriate venue.

RECOMMENDATION 13 (Paragraph 4.34)

The Committee concludes that Canada's electric utilities are a key element in reducing greenhouse gas emissions and urges provincial, territorial and municipal governments to direct utilities to take the lead in developing programs for electricity demand management and for introducing new technologies which improve — in both an energy and an environmental sense — the production, transmission and consumption of electricity.

Response:

- As indicated in the Green Plan, the Government of Canada believes that the provinces and municipalities should give serious consideration to measures which encourage more aggressive demand-side management (DSM) on the part of electric utilities and changes in electricity utility pricing and regulatory structures. There is also interest to

ensure that the environmental implications of generating electricity by different means is clearly understood. In this regard the federal government is closely monitoring the development and progress of a number of different provincial reviews concerned with the relationship between the electricity sector and the environment. The outcome of these initiatives will play a large role in determining the nature and timing of a federal review of the environmental implications of different electricity supply options.

- It should also be noted that the Department of Energy, Mines and Resources is currently working with the Canadian Electrical Association to increase the utilization and effectiveness of DSM by Canadian utilities. EMR is also working with the Canadian Gas Association to encourage the use of demand-side management by gas utilities and pipelines. The objective of demand-side management in the latter context is not only to utilize existing transmission and distribution capacity more effectively, but also to increase the efficiency of gas use.
- Renewable energy sources will be studied in cooperation with the provinces, utilities and other industry partners. Federal efforts will focus on systems design and engineering as well as standard-setting and certification programs (see Response to Recommendation 21 (b)).

RECOMMENDATION 14 (Paragraph 4.38)

The Principal/Interest/Taxes/Energy (PITE) type of mortgage incentive makes excellent sense in regard to new construction, and the Committee recommends that Canada Mortgage and Housing Corporation should take the lead in introducing it in Canada.

Response:

- Under the Green Plan, the federal government will be taking a number of initiatives to help improve energy efficiency in new and renovated buildings. Minimum energy efficiency standards will be developed for appliances and equipment. Energuide labelling of home appliances will be enhanced to provide customers with information for financial and energy savings. The 1983 federal measures for Energy Conservation in New Buildings will be updated and regionalized and their incorporation into more federal, provincial and municipal building codes will be encouraged. The R-2000 energy-efficient standard in home construction will be promoted. Efforts will be made to improve awareness of opportunities for energy efficiency in new and renovated buildings. Development and commercialization of promising technologies for energy-efficient buildings (e.g. better windows, lighting and heating and cooling) will be enhanced.
- The federal government believes that the provinces and municipalities should give serious consideration to the issues of electricity pricing and electric and gas utility regulating structures including the possibility of providing for investment and return on investment on the customer's side of the meter.

RECOMMENDATION 15 (Paragraph 4.41)

The Committee recommends that fuel efficiency standards be legislated for cars and trucks.

Response:

- It is anticipated that an Amendment to the Motor Vehicle Fuel Consumption Standards Act will be submitted to Parliament the end of 1992. At that time, new fuel efficiency targets will be announced which will contribute substantially to the Canadian commitment to stabilize greenhouse gases. These targets will apply to cars and light trucks.

RECOMMENDATION 16 (Paragraph 4.43)

Recognizing that Canada's forests are a major reservoir for atmospheric carbon and that the losses of forest stands through commercial harvesting, wildfire, insects and disease have resulted in a rate of harvesting of Canada's commercial forests and wild lands exceeding the rate of restocking, the Committee recommends that:

- (a) the federal government expedite negotiations with the provinces on federal-provincial agreements for the management of Canada's forests;**
- (b) provincial governments be urged to ensure that NSR lands are adequately reforested through replanting programs or through natural regeneration of the forest cover, and in a reasonable period of time;**
- (c) the losses to wildfire, insects and disease be reduced wherever possible; and**
- (d) future forest resource development agreements be linked to prompt regeneration and protection of all deforested areas, whether harvested commercially or depleted naturally.**

Response:

- The forestry initiatives of the Green Plan demonstrate the Government's commitment to balanced forest management practices and sustainable forestry in Canada. For example, up to eight model forests will be developed in partnership with provinces and industry in the major Canadian forest regions as working models of sustainable development. As well, the Green Plan outlines initiatives that will support the continued diversity of Canadian forests, and ensure that a comprehensive national forestry database is developed and maintained, both prerequisites for sustainable forestry.

Response to the specific sub-recommendations follow:

- (a) New five year federal-provincial forestry agreements were signed with New Brunswick, Nova Scotia and Prince Edward Island in 1989 and 1990. More recently, agreements have been signed with Newfoundland, Manitoba and

British Columbia. A new agreement with Saskatchewan is expected to be signed shortly. Negotiations are currently underway with the remaining provinces to conclude agreements as soon as possible.

- (b) Provincial governments sign long term forest management agreements with the forest industry which require the adequate regeneration of areas harvested by the industry, under license, on Provincial Crown lands. In addition, the federal government through its forestry agreements with the provinces, assists in regenerating older areas that have not regenerated adequately in the past or that have not been adequately reforested. This "backlog" of non-satisfactorily regenerated land is commonly referred to as NSR lands. A key principle of the federal government in negotiating new agreements, is that the provinces commit to regenerating all future cutover areas in order not to expand the backlog of NSR lands.
 - (c) A large part of Forestry Canada's research and development program is aimed at improving detection of forest pests and fires and reducing their contribution to forest losses. As indicated in the Green Plan the Government will accelerate and intensify efforts to develop and deploy environmentally acceptable solutions to forest damage by insects and disease. Forestry Canada, in conjunction with provincial and industrial partners will accelerate the creation of computer aided management tools and their transfer to forest managers.
 - (d) The federal-provincial forestry agreements are partly aimed at rehabilitating the backlog of NSR lands whether natural or man-made. Some provinces have additional backlog rehabilitation programs whereby the provinces and industry sign forest management agreements requiring adequate forest regeneration on provincial crown land where forest harvesting has occurred. Most areas of natural depletion, primarily from forest fires, regenerate adequately on their own over time.
- The federal government has developed eight new forestry principles which will be included in the new round of federal provincial forestry agreements. These principles are in support of sustainable development of our forests and include, among others, a commitment to the prompt regeneration of newly harvested areas. The eight forestry principles guide federal involvement in forestry agreements and are consistent with the National Forest Sector Strategy (1987). They were presented by the federal Minister of Forestry to his provincial colleagues in June 1989 at a meeting of the Canadian Council of Forest Ministers (CCFM). These principles involve:
 1. long-term forest management planning;
 2. improved forestry information;
 3. roles and responsibilities for silviculture;
 4. integrated forest management;
 5. research, development and technology transfer;

6. federal funding for incrementality;
7. public awareness; and
8. human resource development.

RECOMMENDATION 17 (Paragraph 4.51)

Given that vigorously growing trees are an effective means of extracting CO₂ from the atmosphere, the Committee recommends that federal government take the lead in establishing federal-provincial-municipal programs to encourage development of forests on otherwise unused lands, dedicated to sequestering atmospheric carbon as an intermediate-term strategy for reducing CO₂ levels in the atmosphere.

Response:

- Over the past several years, the federal government's forestry science and development activities have been active in examining the role of Canada's forests in the context of global warming. Preliminary results from a recent study by Forestry Canada, using 1986 data, indicate that Canada's forests are a net natural sink for carbon. This means that the country's forests are presently removing more carbon from the atmosphere during their growth than they are losing from decomposition and burning.
- The federal government is currently exploring the prospects for undertaking a national tree planting program for the purpose of sequestering carbon. A major thrust will involve cooperative initiatives with individuals and organizations for a community tree planting program in urban areas, where trees can lower peak energy demands by 20 to 40 per cent simply by providing shade and windbreaks. The goal is to encourage the planting of up to 325 million trees in rural areas as well as in and around 6,000 cities, towns and communities across Canada.

RECOMMENDATION 18 (Paragraph 5.10)

The Committee recommends that the federal government use environmental considerations as a filter for its foreign aid and trade initiatives, encouraging programs and technologies which convey environmental benefits and ending or modifying those that are environmentally unacceptable.

Response:

- The Government of Canada is using environmental information more actively in examining questions of trade and policy, drawing on advice from outside bodies with environmental experience in deploying our resources to meet the new and growing challenges. Foreign aid programs and technologies that convey environmental benefits are encouraged by the fact that environmentally sound development is one of the six priorities of Canada's Official Development Assistance Charter. This priority is pursued through: the funding of programs and projects that enhance the

environment, the promotion of environmental awareness, institution-building and support, data collection, and the mandatory environmental screening of all aid projects, a process that has been in place since 1986.

- Canadian Development Assistance projects have for some time been subject to careful screening for their environmental impact. This process will become more systematic and visible with the expected passage of the *Canadian Environmental Assessment Act*.
- A long term objective of CIDA is to encourage and assist developing countries to develop and implement their own capacity for environmental assessment. With this in view, respect for home country regulations and assessments will be a major element in the procedures applying to Canadian projects abroad.
- Achieving trade practices and disciplines that accommodate environmental imperatives is a challenge to all trading nations. Canada is currently discussing with its partners in the OECD the various means by which this goal can be more fully realized. This includes means by which all trading nations can be assured that adequate environmental assessments will be in place for major projects.

RECOMMENDATION 19 (Paragraph 4.61)

The Committee recommends that the federal government develop policies and programs which encourage Canadian companies to commercialize and export technologies and equipment that are effective in reducing greenhouse gas emissions, particularly to developing countries which are striving to build their domestic economies.

Response:

- The Government fully recognizes the global nature of many environmental problems, and is aware of the need for Canada to take an active role in their remediation, particularly through the transfer of technology to developing countries. Transferring our technology will assist developing countries build their domestic economies, while providing new markets for Canadian technologies. In particular, this can provide a role for Canadian resource processing industries which share environmental challenges similar to those encountered by industries in developing countries. In many cases the transfer of technology will allow a larger net reduction to be made in the emission of greenhouse gases per dollar of investment.
- Privatization and deregulation have made it easier for Canadian firms to start up in new areas of endeavour such as the development of new environmental technologies. Additionally, the development of partnerships between industry and government departments such as examples given below and through ISTC and External Affairs will increase the role our efforts will play in helping developing countries meet environmental obligations.
- The Department of Energy, Mines and Resources is already carrying out a number of initiatives in the transfer of environmentally-sensitive technology, particularly under the auspices of CANMET. Their activities have been in coordination with the International

Energy Agency (IEA), and on a bilateral basis. For instance, CANMET has given advice to China on how to burn coal more cleanly. It will likely play an even larger role in future energy technology initiatives, given that the Minister's National Advisory Council to CANMET has formally urged it to make its expertise available to developing countries.

- The Canadian International Development Agency (CIDA) assists developing countries with the transfer of technical equipment and technological skills that would reduce greenhouse gas emissions. One major area of focus over the years has been the development of hydroelectric potential in developing countries. To date CIDA has provided over half a billion dollars of assistance for these projects. This has permitted developing countries to avoid the use of hydrocarbons for the production of electrical energy.
- The promotion of energy efficiency, improved energy management, and the use of renewable energy sources have been among CIDA's priorities for some time now. Projects financed by CIDA, such as the industrial energy conservation projects in southern Africa and Senegal, wind and solar powered water pumping in the Sahel and northern Africa, solar crop drying in the ASEAN region, wood farming, more efficient charcoal production and improved fuelwood utilization in Zaire, all illustrate the commitment on the part of CIDA to the sustainable and environmentally beneficial path of development. CIDA is also supporting work of the International Institute for Energy Conservation in analyzing the transport problems of Asian cities with one objective being increased energy efficiency.
- As outlined in the Green Plan, during 1991, the Government will also launch the Environmental Technology Commercialization Program to provide financial resources on a cost-shared basis for partnerships and joint ventures. Up to 50 per cent of funding will be provided to attract private venture capital for environmental technology demonstration projects. Joint venture and consortium opportunities will be developed for Canadian firms in the environmental technology industry, both in Canada and internationally.

RECOMMENDATION 20 (Paragraph 4.64)

Given the interconnectedness of the global environment and the necessity of assisting the developing world in protecting our common environmental heritage, the Committee recommends that the federal government, through its own agencies and through Canada's membership in multilateral organizations, advocate programs to reduce deforestation and to encourage reforestation and the planting of forests in developing countries. Support for these activities by the federal government must not reduce current and planned Canadian support for other development assistance programs.

Response:

- Canada has been a strong advocate of programs to reduce deforestation and to encourage reforestation in developing countries through its membership in multilateral organizations and via participation in bilateral arrangements. Canada supports the International Tropical Timber Organization which promotes forest

conservation and the wise use of the forest resource, and through the Canadian International Development Agency (CIDA) supports the Tropical Forestry Action Program.

- In particular, through its regular programming, CIDA together with the International Development Research Centre (IDRC) commits on average about \$100 M annually to international forestry development programs and is presently assisting developing countries like Honduras, Senegal and India to optimize the social, economic and environmental returns from forest land through better management practices. A major Amazon forest management project in the province of Acre in Brazil is in the planning stage. Assistance is also provided to help in the establishment of protected areas and to manage wildlife resources.
- Forestry Canada maintains extensive scientific exchanges with leading forest and developing nations to ensure that Canada remains at the forefront of forest-environmental research, and to facilitate the transfer of forest management technology to developing countries. Through the North American Forestry Commission (NAFC), we are supporting the establishment of a monitoring system of forest health in Mexico. Canada was also instrumental in the establishment of the International Council for Research in Agroforestry which provides the means for the integration of these two disciplines in tropical countries. A further example of scientific assistance is the involvement of Forestry Canada scientists in cooperation with CIDA in the establishment and operation of the Canada-ASEAN Tree Seed Centre in Thailand.
- Canada is also playing a lead role in preparatory work towards an international convention on the conservation and sustainable development of forests, in conjunction with preparation for the 1992 United Nations Conference on Environment and Development (UNCED).

RECOMMENDATION 21 (Paragraph 5.10)

The Committee recommends, for the purpose of attaining integrated environmental and economic objectives, that the federal government considerably increase its support for research, development and demonstration directed to:

- (a) the more efficient and conserving use of energy;**
- (b) fuel substitution leading to reduced greenhouse gas emissions; and**
- (c) technologies for producing and using fossil fuels in less environmentally-damaging ways.**

Response:

- The Government of Canada believes that the dual objectives of improved environmental quality and improved economic performance, including international competitiveness are simultaneously achievable through the support for research,

development and demonstration (RD&D) initiatives aimed at: increased energy efficiency; the promotion of alternative fuels; and mitigation of the effects of fossil fuel consumption/production on the environment.

- The approval of continued funding for the Panel on Energy Research and Development (PERD), in 1988, reaffirmed an awareness that a coordinated energy R&D program is important to enhancing Canada's energy choices and environmental quality. This program, which is coordinated by EMR, has shifted from technical emphasis on fossil fuels to energy efficiency, alternative energy sources and the environmental effects of energy supply and use. The Government's current policy is market oriented and was designed to provide the maximum leverage of federal dollars by building on cooperative relations with industries and the provinces.
- Although the Department of Energy, Mines and Resources is the lead department with respect to energy related research, development and demonstration (RD&D) as illustrated through initiatives outlined below, other departments are also involved in this area of RD&D. Industry, Science and Technology Canada has initiatives to assist industry in identifying and developing action plans to remediate environmental problems, including those that contribute to emissions of greenhouse gases. ISTC's "Environmental Industries Sector Initiative" recognizes the need for stronger alliances among university, government and private sector labs for the development of new science and technology based solutions, in addition to the need for industry partners, especially among resource processors. The government will work with the private sector to ensure the growth and development of new industries through such programs.
- With respect to the specific sub-recommendations:
 - (a) Government priority, at least in the short term will be focused on the efficient and conserving use of energy. By necessity this includes RD&D across a broad spectrum of uses from consumer products to buildings, transportation and our major industrial sectors. EMR will undertake measures to promote the development and commercialization of promising technologies for energy efficient buildings and specific industrial sectors. For example, the 1983 federal Measures for Energy Conservation in New Buildings will be updated and regionalized, and their incorporation into more federal, provincial and municipal building codes will be encouraged. This program will include promoting the R-2000 energy-efficient standard in home construction, and improving awareness of opportunities for energy efficiency in new and renovated buildings. As well, the development and commercialization of promising technologies for energy-efficient buildings (for example, better windows, lighting and heating or cooling) will be enhanced.

The Government will seek industry's commitment to help achieve energy efficiency gains as well as to share information on new energy efficiency technologies and practices. Government-industry cooperation will take place on several fronts: The Minister of Energy, Mines and Resources will establish a National Advisory Council to promote industry-government cooperation and to establish energy efficiency targets for each of Canada's industrial sectors.

Programs will be developed to train and certify energy efficiency managers in industrial firms as well as to identify and develop promising technologies specific to each industry sector.

(b) While energy efficiency measures are important in the short term, Canada's ability to meet its longer-term goal to reduce greenhouse gas emissions depends upon our ability to move to less carbon-intensive energy sources. Alternative transportation fuels from plentiful, diverse sources such as natural gas and biomass can have a major role to play in meeting these goals as well as improving urban air quality. Initiatives in this area will include:

- accelerated development and market penetration of alternative transportation fuel, including expansion of natural gas markets, increased availability of alternative fuel vehicles, and encouragement of ethanol and methanol as automotive fuels and fuel feedstocks, and support for research and development of alternative fuel sources such as hydrogen.

Renewable energy sources such as passive, active and photovoltaic solar energy options will be studied in cooperation with utilities and other industry partners, in particular with reference to use in northern and remote communities. Federal efforts will focus on systems design and engineering as well as standard-setting and certification programs. Initiatives will include:

- enhanced research and development of alternative energy sources, including photovoltaics, fuel cells, landfill gas recovery, passive solar energy and other renewable energy technologies;
- cost-shared market assessments of non-fossil energy sources; and
- increased research, development and demonstration of advanced energy systems (e.g. combined cycle generation to improve the efficiency of coal-to-electricity conversion, co-generation or district energy systems).

(c) The Government fulfills its environmental responsibilities using a multifaceted approach including: RD&D on energy-related technologies and systems (intra-departmentally and through EMR's Panel on Energy Research and Development (PERD)); and, policies and programs to develop and promote energy efficiency and the use of alternative energy sources. Currently, these varied initiatives address a wide range of environmental concerns relating to the effects of energy production/ consumption on soil, water and air quality. Increasingly, however, in keeping with the concerns of Canadians over such problems as acid rain, urban air quality and global warming, resources in this area are being reallocated so as to most effectively address atmospheric environmental issues. By nature of their contribution to these atmospheric problems, the clean combustion of fossil fuels is of prime importance.

RECOMMENDATION 22 (Paragraph 5.18)

The Committee recommends that a study of the regional implications of proposed greenhouse gas limitation measures be included as a vital part of the National Action Strategy on Global Warming.

Response:

- The National Action Strategy on Global Warming has three components: limiting emissions of greenhouse gases; anticipating and preparing for the potential climate changes which Canada and Canadians may experience as a result of global warming; and, improving scientific understanding and increasing prediction capability with respect to climate change.
- The emission limitation component of the Strategy is based on four principles. The need to be comprehensive, address all greenhouse gases and sinks and taking account of interactions with other atmospheric issues and pollutants. The recognition that all Canadians have a responsibility to take domestic action to respond to the problem but that certain actions can only be taken in concert with our major trading partners. The need to be flexible and to be adaptable to new information and developments. The recognition of the importance of regional differences.
- The principle that a limitation strategy should recognize the importance of regional differences is essential in the case of a country as large and regionally diverse as Canada. This principle has three primary aspects. It recognizes that while the federal government may introduce measures to reduce greenhouse gas emissions which have broad applicability across Canada, these measures will of necessity not reflect regional conditions. It will be necessary for the provinces and territories to introduce measures which are region-specific. For this reason, the set of limitation initiatives introduced will likely vary from jurisdiction to jurisdiction.
- This principle also recognizes that the impact of national measures that are introduced will not necessarily be the same in all regions. Certain regions, for example, have fewer options in terms of energy supply than other regions. Therefore, in examining possible national measures, the specific characteristics of regional economies will be taken into account, and any national measures introduced will be fair and equitable across regions.

RECOMMENDATION 23 (Paragraph 5.27)

The Committee recommends that the federal government introduce a major research, development and demonstration program with its objective being the commercial development of transportation fuels and systems that result in the lowest economically and technically feasible emissions of greenhouse gases.

Response:

- While energy efficiency measures are important in the short term, Canada's ability to meet its longer-term goal to reduce greenhouse gas emissions depends upon our ability to move to less carbon-intensive energy sources. Alternative transportation

fuels from sources such as biomass can have a major role to play in meeting these goals as well as improving urban air quality. Green Plan initiatives in this area will include: accelerated development and market penetration of alternative transportation fuel, including market expansion of natural gas for vehicles; increased availability of alternative fuel vehicles, and encouragement of ethanol and methanol as automotive fuels and fuel feedstocks, and support for research and development of alternative fuel sources such as hydrogen.

- Although alcohols can substitute for gasoline as low level blends without any modification to vehicle fuel systems it must be borne in mind that to proceed further there must be adequate delivery and distribution systems, as well as a reasonable supply of vehicles that burn alternative fuels.
- As outlined in the Green Plan, during 1991, the Government will also launch the Environmental Technology Commercialization Program to provide financial resources on a cost-shared basis for partnerships and joint ventures. Up to 50 per cent of funding will be provided to attract private venture capital for environmental technology demonstration projects. Joint venture and consortium opportunities will be developed for Canadian firms in the environmental technology industry, both in Canada and internationally. Initiative types indicated in the recommendation could be considered under this program.

RECOMMENDATION 24 (Paragraph 6.4)

The Committee recommends that the Minister of Environment have the responsibility and authority to develop policies, programs and regulations that span the full range of activities of the federal government, analogous to the Minister of Finance for financial and economic affairs, and that the Environment Minister report to Parliament annually on the environmental impact of all activities.

Response:

Ministerial Authority and Responsibility

- Based on existing legislation (the *Department of the Environment Act* and *The Canadian Environmental Protection Act*) the Minister of the Environment has the authority to develop guidelines and in many cases regulations covering a broad range of activities of the federal government.
- The most recent development in this regard is the proposed *Canadian Environmental Assessment Act*. This would give the Minister of the Environment the right to refer any project to mediation or a review panel after consulting the appropriate authority. The Act would require the Minister of the Environment to table an annual report on the success of implementation of the Act.
- In conjunction with the introduction of the Bill, the government undertook to establish a much enhanced and progressive environmental review process for all its new policies and programs. Under the new process, ministers have decided that the environmental

implications of all proposed policy and program initiatives will be considered before decisions are made. The Minister of the Environment will provide advice to assist responsible authorities in the assessments. When a new policy or program is announced a statement of its environmental implications will be made public, and be reviewable by the Standing Committee on Environment.

- A number of institutional reforms have already taken place that indicate how the Government is committed to integrating environmental considerations into policy making processes and day-to-day operations:
 - The government has established a Cabinet Committee on the Environment whose mandate is to manage the Government's environmental agenda and to ensure that policies, programs and other initiatives requiring federal support are compatible with the Government's environmental goals.
 - The Minister of the Environment is also a member of the Cabinet Committee on Priorities and Planning, which determines the Government's major priorities.

Federal Code of Environmental Stewardship

- To demonstrate the federal government's continued commitment to the principle of sustainable development, the Government of Canada plans the following Green Plan initiative:
 - In 1991, the Government will adopt a comprehensive Code of Environmental Stewardship covering all areas of federal operations and activities.
- The Code will integrate environmental concerns into both policy and program planning as well as into day-to-day operations. It will ensure that all operations and activities of the federal government meet or exceed the standards and practices that the government recommends to others.
- The Code will be complemented by a list of targets or objectives. These targets will reflect environmental commitments that the Government has made or is making, and that will be implemented in its operations. They will cover a broad range of issues, from waste generation to contaminated site clean-up and emission standards.
- The Government will establish an Office of Environmental Stewardship to act as a focal point for coordination, assist the adoption of the Code and targets, provide information and guidance, and serve as a link between operating managers and scientific experts. The Government will ensure that environmental considerations are integrated into purchasing policies and practices; federal departments and agencies will develop environmental action plans indicating how they will implement the Code and report regularly on its implementation.
- With respect to the recommendation for an annual report to Parliament, the Green Plan also commits the Government to a more rigorous approach to State of the Environment Reporting. Specifically:
 - beginning in 1992, the Government will introduce an annual address to Parliament providing a State of the Environment Policy Statement;

RECOMMENDATION 25 (Paragraph 6.5)

The Committee recommends that the Auditor General, working in conjunction with the Departments of Environment and Finance, establish an environmental audit function to assure that all federal departments and agencies have implemented environmental assessment processes, and to monitor the effectiveness of environmental programs. Specifically, the Auditor General should monitor the progress of all federal departments and agencies in setting and attaining targets for greenhouse gas emissions.

Response:

- The Green Plan has committed federal departments and agencies, beginning in 1992, to implement policies and procedures for environmental auditing in cooperation with the Office of the Comptroller General (OCG). A number of federal departments and agencies have already undertaken environmental audits. The OCG is working closely with the Department of the Environment (DOE) in order to see that federal departments and agencies are provided with suggested principles and practices for effective environmental auditing. DOE and OCG will work with federal departments and agencies to ensure that they are aware of the need for, and give proper consideration to conducting environmental audits of areas of environmental concern. The OCG will also work with departments and agencies to see that they plan and conduct audits of their commitments in implementing the Code of Environmental Stewardship.
- Whether all departments and agencies will set targets for greenhouse gas emissions remains to be determined. Where there is need, because of the nature of departmental or agency operations, the setting and attaining of targets for greenhouse gas emissions will be covered under this policy implementation and auditing regime.
- The Office of the Auditor General will conduct audits in these areas in accordance with its mandate.

REPORT OF
THE STANDING COMMITTEE ON ENVIRONMENT

ENVIRONMENT AND THE CONSTITUTION

The Honourable David MacDonald, P.C., M.P.
Chairperson

MARCH 1992

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THE CONTEXT OF THE STUDY

A. INTRODUCTION: THE CHANGING CONCEPT OF "ENVIRONMENT"

1.1 Constitutional renewal and environmental protection are both vital to the future of Canada. The Committee therefore decided to study the division of powers on environmental issues, in the context of the current constitutional debate in Canada. Our decision to examine their relationship has been widely welcomed.

1.2 "Environment" is a word that has meant different things to different people at different times. Over the last 20 years in particular there has been a significant change and enlargement in meaning. The way we define the environment, and thereby identify those issues in which environmental considerations are relevant and important, may have profound implications for the constitutional and political future of Canada.

1.3 It is a truism that the Constitution Act of 1867 did not mention the environment. Some of our witnesses have noted that specific issues that we would now term environmental, such as fisheries and navigation, are specifically included in the 1867 division of powers.¹ However, it seems generally accepted that allocation of these specific powers is very different from recognition of the environment as an integrated whole.

1.4 Because the 1867 division of powers was relatively silent in this regard, it has sometimes been argued that many of our present environmental problems arise from, or have been intensified by, this omission. This led, it is claimed, to neglect of environmental issues by both federal and provincial governments until comparatively recently, and to continuing confusion and uncertainty in regard to which level of government is responsible for environmental action.

1.5 This debate has been renewed, in a modern form, by the appearance of the Government of Canada's proposals on political renewal, contained in *Shaping Canada's Future Together*. At least 10 of the 28 proposals appear to have significant implications for the environment. However, there is little direct reference to the environment in the proposals and this has evidently disturbed a number of individuals and groups. Some, including several witnesses, believe that the environment needs to be included, as a matter of urgency, in the explicit division of powers between federal and provincial governments. The reasons for this belief may be philosophical—the fundamental importance of environmental concerns to the future of

¹ See, for example, the written submission by Elizabeth May (Sierra Club):
It is often said that at the time of the drafting of the British North America Act, no one considered the environment. It is often said, but it is not true. In fact, the 1867 version of environmental problems were already the subject of legislation. . .
Ms. May recognized that the term 'environment' does not appear in either Sections 91 or 92 of the Act, but urged that:
Given that the major aspects of pollution control reflected in pre-Confederation pollution legislation related to navigation and fisheries, it is very significant that both these heads of power were granted to the federal government under section 91.

Canada—but they may also reflect practical concern over what is perceived as a confused and conflicting pattern of actions by federal, provincial and other governments, in the absence of a clearly-defined allocation of responsibilities. Other witnesses have argued that there are good reasons why an explicit division or allocation of powers on environmental issues should not be attempted at this time. As will be seen below, the Committee generally agrees with this latter view.

1.6 Nevertheless, it seems clear that this is an appropriate time to consider the relevance of Canada's constitution, present and future, to environmental protection and environmental quality. To do this, we must begin by asking what the term "environment" now connotes, since this is central to our recommendations on how environmental concerns should be included in current constitutional reform.

1.7 At the risk of over-simplification, we suggest that 1972 marked a major change in perception, both in Canada and in the world as a whole. In Canada, 1972 saw the creation of Environment Canada, and, around that time, of environment ministries in all provinces. In a wider world, 1972 was the year of the United Nations Conference on the Human Environment in Stockholm, Sweden. These national and international events, however, reflected a deeper change in political philosophy and popular thinking. As Barbara Ward later observed,

Before Stockholm, people saw the environment... as something totally divorced from humanity... Stockholm recorded a fundamental shift in the emphasis of our environmental thinking...

In the 1970s, after Stockholm, there was a growing realization of the basic and indestructible links between what humans do in one part of the world and what they do in another. This interconnectedness was one of the great insights of Stockholm, neatly summed up in the conference slogan "Only One Earth." There was a beginning of a sense of shared stewardship for our common planetary home.²

1.8 One significant expression of this sense of interconnectedness was the adoption of the ecosystem principle in the U.S.A.-Canada Great Lakes Water Quality Agreement of 1978. The object of that Agreement is "to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem", and in the Agreement that ecosystem is defined as "the interacting components of air, land, water and living organisms, including humans" within the Great Lakes drainage basin.³

1.9 During the 1980s, a further significant step was taken, with the recognition that interconnectedness exists in time as well as in space: human actions may not merely have a global effect, they may alter irreversibly the environment that is inherited by future generations. This had long been recognized in terms of the depletion of non-renewable resources; in the 1980s it took on a new meaning in terms of global warming and the thinning of the ozone layer in the upper atmosphere.⁴ From this expanded perception emerged the concept of sustainable development, the focus of the report of the World Commission on Environment and Development (the Brundtland Commission).⁵

² Foreword by Barbara Ward, in Eckholm, Erik P., *Down To Earth: Environment and Human Needs*, Toronto, MacLeod, 1982.

³ 1978 Great Lakes Water Quality Agreement (as amended by protocol in 1987), Articles II and I(f).

⁴ See the Committee's reports on *Deadly Releases CFCs* (June 1990) and *Out of Balance: The Risks of Irreversible Climate Change* (March 1991).

⁵ World Commission on Environment and Development, *Our Common Future*, New York, Oxford University Press, 1987, p. 43.

Conclusion 1:

The Committee endorses the definition of sustainable development contained in the report of the World Commission on Environment and Development (the Brundtland Report): Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

1.10 In the last two decades, therefore, the concept of "environment" that is widely shared in Canada and throughout the world has expanded to include three vital elements:

- Environmental problems seldom or never exist in isolation. Water pollution, deforestation and similar issues are usually extremely complex in terms of both their cause and their solution. In the ecosystem of which humanity is an essential and major element, "everything is connected to everything else."
- Human ability to affect the environment in major ways, combined with the transfer and exchange mechanisms within the ecosystem, has led, especially during the second half of the 20th century, to a situation in which environmental problems exist at all scales from the local to the global. Action to avoid or solve such problems can normally be effective only if it takes place on comparable scales.
- The need for coordinated action on a continental or global scale has been heightened by the growing evidence of changes to the atmosphere and biosphere that are imminent and potentially irreversible.

The Committee is convinced that these characteristics of ecosystem interconnections, global scale, and potential irreversibility are fundamental to any review of environmental issues in relation to the division of powers among different levels of government in Canada.

B. THE PRESENT DIVISION OF ENVIRONMENTAL POWERS

1.11 Environmental powers exercised today by federal, provincial and territorial governments, and also by municipalities, are derived from the various related powers assigned to the federal government and the provinces under the Constitution Act, 1867, as amended in 1982. For the environment, the two most important federal heads of power, under section 91 of the Act, are the criminal law power and the "residual" power to make laws for the peace, order and good government of Canada. The federal government is also thought to possess an important source of authority in regard to the environment, although it has not been fully exercised, through its power to legislate in respect of trade and commerce. Other federal powers having a bearing on environmental matters include navigation and shipping; sea coast and inland fisheries; and "Indians, and Lands reserved for the Indians."

1.12 The federal government also derives environmental jurisdiction from its powers with respect to international or transboundary rivers, migratory species, relations with foreign governments, federal lands (including the Yukon and Northwest Territories), industries within the federal jurisdiction, and interprovincial and international transportation. In addition to these legislative powers, the federal government can influence the environment through the taxing power, the spending power, and the power to declare works to be "for the general advantage of Canada" (the "declaratory power").

1.13 Provincial governments derive jurisdiction in relation to the environment from their authority, under section 92 of the Constitution Act, over "property and civil rights in the province", as well as their powers in relation to the management and sale of public lands, local works and

undertakings, powers of taxation, and "generally all matters of a merely local or private nature in the province." The 1982 Resource Amendment to the Constitution Act, Section 92A, granted the provinces exclusive power to legislate in relation to the development, conservation and management of their non-renewable resources. The provinces also have proprietary rights to all Crown lands within provincial boundaries, as well as property rights in virtually all on-shore resources.

1.14 The provinces have legislative responsibility for municipal governments, thereby enabling them to delegate to municipalities virtually any powers and duties assigned to them by the Constitution. Municipal governments do not have any constitutional standing, but derive their powers from the provinces. Municipal regulations, usually in the form of by-laws, often have a major effect on the environment, such as those dealing with zoning, construction, noise, water purification, sewage and garbage disposal. Like the federal government, provinces also have taxing and spending powers that are important for the environment.

1.15 Various witnesses who appeared before this Committee suggested that confusion is the most obvious result of the complex division of powers that exists, and they referred to the negative consequences of this confusion. The witness from the Mining Association of British Columbia claimed that

Resource users are confused as to which level of government has jurisdiction. Decisions are delayed through intergovernmental turf battles. Court intervention on jurisdictional issues is increasingly apparent. Crippling costs to the industry are resulting, and above all, the taxpayer is paying dearly for the overlap and inefficiencies.⁶

1.16 Other witnesses told the Committee that the public's ability to ensure effective environmental protection was hindered by the current constitutional division of powers. The Canadian Bar Association referred to the uneven enforcement of environmental laws that has sometimes been the result of delegation to the provinces of enforcement responsibilities under federal statutes. The same witness, and others, also suggested that

Canadians do not know who is responsible for what. They often do not know where to turn when they want to have legislation enforced.⁷

1.17 Many witnesses felt that the federal government has access to more environmental protection power than it has exercised to date. In particular, the "peace, order and good government" provision was seen as a broad source of potential power, especially since the decision of the Supreme Court of Canada in *R. v. Crown Zellerbach*⁸. Federal regulation on marine pollution was upheld, even though it extended to regulation within provincial boundaries. Witnesses also suggested that the federal government could claim expanded environmental powers under its general trade and commerce power. In *General Motors v. City National Leasing*⁹, the Supreme Court of Canada held that, where the provinces are unable to regulate together in an area, federal regulation will be upheld. This decision has confirmed the power of the federal government to claim jurisdiction in matters that transcend provincial boundaries.

1.18 Early in 1992, after the Committee had concluded its hearings and had adopted its conclusions and recommendations, the Supreme Court of Canada handed down its decision in the case of *Friends of the Oldman River Society v. Canada*. The Committee requested the Library of

⁶ Issue 18, p. 8.

⁷ Issue 16, p. 31.

⁸ [1988] 1 S.C.R. 401.

⁹ [1989] 1 S.C.R. 641.

Parliament to consider the impact of this decision on the Committee's conclusions and recommendations; the Library's response is reproduced as Appendix A. The Committee notes in particular the concluding statement that:

The Oldman River decision is obviously a fundamentally important decision for environmental regulation in Canada, and it will undoubtedly have widespread implications. The decision does not, however, adversely affect any of the Committee's recommendations regarding the division of powers on environmental issues. If anything, it supports many of the Committee's conclusions, and may be of assistance in their implementation.

However, the Committee has not itself yet had an opportunity to consider the implications of the Oldman River decision.

1.19 Our witnesses stressed, however, that environmental problems will be solved only by interjurisdictional cooperation and coordination. As the witness from the Rawson Academy of Aquatic Science put it,

If Canada is to meet successfully the environmental challenges it confronts, industry and the public must co-operate, not litigate, to find ecologically sound approaches. Turf wars among the myriad federal, provincial and municipal agencies concerned with the environment must cease. Partnerships among agencies and the public to meet shared environmental objectives must begin.¹⁰

C. THE COMMITTEE'S APPROACH TO THE ISSUE

1.20 This report is not limited to a review, from an environmental standpoint, of the Government's proposals in *Shaping Canada's Future Together*. Nor, however, is it a fundamental examination of how, in an ideal world, the Canadian constitution could best accommodate environmental and sustainable development needs. The Committee's recommendations take an evolutionary, not a revolutionary, approach to constitutional reform in regard to the environment, for three main reasons.

1.21 First, we believe that this reflects the present political reality. The environment is regarded as a major priority for action by both experts and the public. But the ability to act does not depend primarily on constitutional reform. In the context of the present constitutional debate, the environment does not have the same degree of urgency as issues such as the "distinct society" of Quebec, Senate reform, or aboriginal self-government.

1.22 Second, as suggested already (paras. 1.7 - 1.10), scientific and public understanding of the environment has changed and expanded considerably in recent decades, and there seems little reason to doubt that further change is inevitable. This point was made emphatically by Mr MacMillan (Minister of the Environment 1985-88):

[T]hings are so fast-changing and they are so complex that I doubt that in September 1991 we could take everything sufficiently into account to come up with a formula that will serve us well forever and a day. If things could change so much from when I left the portfolio to the present . . . can you imagine the changes that lie ahead? I venture to say that in the year 2000 somebody will be

sitting here and reflecting on what was happening in 1991 and he or she will not be able to recognize what we are doing, so different will the world be at that point in the context of the environment.¹¹

1.23 Lastly, there is good reason to believe that the existing constitutional situation has much to recommend it. This view was expressed by the present Minister of the Environment, who is in a good position to evaluate both the opportunities and the frustrations:

I believe the Canadian federal system has offered the single best system with the greatest possible flexibility for achieving our regional and individual goals. We will not, as a society, achieve sustainable development as a top-down, government-driven exercise. . . We must share responsibility for our environment.

I believe Canada has already shown how a federal state can achieve such co-ordination. I sincerely believe. . . and this goes beyond the life of this government—that we can be proud of the close working relationship that has developed between the federal and provincial governments on environmental issues.¹²

Public opinion surveys, reported by the witness from The Environmental Monitor, indicate that the present situation is both recognized and endorsed by the public:

It's clear that Canadians are in support of the status quo on environment. They may want to tinker with it and they may be open to some tinkering, but clearly they don't want to throw their lot in with either just the federal or just the provincial level. They see the status quo as operating. They couldn't tell you who has what jurisdiction. They see both operating.¹³

Several witnesses evidently preferred the existing situation to the environmental uncertainties that they perceived may be created by some of the constitutional changes proposed at present. For example, in their joint submission, the Canadian Environmental Law Association and Pollution Probe felt that "The present constitutional proposals . . . serve to confuse, rather than clarify, legislative authority to protect the environment." They recommended a clarification "to reflect substantial provincial autonomy over local matters and federal jurisdiction over extraprovincial and international matters. . . In the alternative we urge Parliament to maintain the status quo with respect to the division of powers."¹⁴

1.24 The Committee does, however, recognize that a substantial *prima facie* case can be made for more fundamental constitutional reform in regard to the environment. A Constitution that is preoccupied with the division of powers—with what one witness termed "the old federal-provincial football game"¹⁵—may be difficult to reconcile with an environmental and sustainable development context that demands recognition of complexity, ecosystem linkages, and the need for cooperation. Those inclined to this view might ask whether existing federal-provincial cooperation on the environment is facilitated by the constitution, or instead represents a successful effort to circumvent constitutional limitations. A recent review, from a legal standpoint, of recent federal environmental legislation and judicial interpretation concluded that

¹¹ Issue 6, pp. 44-45.

¹² Issue 15, p. 8.

¹³ Issue 6, p. 25.

¹⁴ 'Environment and the Constitution', submission to the House of Commons Standing Committee on Environment by the Canadian Environmental Law Association and by Pollution Probe, section 4.3.

¹⁵ Issue 13, p. 14.

*In Canada, constitutional law inhibits environmental laws because the jurisdictional picture dividing federal and provincial powers divides the environment into many different spheres. This division accords nicely with the point source approach to environmental problems, but it conflicts with the more sophisticated ecosystem approach. . . At this point, the constitution has won over the environment.*¹⁶

1.25 The Committee believes that it would not be feasible or useful to explore the case for fundamental reform at this time. However, we do not wish to suggest that this situation will continue indefinitely. It is evident to us that, on the long view, the environment and sustainable development are as crucial to the future of Canada as are the major items that are the focus of current constitutional proposals. If, during the next decade, the constitution appears to be a barrier to effective action on environment and sustainable development, fundamental reform will need to be considered.

¹⁶

Northey, Rodney, 'Federalism and Comprehensive Environmental Reform: Seeing Beyond the Murky Medium', *Osgoode Hall Law Journal*, 29,1, 1989 (published 1991), pp. 127-81, at p. 179.

A. RECONCILING SHARED JURISDICTION WITH FEDERAL LEADERSHIP

2.1 One clear message to the Committee, conveyed in various forms by a number of witnesses, is that the Canadian public is "ahead" of its governments in terms of environmental thinking and the need for action. Meanwhile governments may themselves be ahead of the institutions and mechanisms available for effective action.

... Canadians are somewhat out in front of their institutions. They have been perceptually and in terms of concern levels for a long time, but they are now moving out in front of their institutions in terms of actions. . .

Today Canadians identify individual Canadians as primarily responsible for environmental protection. . .

People are less and less looking to the federal government to be primarily responsible for environmental protection. They never looked primarily to provincial governments for that . . .

. . . Canadians see environment as a transboundary issue that requires huge resources to resolve, that requires partnerships; 24% of Canadians refused to point the finger at anyone. They insist that it is a shared responsibility. . . Canadians want everybody involved. They look to the federal government to bring everybody together, but they are less and less looking to the federal government and they are taking it on themselves. . .

They are looking to the private sector to do what it does best, which is implement. They are not looking to governments to implement; they are looking to governments to ensure the implementation, to ensure that all actors are working together, and to ensure that if someone is not living up to that public trust, that individual or corporation is landed on with both feet.¹

2.2 There is therefore a strong feeling in the public mind that responsibility for the environment cannot sensibly be allocated to a single level of government. That view is shared by the Committee, and was also expressed very forcibly by the Minister of the Environment:

[W]e cannot compartmentalize our environment into neat jurisdictional boxes. In constitutional terms it means we cannot simply confine the environment to Parliament, or conversely to the provinces. Yet, some have suggested that environment should be a separate head of power in the Constitution, that the Constitution should confer the environment on just one level of jurisdiction.

. . . I reject this suggestion totally. Such a proposal is simply not practical when you examine the range and extent of issues involved—protection of oceans and wildlife, acid rain, air quality, fisheries, global warming, municipal and industrial waste management, international relations—and the list goes on.²

¹ Issue 6, pp. 9, 13-14, 20.

² Issue 15, p. 7.

2.3 This affirmation is very reassuring. However, the Committee also notes that the way in which the Government's proposals for political renewal were presented appears to have had the effect of generating widespread doubt in the environmental community about the Government's commitment to a strong federal role in environmental issues. This does not appear to be because the federal government was perceived to be unaware of environmental needs, but because the proposals contained in *Shaping Canada's Future Together* seemed to focus on the need to avoid unproductive federal-provincial dispute. This concern seems to have been reinforced by the perception, among some observers, that the federal government has in recent years avoided testing the limits of the powers that it now has on environmental matters.³

2.4 More specifically, the concern over the present proposals expressed by several witnesses seems to have arisen because several proposals for change seem either to neglect environmental considerations or even to threaten them. Witnesses expressed concern about the entrenchment of property rights, withdrawal of the federal government from some specified areas of environmental action, greater use of the power to delegate authority, elimination of the declaratory power, and other proposals. These objections are considered in more detail later in our report. Taken as a group, however, the Government's proposals appeared to several witnesses as having a potentially negative net effect on the Canadian environment. The only proposal that was clearly seen as positive by these witnesses was the inclusion of sustainable development in the "Canada clause". Even this, however, was questioned, on the grounds that its inclusion would be only symbolic, with no legal force.⁴

2.5 It now seems clear that some of these concerns (though not all of them) could have been minimized or avoided if the Government's proposals had provided more explicit recognition of environmental and sustainable needs. Witnesses such as the West Coast Environmental Law Association reported that they had been reassured by the statement of Constitutional Affairs Minister Joe Clark that environment "is a field in which existing federal jurisdictions must be respected and must be maintained."⁵ Similarly, the Committee welcomed the strong statements about the federal environmental role made by the present Minister, and by one of his predecessors, Mr. MacMillan:

*We are committed to maintaining a strong federal role in the environment and continuing to be a leader in achieving sustainable development, both nationally and internationally.*⁶

³ See, for instance, the witness from the Canadian Bar Association:
If there's one frustration that those of us interested in environmental matters suffer it is that there has been a good deal of timidity on the part of the federal government in asserting its jurisdiction in environment. We suppose this is for fear of treading on provincial toes. (Issue 16, p. 31)

⁴ Enhancing Environmental Protection in the Canadian Constitution: Comments on the Federal Government's Constitutional Proposals, Submission by the West Coast Environmental Law Association, at p. 5:
This proposal. . . is the first official federal recognition of the need to incorporate environmental protection in the Canadian constitution. We strongly support this initiative.
However, there are two basic problems with the federal proposal's environmental content. First, the government's environmental proposals have no legal component. They are exclusively symbolic. Second, as symbolic statements they require considerable elaboration.

⁵ Ibid., at p. 20.

⁶ Issue 15, p. 6.

My advice to you [the Committee] is that whatever course you take, whatever philosophical or ideological predisposition might be brought to bear on your own deliberations, you not lose sight of the fact that the federal authority cannot be compromised; it must be exercised. The issues are increasingly ones of planetary survival, whether the planet is going to be here in a generation or so.⁷

2.6 There should be no "soft centre" at the heart of the federal government's environmental policy and action. Though responsibility must inevitably be shared—with aboriginal groups, municipal governments, the private sector and individual Canadians as well as with provincial and territorial governments—environmental protection and the shift to sustainable development patterns will require all jurisdictions to exercise their environmental authority to the fullest extent possible.

2.7 When we seek to define in more detail the limits of the federal government's environmental powers, or to define the appropriate roles of each of the main participants in environmental action, we naturally begin with the traditional notion of provincial governments as best able to deal with local concerns, and the federal government as bearing the primary responsibility for environmental issues that have national or international dimensions. That view is evidently shared by the majority of witnesses, for example, Mr. Jack MacLeod, President and CEO of Shell Canada, and a member of the National Round Table on Environment and Economy:

I suggest that the model for evolution of Canada's shared jurisdictional environmental management that has served us relatively well to the present has been one that has recognized two basic values: first, that the provincial jurisdiction, being the closest to the community, is the most logical jurisdiction to exercise prime authority and accountability for environmental management related to developments within the communities of the province; and second, that management of environmental impacts related to developments within a province that in fact reach beyond provincial boundaries, whether to other provinces or to other countries, must be subject to the authority and accountability of the federal jurisdiction.⁸

This view was echoed by Pollution Probe and the Canadian Environmental Law Association (see para. 1.23).

2.8 Witnesses, however, recognized that in the contemporary world the distinction in principle may be hard to draw in practice. Mr. MacLeod:

I see it virtually impractical to think that any major project in any industrial sector should logically be left solely to the jurisdiction of the provinces. I think that the federal and the provincial jurisdiction, on a project by project basis, can work out and commit to accords what respective roles they play in regard to any single major project. . .

I guess you can say immediately that there will be very few projects that will not have implications that transcend the boundaries of the province and therefore there will be virtually shared jurisdictional implications on every major project. That is my view.⁹

7 Issue 6, p. 32.

8 Issue 10, p. 6.

9 Issue 10, pp. 8, 9.

Mr. MacLeod was echoed this time by the witness from the Assembly of First Nations:

*We have to recognize that some of the jurisdiction is the same jurisdiction that has to be exercised between or among us all. Environmental concerns are certainly of that nature. We can't pretend that we can build a dam in Quebec or in northern British Columbia that doesn't affect people of the Maritimes, the Prairies, the Northwest Territories, the United States or the world.*¹⁰

2.9 At a time when, at least in the opinion of some witnesses and other experts,¹¹ the federal government has been very cautious in the exercise of its authority, we were told that the opposite has been happening in the United States.

[W]ith the globalization of environmental concerns, transboundary pollution, the Canadian power to act to protect its environment is also the power to protect the United States environment, just as American actions affect your environment.

The United States is one of the most highly federalized environmental systems. We have had a creeping federalization of environmental law during the last 20 years.

*. . . [L]et me emphasize that before the 1960s, environmental protection was a matter of state law. There was very little federal administration or action in the environmental protection field. In fact there were doubts as to whether the Congress of the United States could act to regulate water quality or air quality. There were very limited enforcement standards.*¹²

2.10 However, this witness from the Environmental Law Institute in Washington, D.C. noted that "creeping federalization" had not inhibited action at state and local levels.

During the 1980s state environmental programs blossomed. State and local enforcement programs have become reality. . .

*State and local environmental law will be even more important in the 1990's.*¹³

2.11 It is clear to the Committee, as it seems to be to virtually all our witnesses, that practically every aspect of modern life has an environmental dimension, and the transfer and exchange mechanisms in the ecosystem may rapidly extend environmental effects beyond local, provincial or even national boundaries. A strong central authority therefore seems unarguable. As Mr. Futrell summarized it,

*I cannot imagine a modern industrialized state without a clear federal power to take the lead on standard setting, on PCBs, on pesticides, toxic substances, air pollution regulation and water pollution discharges.*¹⁴

2.12 It is equally clear to the Committee, however, that provincial governments will continue to have major environmental responsibilities, expressed in all forms from policy development to enforcement. Provincial jurisdiction over natural resources and municipal affairs makes these responsibilities inevitable and vital.

¹⁰ Issue 13, p. 16.

¹¹ See para. 2.3, footnote 3.

¹² Issue 9, p. 8.

¹³ Issue 9A, pp. 7, 8.

¹⁴ Issue 9, p. 25.

Conclusion 2:

Present responsibility for the environment in Canada rests clearly with all levels of government. During the last quarter of a century, the demands of one of the largest national ecosystems in the world have required substantial expansion of policies and action in regard to the environment by all jurisdictions.

B. CONCURRENCY: FORMAL AND INFORMAL

2.13 All this points toward environmental jurisdiction that is concurrent, rather than one that is based on a division of powers. This seems to the Committee to be the most logical approach, yet we recognize that concurrent jurisdiction has its own difficulties.

(a) Although provision for concurrent jurisdiction exists in the present constitution, e.g. in regard to agriculture, the value of this has been reduced, or even nullified, by judicial interpretation. A series of judicial decisions between the 1930s and the 1950s severely limited the potential scope of the agriculture power.

[C]ourts have neutralized the federal agriculture power by defining its jurisdiction narrowly. . . Courts have interpreted this agriculture power in terms of the division of powers in sections 91 and 92. . .

If the federal government can only produce legislation resembling other federal legislation, there is nothing unique about the contribution of concurrent power in agriculture.¹⁵

The same author suggests that judicial decisions in other contexts offer more encouragement to concurrency in the environment¹⁶, but the proof of this would come only with further judicial decisions. It seems evident that concurrency is an awkward concept to accommodate in a constitution, like Canada's, that has historically emphasized the division of powers.

(b) It is undeniable also that provincial governments have been and remain jealous of their areas of jurisdiction. Concurrency, like the use of the spending power, can easily be seen as "creeping federalization", and resisted by the provinces as a matter of principle. The Committee recognizes that, in the environment field in particular, ecosystem and similar considerations make it almost impossible to define the limits of environmental legislation. Emission limits, or other pollution controls, for example, may have potential effects in economic terms, or may threaten the viability of single-industry communities. Provincial (and other) opposition to federal legislation with such far-reaching implications may be inevitable and understandable.

(c) Finally, concurrent powers on environmental matters may seem likely to increase overlap, duplication, and conflict, especially in regulation and enforcement. Or the opposite may happen: in a situation where both levels of government have authority to act, neither may do so, in the hope that responsibility will be assumed (and the necessary resources provided) by the other.

2.14 These are real and formidable problems. No doubt they help to explain why Canada has maintained a constitution that emphasizes the division of powers rather than concurrency. Nevertheless, in the view of the Committee, concurrency is the most meaningful approach in terms of the needs of environment and sustainable development. We share the vision expressed by the witness from the Assembly of First Nations:

¹⁵ Northey, p. 167.

¹⁶ Northey pp. 169-174.

Let's start to anticipate the kinds of powers and jurisdictions that might be required in order to ensure that 100 years from now, we have protected the environment and we have made sure that our relationship to each other takes place on the basis of respect. . .

We are going to have to abandon the old assumptions of constitutional discussions simply being a transfer of power between the federal or provincial jurisdictions. We should have a look at our Constitution from the point of view of dreaming what possibility does exist to produce the new relationships among us all that will produce a better country.¹⁷

2.15 We note that although the public is rightly concerned to avoid governmental overlap and duplication, it simultaneously believes that concurrent jurisdiction over the environment is vital (see para. 1.23). This was also expressed very vividly in the evidence submitted by the Canadian Manufacturers' Association (CMA), which began by stressing the serious effects of overlap and duplication:

The sharing of jurisdiction for the environment has led to increasing overlap in regulatory requirements among federal, provincial and municipal levels of government. . . From the early 1970's this overlap in jurisdictional responsibilities for the environment has created confusion, uncertainty and unnecessary expenditure of scarce resources by the manufacturing sector and irritation among and between federal, provincial and municipal levels of government. . . In particular, the duplication of federal and provincial environmental assessment and review processes has been costly in terms of time delays in obtaining approvals for development proposals, the human resources required to prepare and present the necessary documentation to meet the environmental requirements for each level of government and the accompanying financial costs. These irritants make it difficult for Canadian manufacturers to remain competitive when they are already burdened with high interest rates and new global economic challenges.¹⁸

2.16 The CMA, however, does not therefore argue for a greater degree of specificity in the division of powers to avoid overlap; instead it regards recent efforts to achieve federal-provincial harmonization of environmental action as encouraging concurrency.

The existing federal, provincial approach to environmental challenges does suggest support for the continuing concurrent operation of federal and provincial jurisdiction as it relates to the environment. . . If the concurrent jurisdictional approach was reinforced to also recognize a federal responsibility for setting national minimum standards it would go a long way to addressing the major irritants outlined in this submission. . .

The [National Environmental Quality Committee of the CMA] wants to emphasize that in proposing the redesign of Canada's traditional constitutional model, which now ensures the occurrence of legislative overlap, and duplication, in environmental matters, to one which promotes and facilitates broadly concurrent federal and provincial operation of legislative powers and policies for addressing environmental protection and sustainable development practices, it does not suggest formal constitutional amendment. It does suggest the need for immediate political direction, consultation and thereafter formal action.¹⁹

2.17 This recognition of the potential of concurrent powers is not universal. For example, the evidence submitted by the Mining Association of British Columbia recommends that

¹⁷ Issue 13, p. 14.

¹⁸ Submission from the National Environmental Quality Committee of the Canadian Manufacturers' Association, pp. 3-4.

¹⁹ *Ibid.*, pp. 18-19.

. . . the subject of the environment should be specifically referred to in the division of powers by assigning exclusive jurisdiction, to one or another government, [of] the various aspects that go to make up the sum total of the subject. This we call "the Segmentation of Constitutional Responsibilities".²⁰

For the reasons set out in para. 1.10, the Committee believes that attempts at segmentation, whether along the lines proposed by the Mining Association of British Columbia or on some other basis, would be inherently unsuccessful, and might well generate even more overlap and irritation than now exists.

2.18 What is the "model of concurrent operation of federal and provincial laws [that] is slowly emerging"?²¹ The CMA suggests that

*The statute and regulations dealing with the transportation of dangerous goods and the workplace hazardous materials information system are examples of coordinated complementary federal, provincial responses.*²²

The CMA also believes that the provisions for the regulation of toxic substances in the Canadian Environmental Protection Act include "modest recognition of concurrent rather than exclusive constitutional spheres."²³

2.19 Other witnesses, notably the Minister of the Environment, have suggested that the focus for concurrent federal-provincial jurisdiction on environmental issues may increasingly be the Canadian Council of Ministers of the Environment (CCME).

Through the CCME, we are developing national standards that will provide a level playing field of regulatory requirements for industry and to help fulfil our international environmental obligations. . .

It's a different structure from the one we usually find in federal-provincial fora, where all governments are there, they meet once a year, and there's a provincial government and federal government that chair. In the council, all governments are equal. . .

*Secondly, the council is structured in such a way that it has a secretariat that employs approximately 40 people. They produce policy, they produce studies, and there is a lot of interjurisdictional co-operation. From the little experience I have, it is unique in federal-provincial relations.*²⁴

2.20 Similar enthusiasm for CCME was expressed by the Nova Scotia Minister of Environment, Mr. Leefe:

The Canadian Council of Ministers of the Environment. . . as a priority, is focusing on the harmonization of provincial/territorial legislation and the cooperative administration of programs such as environmental impact assessment. There are also a wide array of international environmental issues that require international commitments which can only be achieved through local or provincial action.

²⁰ Disentangling the Environmental Regulation Labyrinth, brief submitted by the Mining Association of British Columbia, p. 11.

²¹ CMA submission, p. 11.

²² Ibid., p. 11. See also Northey's comments on the transport of dangerous goods example, *op. cit.* at pp. 169-172.

²³ Ibid., p. 15.

²⁴ Issue 15, pp. 8, 15-16. The Minister also noted (p. 8) that federal-provincial cooperation on the environment had already generated 400 multilateral and bilateral agreements.

The need for federal/provincial cooperation and coordination in the area of environment was never more clear, but we believe this cannot be achieved through constitutional change in the division of powers. To attempt to do this would be inconsistent with one of the fundamental principles of sustainable development, that being the integration of environmental concerns into all of our decision-making processes. Environment is not a line department function. . .

To achieve this goal will require a lot of agreement with a lot of partners. Governments have a duty to provide protection of our natural environment, but we also have a duty to do so in a way that respects the importance of certainty and predictability to our economic sectors and in the most efficient and cost-effective manner.

For the past year, I have had the honour of chairing the Canadian Council of Ministers of the Environment and believe that this organization has seized the challenges we face and will be able to provide an effective forum for addressing all jurisdictional matters relating to Canada's environment.²⁵

Conclusion 3:

Effective recognition and understanding of environmental problems, and cooperative and coordinated policies, actions and enforcement measures among all jurisdictions, are more necessary at present than a new division of environmental powers.

Recommendation 4:

The Committee recommends that the environment be regarded as an area of shared jurisdiction, in which concurrency and partnership are the appropriate and effective bases for governmental action.

C. PARTNERSHIPS BETWEEN AND BEYOND GOVERNMENTS

2.21 "A lot of agreement with a lot of partners". It is clear to the Committee, as it evidently is also to the CCME and the public, that effective environmental action involves partnerships between governments and other stakeholders—those who have a stake in the environment. Several witnesses expressed the hope that the national, provincial and territorial Round Tables that have been created in recent years will play a continuing and important role in developing such partnerships.

It has certainly been a process that has worked to build consensus and vision and in working with sustainable development because they are charged with how do you implement sustainable development to develop strategies in that way? We are in fact getting clear about a new paradigm, one that integrates these things rather than simply balances them, these things being environment and economy. It is a very promising process for building an enabling framework.²⁶

²⁵ Letter from John G. Leefe to the Chair of the Standing Committee dated 22 October 1991. See also the comments on the CCME made by Mr. MacMillan (Issue 6, p. 47) and by Mr. MacLeod (Issue 10, p. 7).

²⁶ Issue 10, p. 24. See also Mr. MacLeod (Issue 10, pp. 5-6); and Mr. McCready (Issue 10, pp. 37-38). The Canadian Manufacturers' Association (Submission, p. 7) believes that the Round Tables can only make a meaningful input to environmental decision-making if the present separate Round Tables become better coordinated with one another.

2.22 One of the clearest illustrations of the fact that environmental and sustainable development considerations extend far beyond "the old federal-provincial football game" has been the influence of aboriginal rights on the Committee's investigation. In part, this was due to the inclusion of aboriginal self-government as a key element of the Government's proposals in *Shaping Canada's Future Together*. The Committee also realizes that any discussion of current and future environmental powers in Canada must recognize that spiritually, socially and economically the environment is vital to aboriginal peoples. Self-government is potentially an opportunity for aboriginal peoples to restore and develop the sustainable relationship with the environment that was characteristic before external immigration and paternalism. As the witness from Inuit Tapirisat expressed it,

We have lived in the Northwest Territories, in northern Quebec and Labrador, for thousands of years and have come to see ourselves as the custodians of those vast lands. Our custodianship is based upon the fundamental beliefs about how humans should relate to the land. . .

Foremost among those beliefs is the respect for the land, the sea and all the living things that occupy the land and the sea. From this flows other principles concerning how and when to use the resources of our land and how to ensure its welfare for future generations. For Inuit, this approach to the environment arises out of life-and-death issues, not some fine-sounding, abstract philosophy. It has enabled our people to survive and flourish in an environment that seems daunting to many outsiders.²⁷

2.23 The legal basis, character and timing of aboriginal self-government are beyond the scope of this Committee. The potential impact of self-government on the environment is however a significant factor in our consideration of future environmental powers. Stated in the simplest form, it will create the need for new partnerships and new relationships, which will need to be developed as carefully as any traditional federal-provincial relationship.

Let me be a little bit more specific about the kinds of environmental powers we are talking about in relation to self-government. To Inuit, management of the environment means much more than control over administrative processes, such as environmental impact assessments and reviews. For us, environmental management must encompass a whole range of powers and responsibilities necessary to safeguard the lands and resources of our homelands. . .

Based on our past experience in negotiations with Canadian governments, we do not expect to achieve easily the power-sharing models that we feel are necessary. But regardless of how these negotiations on environmental jurisdictions turn out, there is for us an essential condition that must be met. No transfer of governmental powers over the environment, whether they are bilateral or not, is acceptable without Inuit consent.²⁸

2.24 The representatives of both Inuit and Indian organizations who appeared as witnesses went out of their way to emphasize that self-government would provide the opportunity for realistic partnerships, not increased separation of aboriginal peoples from the rest of Canada, and they also renewed their commitment to development, provided that development is sustainable.²⁹ Chief Wilson envisioned the desired relationship as it might develop in relation to his own people on Vancouver Island:

²⁷ Issue 8, p. 5.

²⁸ Issue 8, pp. 6-7.

²⁹ Issue 13A, pp. 5-7; Issue 8, pp. 25-26.

We would have exclusive jurisdiction over certain areas, shared jurisdiction in regard to environment and other resources, and a way of dealing with the federal government and provincial government as equals. That doesn't mean our resources would be equal or our jurisdiction would be equal, but. . . you don't assume that you have the right to make decisions for me. . .

When I say exclusivity, don't interpret that as balkanization or somehow isolation. . .

. . . I look forward, when the aboriginal title grievance is negotiated to our satisfaction in the Kwawkewlth-speaking area, to having a relationship to the municipal corporations within our jurisdictions, to the regional district, especially in terms of sewage, infrastructure and environmental considerations, a relationship to the provincial government that's clearly defined, and a relationship to the country that is defined by our negotiations. It is as huge as that.³⁰

2.25 The Committee recognizes that there are differences in the approach to aboriginal self-government, and its linkage to land claims, among the main aboriginal groups in Canada. The Committee also understands that, in addition to self-government within aboriginal lands, the aboriginal groups see a need to share in the management of those environmental elements that affect them but extend far beyond the limits of these lands (e.g. wildlife management or the control of sources of air pollution affecting aboriginal lands). It is clear to the Committee, as it is also clear to the aboriginal organizations that appeared as witnesses, that the development of appropriate partnerships and management systems will be neither easy nor swift. It is also clear, however, that a principal objective of these organizations is sustainable development, for Canada as well as for areas of aboriginal self-government in Canada. The Committee believes that the achievement of aboriginal self-government could provide a significant opportunity for progress towards environmental protection and sustainable development in Canada.

Recommendation 5:

The Committee recommends that aboriginal self-government be regarded as an opportunity and an obligation to pursue the protection of the environment and the adoption of sustainable development patterns.

2.26 If effective environmental partnerships are to be developed, they must clearly include municipal governments, which so often represent the "front-line" of environmental action—in air pollution control, solid waste reduction, sewage treatment and many other tasks. The Mayor of Toronto expressed the need for an altered and improved relationship with the senior levels of government to enable partnership and cooperation on the environment.

Local governments would love to talk to the federal government, would love to talk to the federal and provincial governments around a table, but it has been a no-no for some time now. . .

. . . [T]here needs at least to be a dialogue—I don't see any problem with that—even informal dialogue, so that we are meshing together our energies and our efforts and our resources to do the best we can to overcome environmental degradation. I think that way Canada can make a much better contribution to the saving of this planet, and can set strong leadership. Let's not go off in different directions; let's work together at doing this. . .

³⁰ Issue 13, pp. 18, 25.

. . . It is an absurd way to go about using our resources most efficiently and effectively on any issue, not just on the environment but on a lot of other issues as well that cross over the borders between the different levels of government.³¹

2.27 It is therefore clear to the Committee that the "status quo" that is widely supported (para. 1.23) is far from being a "static quo". Powers in regard to the environment are widely shared at present, among federal, provincial and municipal governments, the private sector and individual Canadians. The prospect of significant powers being exercised by aboriginal groups seems imminent. Concurrency is already a reality, even if in a different form to that in which the term is normally used by constitutional lawyers. Mechanisms are evolving or being strengthened to develop partnership and cooperation among those who share this power. Additional mechanisms for dialogue and concerted action are demanded and are likely to be needed during the 1990s.

2.28 It is this sense of creative dynamism that causes the Committee to avoid recommending at this time significant changes in the formal division of powers in regard to the environment. Growing recognition of the complexities imposed by ecosystem relationships, the global character of so many environmental problems, and the logical consequences of a sustainable development approach all point towards a very wide diffusion of environmental power, and to growing cooperation among the diverse holders of that power. Echoing Mr. MacMillan (para. 1.22 above) we can anticipate that what is happening in 1991 may be unrecognizable a decade from now, "so different at that point will the world be in the context of the environment".

D. ENVIRONMENTAL UNION: THE INTEGRATION OF ENVIRONMENT AND ECONOMY IN SUSTAINABLE DEVELOPMENT

2.29 It appears to the Committee that this sense of dynamism and of the need to provide for the integration of environmental concerns throughout Canadian economy and society is inadequately recognized in the Government's proposals in *Shaping Canada's Future Together*. This has evidently given rise to concern among some of the witnesses who appeared before us, especially in regard to the proposals on the economic union. For example, witnesses from the Rawson Academy for Aquatic Science and the Canadian Bar Association both argued, from their different perspectives, that if the economic union needs a strengthened role for the federal government, the same is true for what they regard as the environmental union that is also Canada.

[E]nvironmental and economic policy are inextricably intertwined. Thus, Canada cannot have an effective economic union if environmental rules are balkanized. . .

[W]e do not believe that an economic union can succeed without an environmental union. In a country such as Canada, where provincial and ecological boundaries do not coincide, the federal government already has a clear role to play on transboundary issues both internationally and domestically.³²

It would appear. . . that the driving forces behind the current. . . proposal is that, one, Canada is essentially a common economic space, not, for instance, an ecological union or a common land space or a common natural space. Second, the driving principle of federalism should be efficiency in the economic or accounting sense.

³¹ Issue 14, pp. 20-21.

³² Issue 12, p. 9-10.

*Those are some elements, some aspects perhaps, of what federalism is about. But federalism is not about the division of powers, to see who can have the most powers or have the most political credibility, or even necessarily doing things in the most efficient way. It is about delivering good government, protecting the rights of citizens, protecting land and protecting the environment.*³³

2.30 It may well be that the concern expressed by these and other witnesses has arisen because *Shaping Canada's Future Together* does not clearly reflect, in its proposals on the economic union, the basic principle of sustainable development, to which the federal and other governments in Canada are committed: that economic and environmental planning must be integrated and inseparable. For our witnesses, and for the Committee, a major objective of the political renewal envisaged by the Government should be to encourage the adoption of sustainable development patterns. We recommend, therefore, that this be made explicit in the proposals on economic union.

Recommendation 6:

The Committee recommends that the proposals for political renewal recognize explicitly that our common but varied environment unites Canada, just as our common but varied economy unites us. Economy and environment are inextricably intertwined. Specifically, the Committee recommends explicit recognition in the proposals that:

- **Canada has a major responsibility to contribute to planetary survival, arising from the vast range, distinctive character, and fragility of its natural environments.**
- **Human activities in the contemporary economy and society generate environmental problems on all spatial scales from the very local to the global; through ecological linkages and transfer mechanisms these problems frequently increase in significance, and in some cases threaten irreversible change.**
- **Consequently, the adoption of sustainable development patterns is essential for both Canada's prosperity and the protection of the environment.**

E. OVERLAP AND DUPLICATION?

2.31 We noted earlier (para. 2.20) that the form of concurrent jurisdiction over the environment that is now developing may provide opportunities for harmonization of legislation and regulation, and for cooperative administration of programs. To many people, however, the principle of concurrent jurisdiction, and the growing number of bodies with environmental powers, may seem a prescription for overlap, duplication, confusion and waste of resources.

2.32 The problem of overlap was described by one of our witnesses as one of the "age-old controversies about what the nature of Canadian federalism is."³⁴ Reducing overlap and duplication is the *raison d'être* of the proposals on "Streamlining Government" in *Shaping Canada's Future Together*. Many witnesses felt that the current constitutional division of powers had caused frequent overlap and duplication of regulatory powers, which generated "unnecessary

³³ Issue 16, p. 27.

³⁴ Issue 16, p. 46.

and burdensome costs" to industry, could "choke off new investment, may even force mine and plant closures, destroy some communities and harm Canada's balance of payments".³⁵ It was primarily in order to find a way out of what it saw as a "regulatory labyrinth"³⁶ that the Mining Association of British Columbia recommended the segmentation of constitutional authority (see para. 2.17 above).

2.33 On the other hand, other witnesses suggested that when more than one level of government is involved in a particular environmental field, their activities may be complementary rather than overlapping. For example, the Mining Association of Canada, while welcoming efforts at harmonization and streamlining, recommended strongly that the federal government retain relevant expertise, so that federal policies would remain sensitive to the needs of the mining industry, even though the bulk of the legislation affecting the industry is provincial.³⁷ Commenting on the situation in British Columbia, the witness from the West Coast Environmental Law Association suggested that

... although there are many areas in which both sets of [federal and provincial] environment legislators are dealing with the same fields, the amazing thing is that they are not duplicating each other's efforts, because the areas are so large and they have such small staffs that they are beavering away on their own tasks quite independent of each other.

*A far bigger problem than duplication is the fact that they do not know what each other is doing. . . What they have to do, and what they are beginning to do, is co-ordinate their activities more, because the job is far bigger than both levels of government.*³⁸

2.34 The Committee has no doubt that many valid examples could be found of overlap and duplication on environmental management in Canada. These seem to be particularly acute, at the present time, in regard to the requirements and mechanisms for environmental impact assessments. It was on impact assessments that many of our witnesses focused their comments, and it is clear to the Committee that the lack of a coordinated approach by federal and provincial governments to environmental impact assessment is not merely time-consuming and onerous on all the parties involved but is also counter-productive in terms of environment and sustainable development needs.

2.35 On other aspects, the evidence, as we have suggested, is less clear-cut. Reflecting on his own long experience in the petroleum industry, Mr. MacLeod (Shell Canada) commented that

*We, industry, have spoken out a lot over the years about the difficulties within Canada of the playing-field not being level, overlapping jurisdictions, and multiple standard requirements, and I have participated in some of that complaining. I am not going to try to speak for any other industry; but in hindsight, when I sit down and ask myself what real problems it has caused, how difficult it has been to operate in the face of that de facto as opposed to in anticipation of the horrors, we have not had many problems. Governments, through shared jurisdictional framework in regard to the environment, have worked things out.*³⁹

2.36 The Minister of the Environment went even further:

³⁵ Issue 18, p. 9.

³⁶ Submission, p. 2.

³⁷ Environmental Issues and Constitutional Reform, Submission from the Mining Association of Canada, pp. 3-5.

³⁸ Issue 13, pp. 54-55.

³⁹ Issue 10, p. 18.

[A] certain amount of overlap is a reality, given the multifaceted interdisciplinary nature of our environment.

I know some people are, by nature, shocked by the idea that there may be overlap, and they read into it waste every time there is. . . But there is also another side to the coin of overlap. . . In some cases overlap may even be helpful to developing the process.

I think if there is one area in which we want to look at the overlap problem with those eyes also, the environment is one of them.⁴⁰

2.37 There is no substitute in the environmental field for concurrency and cooperation among all those with environmental powers. That is not merely the belief of this Committee; it was also the conclusion reached twenty years ago, before federal or provincial environment ministries were established, by Mr. Jim MacNeill. He had been invited by the federal government to consider how environmental issues might best be accommodated within the context of proposals for constitutional reform that were then being negotiated. Two decades later, the only significant change that appears necessary to his conclusion is the recognition that environmental action in Canada requires much more than federal-provincial cooperation. That apart, his findings seem undeniable and as relevant now as then.

Effective management strategies . . . necessarily concern both orders of government. This appears to be an almost inescapable conclusion from the foregoing analysis. It flows not only from the fact that environment problems are dominated by spillovers. It flows also from four characteristics that stand out in each part of the analysis: ecological interdependence; physical interdependence; problem interdependence; hence, jurisdictional interdependence. The overriding corollary of this, of course, is intergovernmental cooperation, at all levels and in all possible forms. It is difficult, if not impossible, to visualize any political or institutional structure, or any system of powers, that would reduce the importance of such cooperation or that would work without it.⁴¹

Recommendation 7:

The Committee recommends that present trends, both formal and informal, towards concurrent environmental jurisdiction be encouraged and strengthened. In particular, the Committee recommends:

- **strengthened formal and informal mechanisms for consultation and cooperation among governments in Canada;**
- **harmonization of existing and proposed regulations and actions to protect the environment and promote sustainable development, based on high national standards and the opportunity for individual jurisdictions to adopt still more stringent measures;**
- **other measures to avoid unnecessary overlap and duplication, and to promote collaboration and the adoption of joint policies, programs and projects;**

⁴⁰ Issue 15, p. 9. See also the witness from the Environmental Law Institute (Issue 9, p. 30):

Having just one person in charge and delegating authority has led to some unhappy consequences in other societies. Your system and our system are systems of mutual adjustment that coax areas of the civil society to come along with a lot of jawboning and bargaining. . .

I have come to the conclusion that redundancy, dispersed power and enforced bargaining are really the better path to wise decision-making.

⁴¹ MacNeill, J.W. *Environmental Management*, Ottawa, Information Canada, 1971, p. 175.

- development of links and consultation mechanisms with other relevant jurisdictions, including international institutions, municipal governments, and the institutions of aboriginal self-government, as the latter are established;
- action to give greater public awareness and understanding of, and access to, national and international coordination mechanisms concerned with the environment and sustainable development.

4. IN REGARD TO THE ROLE OF THE FEDERAL GOVERNMENT

4.1. *Policy Leadership*. Almost without exception, all stakeholders have expressed the view that the Government of Canada has a leadership role in the development of environmental policy. The Government's leadership role is seen in the development of the federal government's policy on environmental protection, the development of the environmental protection legislation, the development of the environmental protection standards, the development of the environmental protection programs, and the development of the environmental protection institutions.

4.2. *The Government's Role in the Development of Environmental Policy*. The Government's role in the development of environmental policy is seen in the development of the federal government's policy on environmental protection, the development of the environmental protection legislation, the development of the environmental protection standards, the development of the environmental protection programs, and the development of the environmental protection institutions.

4.3. *The Government's Role in the Development of Environmental Legislation*. The Government's role in the development of environmental legislation is seen in the development of the environmental protection legislation, the development of the environmental protection standards, the development of the environmental protection programs, and the development of the environmental protection institutions.

4.4. *The Government's Role in the Development of Environmental Standards*. The Government's role in the development of environmental standards is seen in the development of the environmental protection standards, the development of the environmental protection programs, and the development of the environmental protection institutions.

4.5. *The Government's Role in the Development of Environmental Programs*. The Government's role in the development of environmental programs is seen in the development of the environmental protection programs, and the development of the environmental protection institutions.

4.6. *The Government's Role in the Development of Environmental Institutions*. The Government's role in the development of environmental institutions is seen in the development of the environmental protection institutions, and the development of the environmental protection programs.

4.7. *The Government's Role in the Development of Environmental Programs*. The Government's role in the development of environmental programs is seen in the development of the environmental protection programs, and the development of the environmental protection institutions.

4.8. *The Government's Role in the Development of Environmental Institutions*. The Government's role in the development of environmental institutions is seen in the development of the environmental protection institutions, and the development of the environmental protection programs.

SPECIFIC ISSUES AND RECOMMENDATIONS

A. IN REGARD TO THE ROLE OF THE FEDERAL GOVERNMENT

3.1 *Federal leadership.* Almost without exception, and whatever their backgrounds and perspectives, the witnesses before the Committee asserted the need for continued federal leadership on environment and sustainable development.¹ Several witnesses urged either an extension of the federal government's powers to establish national environmental standards, or the use of latent powers that the witnesses believed already exist at the federal level. Other witnesses saw in the proposals set out in *Shaping Canada's Future Together* indications that the federal government was prepared to relinquish powers which the witnesses regarded as essential if federal leadership is to be effective.

3.2 The Committee is impressed by the unanimity and the convergence of views on federal leadership. For example, Pollution Probe and the Canadian Environmental Law Association argued that

Given that a clear federal role in environmental matters is necessary, it must be recognized that Parliament will likely require its entire arsenal of jurisdictional powers to play this role fully. Specifically, we are referring to the full residual power, the declaratory power, the "general" power under trade and commerce, and the spending power.²

From the industry side, TransCanada Pipelines Ltd.'s position is that

Federal authority over the environment should be dominant to provide uniform regulation across the country in respect of environmental processes as well as pollution controls.³

Similarly, the mining industry expressed concern at the indications that the federal government would withdraw from mining (and other fields of jurisdiction). Meanwhile different legal witnesses were concerned at what they saw as a contradiction in the Government's proposals, and the possible adverse signal that this might give to courts dealing with environmental matters.⁴

¹ The main exceptions may have been the Canadian Electrical Association and the Mining Association of British Columbia (MABC). The former explicitly endorses a primary role for provincial governments on environmental matters. Though not explicit on this point, MABC's proposals would probably reduce substantially the federal government's role on environmental matters within Canada.

² *Environment and the Constitution*, pp. 25-26.

³ Submission of TransCanada Pipelines Ltd., p. 5.

⁴ Issue 16, p. 25. See also Issue 13, pp. 45-49.

Aboriginal organizations were understandably concerned about any potential weakening of powers, including environmental powers, by the Crown with which they had negotiated earlier treaties and with which they anticipated much more comprehensive negotiation in the near future.⁵

3.3 When witnesses were pressed on the specific elements in the Government's proposals, it appeared that some of the items did not generate real concern in themselves; what mattered more to the witnesses was the cumulative effect of the total package. Those⁶ who were inclined to oppose the elimination of the declaratory power (section 92(10)(c) of the Constitution Act 1867) were probably aware that it had seldom been used in recent years. On environment-related fields such as forestry and mining, it was recognized that the federal interest is at present a very limited one. Nevertheless, several witnesses found the phraseology in the Government's proposals obscure, and therefore troubling.⁷

3.4 Similar concern about the vagueness of the Government's proposals was expressed in regard to the areas proposed for administrative and/or legislative delegation, including wildlife conservation and protection and soil and water conservation. As a witness from the Canadian Bar Association expressed it,

When we see streamlining proposals such as this, the question is, is this good-faith streamlining or is it passing the buck?⁸

It must also be recognized that, in the eyes of many observers, past experience with administrative delegation in the environmental field does not encourage further action of this kind. Mr MacMillan, with ministerial experience, was explicit:

The record of provincial governments in this country in the environmental field is appalling, when the federal government has devolved or delegated some of its authority, especially for enforcement, to the provinces, as it did, for example, vis-à-vis section 33 of the Fisheries Act.⁹

There may be no objection to the principle of delegation—it may indeed represent a very sensible way to improve the environment—but witnesses insist that delegation should be accompanied by a provision for reporting by the jurisdiction to which the powers are delegated, and delegation should be revokable if it fails to achieve the desired objective.¹⁰

Recommendation 8:

The Committee recommends that the proposals for political renewal in regard to the recognition of areas of provincial jurisdiction, and in regard to streamlining government, include specific and unambiguous statements so as to ensure that these proposals are compatible with a strong federal commitment and capacity in regard to environment and sustainable development, and with the exercise of appropriate federal jurisdiction in all the areas identified in the Government's proposals.

⁵ See, for example, Issue 13, pp. 4-37. See also Issue 13A, p. 9:
"Our treaty and aboriginal rights are being placed in jeopardy by developments which do not respect the environment."

⁶ For example, Ms Barbara Rutherford, Canadian Environmental Law Association, Issue 17, p. 12.

⁷ See, for instance, Issue 13, pp. 50-51, and *Environment and the Constitution* (Pollution Probe and CELA), section 4.1.3.

⁸ Issue 16, p. 43.

⁹ Issue 6, p. 33-34. See also Issue 13, p. 54.

¹⁰ The WCELA brief demands, as a condition of delegation by the federal government, (1) strong federal leadership, (2) accountability, and (3) reasonable provisions for public participation in decision-making. (p. 27)

Recommendation 9:

The Committee recommends that proposals on administrative and legislative delegation related to the environment require provisions in the enabling agreements to ensure:

- regular and public reporting to the legislature of the delegating authority by the jurisdiction to which the powers are delegated;
- revocation of the delegated powers if, in the opinion of the legislature of the delegating jurisdiction, the powers are not being effectively exercised by the jurisdiction to which powers have been delegated;
- full public information, and opportunity for individuals and groups to comment and make representations on the implementation of the administrative or legislative provisions at any time.

3.5 The Committee believes that, from an environmental standpoint, it may be desirable to reconsider the proposal that the federal government relinquish its power, under Section 92(10)(c), to assume federal authority by declaring works to be "for the general advantage of Canada." This "declaratory power" has not been used for several decades, and it is clear from *Shaping Canada's Future Together* that its continued existence is seen by the federal government as a potential irritant in federal-provincial relations. This may be so, but unlike other general powers, such as "peace, order and good government", it is not a legislative power but one that could enable the federal government to act quickly in an emergency. In the context of cooperation and partnerships that we see developing in the environmental field, it may be that the declaratory power would enable a rapid response to an unexpected environmental crisis, in which the federal government's use of the power would be encouraged and endorsed by other levels of government.

Recommendation 10:

The Committee recommends that the significance of the "declaratory power" be clarified with respect to the ability of the federal government to maintain and enhance environmental quality and to promote sustainable development, prior to any changes to Section 92(10)(c) of the Constitution.

3.6 As discussed below, there was less uncertainty, and clear opposition, to both restrictions on the use for environmental purposes of the federal residual power ("peace, order and good government") and to the proposal to entrench property rights in the Constitution.

3.7 In summary, federal leadership on the environment is seen as a major requirement by most of our witnesses, and needs to begin with a clarification of the Government's attitude to the environment vis-à-vis its proposals for political renewal. As some witnesses observed, the government's proposals need to be subjected to an environmental impact assessment. We recommend that this clarification include at least three elements:

- (a) A reiteration and amplification of the brief statement by the Minister for Constitutional Affairs, that the environment "is a field in which existing federal jurisdictions must be respected and must be maintained."
- (b) Greater specificity on the nature of those proposals that directly or indirectly appear to affect the environment. These include the residual power, areas for federal withdrawal, areas proposed for delegation, property rights, and possibly also aboriginal self-government. Reassurance on safeguards and accountability is particularly important.

- (c) Recognition, in the context of the proposals on economic union, that economic and environmental decision-making are "inextricably intertwined".

3.8 *Implementation of International Agreements.* Special concern was expressed by several witnesses about the federal government's lack of a "treaty power", i.e. the power to act within Canada to meet international treaty obligations. Section 132 of the Constitution Act 1867 gave this power to the Parliament of Canada; however a 1937 judicial decision¹¹ held that this power did not extend to treaties entered into by Canada itself, in contrast to those, prior to the 1931 Statute of Westminster, that Canada inherited from Britain or that were negotiated on Canada's behalf by the imperial government. The ruling has not prevented Canada from acquiring or complying with such international obligations; however, when compliance involves provincial jurisdiction, cooperation with provincial governments is normally required.

3.9 This situation differs markedly from that in the United States, where, we were told, under Article 6 of the U.S. Constitution, a treaty ratified by the U.S. Senate becomes

*the supreme law of the land. . . and the judges in every State shall be bound thereby, anything in the constitutional laws of any State to the contrary notwithstanding.*¹²

3.10 In *Shaping Canada's Future Together*, the treaty power is not addressed directly. However, in his statement to the Committee, the Minister of the Environment expressed the belief that the increased cooperation and coordination sought in the proposals

*. . . would allow the Government of Canada to play a leading role in the management of transboundary environmental issues, both within Canada and internationally, and to negotiate international environmental treaties and agreements on behalf of Canada with the confidence our commitments can be fulfilled.*¹³

3.11 Several witnesses nevertheless evidently believe that this absence of a treaty power represents a real weakness in the Canadian system, one that is particularly important in an environmental context.¹⁴ There is, however, a diversity of views on how this gap should be filled. The West Coast Environmental Law Association recommended the creation of a specific external affairs power on environmental matters:

*We recommend that the Government of Canada revise its constitutional proposals by expressly enumerating a federal power to legislate as necessary to implement Canada's international environmental commitments.*¹⁵

The WCELA recognizes that "This would require a mechanism to assure the provinces of an opportunity to participate in the formulation of Canada's negotiating position regarding such commitments."¹⁶ It is not clear to the Committee how feasible such "special treatment" for

¹¹ A.G. Can. v. A.G. Ont. [1937] 1 D.L.R. 58 (P.C.)

¹² Issue 9, p. 13.

¹³ Issue 15, p. 12.

¹⁴ See, for example, Issue 16, pp. 24-25.

¹⁵ *Enhancing Environment Protection in the Canadian Constitution. . .*, p. 23.

¹⁶ *Ibid.*, pp. 22-23.

environmental commitments would be; as the WCELA itself recognizes,¹⁷ international trade commitments suffer from a similar disability and may have a similar claim to such an external affairs power.

3.12 In the view of a witness from the Canadian Bar Association the problem, though a serious one, should not be addressed through a constitutional amendment.¹⁸ Mr Fairley urged instead that deliberate use should be made of powers that the federal government already possesses.

I think that there is a very good argument, a good principled argument, that peace, order and good government for the nation is a mandate for implementing international obligations that are clearly of a kind that have a national dimension to them. . .

If the federal government wants to take the bull by the horns, it could test it. There have been opportunities to do it. The Justice Department has steadfastly, probably under Cabinet directives, avoided ever doing that.

The general trade and commerce power, the resuscitation of that, is another rubric that could be used. . . to have a new principled interpretation of what federal legislative powers should be in relation to international obligations.¹⁹

3.13 This issue clearly extends far beyond environmental concerns and the Committee is in no position to prescribe its own solution. However the Committee agrees that ensuring the implementation of international environmental commitments is a real and urgent need. Without it, Canada's negotiating position is unnecessarily constrained by what the federal government believes would be acceptable to all affected provinces; Canada's credibility on the international scene may be called into question; and major opportunities to protect and improve the Canadian environment may be missed or diminished. It seems clear that Canada will be hard pressed to fulfil the international environmental commitments that it has made in recent years (e.g. in regard to the atmosphere or the Great Lakes). The Government of Canada should not be in the position of having to plead that a failure to fulfil a commitment was due to its lack of environmental authority. It may be that this issue could be considered productively within the framework of the Canadian Council of Ministers of the Environment. Be that as it may, we recommend that the Government of Canada address the general question of the treaty power in its revised constitutional proposals, because of its significance for environment and sustainable development in Canada.

Recommendation 11:

The Committee recommends that the proposals for political renewal include explicit recognition of the need for a power to ensure that Canada's international commitments to improve the national and global environment, and to promote sustainable development, can be implemented effectively and expeditiously. The Committee recommends the creation of a formal consultation mechanism in regard to the exercise of this power, particularly for Canadian jurisdictions with relevant powers. The Committee also recommends that this so-called 'treaty power' should include major international agreements that do not have the status of treaties.

¹⁷ *Ibid.*, p. 23.

¹⁸ Issue 16, p. 38.

¹⁹ Issue 16, p. 36.

3.14 *Peace, Order and Good Government.* This residual power of the federal government, under section 91 of the Constitution Act, is in present circumstances a main foundation for the federal government's environmental powers. As we were told by a former Minister of the Environment,

When we devised, for example, the Canadian Environmental Protection Act, we were advised by the lawyers seconded to us by the Department of Justice and by our internal legal experts that we would be on very shaky constitutional and legal grounds to the extent that we strayed in weaving our legislation away from, principally, the peace order and good government provisions of the Constitution and the federal criminal law power having to do with health, life and safety.²⁰

As discussed earlier (para. 1.17), the peace, order and good government ("POGG") power was further expanded, as a source of federal jurisdiction in environmental matters, by the *Crown Zellerbach* decision in 1988.

3.15 Many other witnesses, when stressing the importance of a strong federal role in environmental legislation, expressed particular concern about the Government's proposal to restrict the use of the POGG power.²¹ Witnesses suggested that, if the federal spending power is to be limited in the manner proposed by the Government, the POGG power may take on even greater importance as a basis of federal authority.

3.16 It is not clear to the Committee what the practical consequences to federal environmental powers of the Government's proposal on the residual power would be.²² Nor is it clear why the Government found it necessary or desirable to make this proposal, which would "transfer to the provinces authority for non-national matters not specifically assigned to the federal government under the Constitution or by virtue of court decisions." It is the Committee's understanding that, under the test set out by the Supreme Court of Canada in *R. v. Crown Zellerbach*, non-national matters would not fall within the federal government's authority in any event.²³ If this is so, the Committee recommends that the Government reconsider its proposal on the Federal Residual Power, on the grounds that the proposal has little constitutional significance, but may indicate politically a weakening of federal leadership that would be very undesirable in regard to the environment.

Recommendation 12:

The Committee recommends that the proposals for political renewal recognize that the federal residual power ('peace, order and good government') is one of the basic foundations for federal action to protect the environment and promote sustainable development. This power should in no way be diminished in its ability to deal with environmental needs.

3.17 *Data Collection, Monitoring, Research and Public Information.* At the core of the arguments for federal leadership, a "level playing field", and an environmental union is the belief, expressed frequently by witnesses, that the federal government must have the power and capacity

²⁰ Issue 6, p. 32.

²¹ *Shaping Canada's Future Together*, p. 36.

²² Mr Andrews, the witness from the West Coast Environmental Law Association, expressed the view that, on an initial reading, the federal power with respect to national concerns would not be affected by the Government's proposals. He went on: *It strikes me the main concern with this proposal is on the political side; that is, to the extent which removing some of the federal government's residual powers may reflect a political move away from a stronger federal role. On that, I would simply answer with the political importance of a strong federal role in protecting the environment.* (Issue 13, p. 46)

²³ See Northey, pp. 140-144.

to set national standards in regard to the environment. Capacity to act involves knowledge: data collection and analysis, monitoring and research. Similar knowledge needs exist in regard to Canada's international environmental negotiations. As the witness from the Rawson Academy of Aquatic Science told us

The federal government is the one institution that has invested the most in Canada in developing the knowledge that is required for policy-making in the environmental field. This is a priceless asset that needs to be nurtured. . .

[C]learly, when we're looking at issues such as global warming or the loss of bio-diversity or acid rain, any action we take has be based on sound, credible research. This is an area where the federal government should continue to play a leadership role.²⁴

3.18 The witness from the public opinion survey The Environmental Monitor also emphasized the need for the federal government to increase its activity in regard to public information and education on the environment. He pointed to the great gap between concern and understanding that exists.

In terms of specific understanding of what issues are priorities, let alone what factors will improve those issues, that's where Canadians are some of the first to say they don't understand that. Our data shows very graphically when we ask, in open-ended kinds of ways, what is the primary cause of global warming, that ozone depletion is identified as the prime reason for global warming. . . Only 14% identify the use of fossil fuels.

How can you go forward with good public policy with gaping perceptual problems like that? Hence, that is a good example why our data suggests, very strongly, that the federal government has probably a unique and certainly justifiable role in adult public education in Canada around these issues.²⁵

3.19 The Committee welcomes the statement, in *Shaping Canada's Future Together*, that "The government is committed to ensuring the preservation of Canada's existing research and development capacity".²⁶ We note, however, that this has not prevented several witnesses from expressing concern on just this point, since the statement appears in the context of Government proposals to withdraw from fields in which research, data collection and monitoring are at present the principal fields of federal government activity.²⁷ If the concern arises solely from incorrect interpretation of a section of the Government's proposals that has been ambiguously drafted, the Committee believes that clarification on this point would be widely welcomed.

3.20 More fundamentally, however, the Committee believes strongly that readily-available environmental data and information, and better public access to the policy development and action by governments on environment and sustainable development are essential. These become even more crucial if, as recommended earlier in this report, concurrent jurisdiction and partnerships are to be the basis of environmental policy and action in Canada. It seems clear to the Committee that adequate data and information are not available, to governments or to the public. Similarly, the activities of bodies, such as the CCME and the national and provincial Round Tables on Environment and Economy that have actual or potential roles in building cooperation and partnerships, are little known to the public or, indeed, to anyone other than those directly involved in them. The mechanisms of environmental management in Canada need to be much more transparent than they are at present.

²⁴ Issue 12, p. 25.

²⁵ Issue 6, p. 19.

²⁶ p. 37.

²⁷ See for example, the submission from the Mining Association of Canada, pp. 3-4.

Conclusion 13:

Environmental protection and the adoption of sustainable development patterns involve the whole population. At present, public access to data and information on environmental issues, and to related governmental activities (including intergovernmental liaison mechanisms) is quite inadequate. The Committee's recommendations in regard to the division of powers all take as a prerequisite the need for greater public access to environmental information and greater public participation in environmental action by governments.

Recommendation 14:

The Committee recommends that the proposals for political renewal include measures to enable Canadians to participate effectively in, and hold accountable, the institutions of government at all levels, in order to fulfil objectives for a healthful environment and sustainable development.

B. OTHER ASPECTS

3.21 *Property Rights.* Witnesses before the Committee expressed considerable concern about the potentially negative implications for the environment of the proposed entrenchment of property rights in the Canadian Charter of Rights and Freedoms.²⁸ The current proposal to entrench such a right provides no definition of property, no location for such a right within the Charter, and no draft wording for such a provision. Witnesses therefore had some difficulty in addressing themselves in detail to this item. The character of their concern, and the extent to which it is shared by many witnesses are, however, clear enough.

3.22 Many witnesses opposed the entrenchment of property rights because such a provision could impede the ability of governments in Canada to develop and implement environmental measures. All the witnesses from the environmental community took this view, as did most others. Some witnesses, while opposed in principle to entrenchment of property rights, proposed measures through which negative environmental effects of such a change could be reduced.

3.23 A witness from the Canadian Bar Association advised the Committee that unqualified entrenchment of property rights would interfere with the ability of all levels of government to implement environmental protection legislation.

*That is because many environmental controls are attached or implemented by way of laws relating to land use, zoning and planning, natural resource extraction and management and so forth.*²⁹

The fact that such rights are subject to reasonable limits, pursuant to section 1 of the Charter, did not reassure the witness, because the determination of what is a reasonable limit depends on judicial interpretation. As another expert legal witness commented,

Actions by government that have anything to do with property would come under increasing scrutiny, and there are two bases for the concern. One is that at the end of the day courts would actually strike down the governmental initiatives that were aimed at protecting the environment.

²⁸ *Shaping Canada's Future Together*, p. 3.

²⁹ Issue 16, p. 28.

The other is that there would be court challenges and years of court battles over government action to protect the environment, based on such a Charter right. It could be years or even decades before we know the extent to which the courts will draw the line in order to protect government's ability to deal with environmental problems. That is why we call it the "chilling effect".³⁰

3.24 The President of Inuit Tapirisat of Canada advised the Committee that her organization is concerned that resource development corporations may use constitutionally-guaranteed property rights to challenge certain aspects of aboriginal title to land. Chief Wilson, representing the Assembly of First Nations, also opposed the entrenchment of property rights in the Charter. He indicated to the Committee that a right to property may run "right in the face of regulations that are designed to protect that property."³¹

3.25 Although a substantial number of other countries have entrenched property rights in their national constitutions, witnesses who appeared before the Committee were only able to speak to the American experience. Some³² felt that the experience with the provision protecting property rights in the United States Constitution should reassure Canadians, because Americans have nevertheless developed an environmental protection that is in many respects more stringent and more effective than Canada's. Other witnesses however cited American experience as an indication of the ways in which property rights can interfere with government efforts to protect the environment.

3.26 According to Mr Futrell of the Environmental Law Institute in Washington, D.C., the U.S. Supreme Court has never struck down a regulation made by the federal Environmental Protection Agency as being a violation of the property right.³³ At the state government level, however,

*The federal private property clause can sometimes trump state actions and state efforts to protect the environment.*³⁴

He suggested that the "takings clause" (the property rights provision in the Bill of Rights) can have a chilling effect:

*This clause does not necessarily undermine environmental regulation; however, in a number of state legislatures, especially in the south and mountain west, it has been used as a powerful argument to stymie legislation in committee. It has tremendous prestige.*³⁵

³⁰ Issue 13, p. 48.

³¹ Issue 13, p. 29.

³² See, for example, the comments by the Minister of the Environment, Issue 15, p. 11.

³³ Issue 9, p. 23.

³⁴ Issue 9, p. 10.

³⁵ Issue 9, p. 13.

Witnesses were unable to provide the Committee with examples of the way that entrenchment of property rights might have a beneficial effect on the environment.³⁶

3.27 Many witnesses felt that property rights are already adequately protected in Canada by existing legislation. The witness from the West Coast Environmental Law Association advised us that, at common law,

*... the courts already interpret statutes in such a way as to give the benefit of any interpretation doubts to the holders of private property.*³⁷

Similarly Mr. Muldoon, of Pollution Probe, suggested that

*I think it's fair to say that property rights are probably one of the oldest, most established, and certainly one of the more complex regimes of our law.*³⁸

3.28 Several witnesses were concerned that, if property rights are to be entrenched, there should be explicit wording in the provision to ensure that such rights do not affect the ability of governments to protect the environment. Others felt that, if property rights were entrenched, it "becomes essential that counterbalancing environmental rights must also be entrenched."³⁹

3.29 The Committee is aware that, in the larger context of the constitutional debate, other concerns are being expressed about the property rights proposal. The Committee, like our witnesses, focused only on the potential implications for the environment. Members held sharply different opinions concerning the potential consequences for the environment of the proposal to amend the Canadian Charter of Rights and Freedoms to guarantee property rights. One view was that environmental protection is already adequately guaranteed by Section 1 of the Charter, by case law, and by the potential for using the "notwithstanding" clause. This opinion held that the inclusion of property rights in the Charter presents no threat to the environment. Some other members of the Committee did not share this conviction. They took the view that there is good reason to believe that efforts to maintain or enhance the quality of the environment, or to promote sustainable development, could be impugned or substantially obstructed by the entrenchment of property rights, and that therefore this proposal should be withdrawn. Several members also expressed the view that property rights in Canada are already adequately safeguarded by legislation and case law, and that no obvious need for a constitutional amendment has been demonstrated.

Recommendation 15:

The Committee recommends that, if any amendment were made to the Canadian Charter of Rights and Freedoms to guarantee property rights, it be clearly stated in the wording of the guarantee that maintenance and enhancement of the quality of the environment and the promotion of sustainable development shall take precedence.

³⁶ The witness from the Sierra Club (Ms. Elizabeth May) did express the belief that "in some instances ... a Charter-entrenched property right might help to protect the environment". However, she opposed inclusion of the property right (or environmental rights) in the Charter, on the grounds that entrenching property rights would lead to "great confusion, a bonanza for lawyers". (Issue 17, p. 33).

³⁷ Issue 13, p. 48.

³⁸ Issue 17, p. 9.

³⁹ Issue 12, p. 8.

3.30 *Environmental Rights*. Witnesses before this Committee welcomed the Government's proposal to create a "Canada clause" in the body of the Constitution that would include

*. . . a commitment to the objective of sustainable development in recognition of the importance of the land, the air and the water and our responsibility to preserve and protect the environment for future generations.*⁴⁰

However, some witnesses cautioned that the provisions in the Canada clause would be of symbolic value only, and that there is therefore a need for some legal backing for the principles.⁴¹ In order to give legal force to the environmental commitment, several witnesses recommended that environmental rights be enshrined in the Canadian Charter on Rights and Freedoms. Some of our witnesses have recommended wording of such a right.⁴² Inclusion of environmental rights was urged on several grounds:

First, environmental rights would be a clear step toward mandating the requirement of the full integration of environmental quality into decision-making of government in the private sector. It would also have educational value whereby private and public sector actors would more likely take all environmental norms and issues more seriously.

Third, environmental rights would recognize the inherent value of the environment and natural resources for their own sake. . .

*Fourthly, environmental rights empower people to protect the environment that sustains them.*⁴³

The same witness noted that about 20 countries now have express or implied rights to a healthful environment in their national constitutions, and that environmental rights are gaining international recognition.⁴⁴ Some provincial and territorial jurisdictions in Canada have enacted or are considering environmental rights legislation (Yukon Territory, Northwest Territories, Ontario).

3.31 The Committee was impressed by the recommendation from Mr. Futrell (Environment Law Institute) that, where possible, constitutions in common law countries should be silent on specific issues such as the environment, in order to keep legislative options open and reduce the area for judicial interpretation.⁴⁵ However, witnesses from the Canadian Bar Association (CBA) advised us that there would be no real risk of lack of governmental accountability or flexibility if environmental rights were given constitutional protection. The CBA suggested that there is often a "dialogue" between the courts and the legislatures on such matters, so that legislatures can amend the law if they do not agree with the courts' interpretations.⁴⁶

3.32 All the witnesses who raised the subject of entrenching environmental rights in the Charter were convinced that the arguments for such rights became even more compelling in the face of a decision to entrench property rights. This reflects the apprehension that courts called on to apply the property rights provision would otherwise have to interpret it in a context that gave

⁴⁰ *Shaping Canada's Future Together*, pp. 9-10.

⁴¹ See, for example, Issue 13, p. 39.

⁴² See, for example, *Enhancing Environmental Protection in the Canadian Constitution* (WCELA), pp. 32-34.

⁴³ Issue 17, p. 6.

⁴⁴ *Environment and the Constitution* (Pollution Probe and CELA), Appendix D.

⁴⁵ Issue 9, pp. 18-19.

⁴⁶ Issue 16, pp. 28-29.

insufficient guidance as to its intended effect on existing environmental protection legislation. A right to environmental quality could assist the courts by indicating where the balance is to be struck between private property rights and legislative efforts to protect the environment.

3.33 *Beyond considerations of constitutional reform and the division of powers.* Although the Committee was left in no doubt, during its study, of the vital environmental significance of federal leadership, intergovernmental cooperation, environmental rights and other similar features needed in the working of the Canadian constitution, it also recognizes that much of the task of protecting and improving the Canadian environment, and adopting sustainable development patterns, is undertaken by individual Canadians, the private sector, and in the marketplace. Industry witnesses such as Mr. McCready (TransAlta) urged on governments the need to establish realistic costs and prices, so that environmental resources could be valued more highly than is normal at present. Harmonizing the labyrinth of regulations does more than ease the task of business and industry; it increases the likelihood that the regulations will be obeyed and enforced. And as the witness from The Environmental Monitor pointed out, individual Canadians are not merely concerned about the environment; they see themselves as primarily responsible for acting on that concern. The recommendations that we have made in this report are of more than intrinsic importance; they are designed to assist the governmental framework of Canada in its enabling role, facilitating environmental action that goes far beyond the capacity of the governments themselves.

Minister of the Environment



Ministre de l'Environnement

FEB 26 1993

Mr. David MacDonald, P.C., M.P.
Chairman
Standing Committee on Environment
Room 309
East Block
House of Commons.
Ottawa, Ontario
K1A 0A6

Dear Mr. MacDonald,

Please find attached a copy of the Government's response, in both official languages, to the Standing Committee Report "Environment and the Constitution" which has been submitted to the Clerk of the House of Commons, pursuant to Standing Order 32(1).

I would like to take this opportunity to thank you and the Committee for a very valuable and perceptive Report.

Yours sincerely,

Jean J. Charest

Encl.

Ottawa, Canada K1A 0H3

GOVERNMENT RESPONSE

The Standing Committee on Environment tabled its report, *Environment and the Constitution*, in the House of Commons on March 12, 1992. This report was based on hearings and submissions with representatives of environment, business, and aboriginal groups, law associations, research institutes, as well as municipal and provincial governments.

The Standing Committee report is a perceptive document that contributed to the constitutional deliberations of the Canada Round. As the Canada Round is now completed, the Government's response examines the nature of the federal-provincial partnership on environmental matters and the long standing Government commitment to sustainable development, rather than the specific constitutional matters raised in the Standing Committee report.

The environment is and will continue to be a high priority of this Government. We will work with our provincial and territorial partners to fulfil our responsibilities to current and future generations of Canadians to protect their natural heritage. This commitment is based on the belief that a strong federal role in the environment, that complements the role of the provinces and the territories and fosters the participation of a broad-spectrum of Canadians, is the only practical way to prevent and to respond to environmental concerns.

Sustainable Development The Integration of Environment and Economy

Over the years we have gradually come to understand the linkages between environment and economy and to view environment and economy as two sides of the same coin. More recently, through the work of academics such as Dr. Michael Porter of Harvard University, it has become apparent that high environmental standards may also act as an incentive for increased competitiveness through innovation. In addition, as most Canadians would agree, without a healthy environment and a productive resource base, we cannot have a strong economy. These linkages are further underscored when one considers that economic growth also provides Canadian governments, industries and individuals with the resources to invest in the infrastructure required for pollution prevention, control, and clean-up.

The interrelationships between environment and economy were internationally recognized as a result of the work of the United Nations Commission on Environment and Development. As the Commission wrote in its landmark report *Our Common Future* "the common theme throughout this strategy for sustainable development is the need to integrate economic and ecological considerations in decision-making". The Commission added that they are, after all, integrated in the workings of the real world.

At a national level, the notion of sustainable development has also been endorsed by the Canadian Council of Ministers of the Environment and the Canadian Council of Forest Ministers and strategies and action plans are being developed to integrate economic and environmental decision making. With the establishment of the National Round Table on the Environment and the Economy, a multisectoral forum, the Government has also shown its commitment to building a national consensus on sustainable development.

Improved decision-making and sustainable development provide a solid foundation for Canada's Green Plan released by the Government two years ago. Since the release of the Green Plan, the Government has announced several new initiatives, in all parts of Canada, which will help Canadians reassess the way we make our environmental and economic decisions and which will translate our sustainable development goals into action. The Government is committed to decision-making processes that ensure that the environment is fully considered in project and policy evaluation. This approach underlies the most recent reforms of the federal environmental assessment and review process.

The Government put this commitment into action during the negotiations of the North American Free Trade Agreement. In consultation with the provinces and territories as well as non-governmental groups, the Government negotiated a precedent-setting agreement which included a comprehensive environmental assessment of the implications of the agreement itself as well as specific environmental provisions.

The Government, therefore, supports the Standing Committee recommendations and conclusions which endorse sustainable development and recognize the inextricable linkages between environment and economy.

Environment: The Responsibility of all Canadians

It is only through the active involvement and commitment of all Canadians and all governments that we can meet the national and global environmental challenges before us. It is for this reason that when designing Canada's Green Plan, the Government consulted extensively with Canadians — individuals, environmental groups and business leaders, as well as provincial, aboriginal and municipal representatives. The Government also sought the advice and assistance of these same groups in the development of Canada's negotiating positions for the United Nations Conference on Environment and Development (UNCED) which took place in Rio de Janeiro, Brazil last June.

Canada has been a leader in the UNCED process from the beginning. Recognizing that no community, province, or nation alone can deal with the serious environmental challenges before us, the Government of Canada on behalf of all Canadians was one of the original sponsors of the United Nations resolution that established the conference known now as the Earth Summit.

In our preparations for this important event we were also exemplary. Representatives from environmental groups, business and industry associations, aboriginal groups, and sustainable development institutes, were involved in the preparation of Canada's negotiating position and went to the Summit as part of Canada's official delegation. The nature of the Canadian delegation and the leadership role played by Canadians at the Summit helped make the whole world understand Canadians, from all walks of life, are committed to make sustainable development a reality and are willing to think creatively about the important challenges posed by sustainable development.

The Government also recognizes that Canadians want to know about the progress being made on environmental issues and to understand the nature and scope of the challenges before us. Canada's Green Plan commits the Government to report to Canadians on progress towards the achievement of national environmental goals. The public will be given access to credible environmental information from a wide range of sources. In this way, Canadians can be the judge of

environmental commitment and achievements — Canadians can evaluate for themselves their own performance and that of their governments and their industries. Based on this understanding, Canadians will be able to make better decisions in the future.

It is for this reason that, in 1986 and again in April of last year, the Government provided Canadians with the report "The State of Canada's Environment". This document speaks to Canadians about the wealth and diversity of Canada's natural endowment and yet it objectively highlights the areas where more work needs to be done.

In addition, the Government has, through the Environmental Choice Program of the Green Plan, provided Canadians with an independent source of information to help Canadians direct their consumption to those products that are less harmful to the environment.

The Government also understands that Canadians want to know what the Government has done to fulfil its own responsibilities. Public accountability is a key element of Environment Canada's legislation such as the *Canadian Environmental Protection Act*, the *National Parks Act*, and the new *Canadian Environmental Assessment Act*.

Environment: The Responsibility of all Governments

When discussing intergovernmental relations on environmental matters, it is important to examine the nature of environmental issues and to determine how this affects our management approaches.

Formerly, environmental management was perceived as primarily a local issue with local impacts. Over the last decade, Governments have increasingly recognized that since ecosystem boundaries do not correspond to jurisdictional boundaries, environment is the responsibility of all Governments and cooperation among Governments is essential for environmental management. As our understanding of the linkages between ecosystems has evolved and the implications of this interdependence more fully appreciated, the environment has increased in importance both on the national and international scale. Governments have also come to the realization that the most effective and efficient regimes for managing this interdependence are based on cooperation and coordination among Governments.

The relationship of First Nations with the federal government is an evolving one so that increasingly First Nations are acquiring greater decision-making authority for matters affecting their communities.

The partnerships involving federal, provincial and territorial governments as well as First Nations will make a significant contribution to the achievement of Canada's environmental goals and objectives through the development of innovative, decentralized approaches to environmental management that feature aboriginal knowledge and customs. This cooperative approach to the consideration of environmental matters characterizes the relationships between Governments and aboriginal people on a wide range of environmental matters.

For example, co-management of wildlife resources, national parks and environmental impact assessment are key elements of land claims agreements. Multilateral discussions are ongoing on an agreement involving the federal government, the Province of Saskatchewan, the Federation of Saskatchewan Indian Nations and the Saskatchewan and Canadian Wildlife Federations regarding cooperative wildlife management in Saskatchewan.

Partnership Among Governments

The very concept of the environment and its multifaceted, multidisciplinary, and all-embracing nature will always give rise to areas in which legislative powers overlap, in which the jurisdiction of one level of government seems to encroach on the other. As noted in the Brundtland Report: "the traditional forms of national sovereignty are increasingly challenged by the realities of ecological and economic interdependence". The best regimes for managing the environment are, therefore, based on cooperative actions in which each Government plays distinct roles that complement the roles of the other order of government.

Mechanisms such as bilateral and multilateral agreements as well as the work of ministerial councils, such as the Canadian Council of Ministers of the Environment, have worked well and have resulted in coordinated approaches to national issues. In this way, Canadian governments have worked together to reduce acid rain, to deal with contaminated sites, to reduce and manage our solid wastes, to begin the clean-up of the St. Lawrence and Fraser Rivers, to respond effectively and expeditiously to environmental emergencies and the list goes on.

The move towards greater international cooperation on environmental matters has had a profound impact on the priorities of Governments in Canada with respect to environment. Although the federal government may enter into binding international agreements to address global environmental problems, provincial and territorial governments increasingly have an important role to play in the development of national positions and the implementation of international agreements. Provincial input into Canada's negotiating positions has allowed Canada to negotiate in international fora from a position of strength, secure in the knowledge that it can fulfil its international obligations. Recent examples of successful federal-provincial cooperation during the development of negotiating positions and in the implementation of international commitments include the Canada-US Acid Rain Accord, the Climate Change Convention, the Biodiversity Convention, and the ECE Agreement on Environmental Assessments in a Transboundary Context.

Provincial and territorial governments, through the Canadian Council of Ministers of the Environment, also made a significant contribution to Canada's preparations for the Earth Summit.

The Challenges of Cooperation and Coordination

Nationally consistent standards are essential to ensure that the natural heritage of all Canadians, in all regions of Canada is protected and that industry has a level playing field in terms of regulatory requirements. Harmonization of policies and standards can also provide Canadians with the significant economic benefits that accrue from greater internal trade. It is through federal-provincial cooperation and federal leadership that nationally consistent standards can and have been developed.

Through the activities of the Canadian Council of Ministers of the Environment, Governments are placing a high priority on the development of harmonized environmental policies and regulatory practices and processes in areas such as environmental assessment, the reuse, recycling and reclamation of ozone depleting substances, and global warming.

The Government recognizes that both orders of government have authority for environmental matters. The relationship of the federal government with provincial governments is based upon the conviction that these constitutional responsibilities must be both recognized and respected. The Government therefore supports the Standing Committee recommendation regarding the need for

cooperation and coordination between the two orders of government on environmental matters. The Government is also committed to working with its provincial partners towards increased harmonization, where appropriate, of federal and provincial policy and regulatory frameworks.

Reconciling a Strong Federal Role with Shared Authority

The Government of Canada is committed to maintaining a strong role in the protection and management of the environment and to continuing to be a leader in achieving sustainable development. Since the release of Canada's Green Plan, we have announced over two billion dollars in new expenditures on the environment for initiatives such as the clean-up of the Great Lakes, the Fraser River and Atlantic Hot Spots, the development of infrastructure on reserves and the protection of our natural and cultural heritage.

There is no doubt, however, as noted in the Standing Committee report that, no single jurisdiction can respond effectively to all the environmental challenges we face in the coming decade. Cooperation and partnership among jurisdictions to respond to the local, national and international dimensions of sustainable development are essential.

OZONE DEPLETION:
ACTING RESPONSIBLY

The Government of Canada, Ottawa, Ontario, Canada

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**OZONE DEPLETION:
ACTING RESPONSIBILITY**

GOVERNMENT 342

The Honourable David MacDonald, P.C., M.P.

JUNE 1992

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INTRODUCTION

"Ozone depletion is a threat to the continuation of life on Earth." This unanimous opinion was reached by the House of Commons Standing Committee on Environment, and expressed in the Committee's report *Deadly Releases CFCs* (June 1990, p. 1). From this concern arose 23 recommendations and a call to the governments of the world to "declare themselves at war with all of those elements which are responsible for depletion of the Earth's ozone. . ." (*Ibid.*) Although less than two years have passed since the release of *Deadly Releases CFCs*, rapidly changing events have compelled the Committee to revisit this issue.

On 6 April 1992, the Committee held a one day set of hearings to investigate recent scientific evidence that indicated stratospheric ozone over the Northern Hemisphere was becoming depleted at rates in excess of earlier predictions. University and Environment Canada scientists were requested to critically evaluate Canadian atmospheric data and recent preliminary observations by the United States National Aeronautics and Space Administration (NASA). Health care professionals appeared before the Committee to review the human health risks posed by possible increased levels of UV-B; and the Committee received valuable suggestions and recommendations from concerned environmental groups.

Committee members are strongly of the opinion that Canada must be able to respond effectively and promptly to the challenge of ozone depletion. To ascertain the level of Canadian preparedness, representatives of Du Pont Canada, and the Heating, Refrigerating, and Air Conditioning Institute of Canada were asked to discuss recent advances made towards the development of replacement chemicals for CFCs and alternative refrigeration technologies. In addition, Dr. J. Buccini, Director, Commercial Chemicals Branch, Environment Canada, outlined the department's action plan for the accelerated phase-out of ozone-depleting chemicals.

One of the major objectives of these hearings was to provide the Canadian public with a factual assessment of ozone depletion, in order that they may make informed decisions in regard to individual initiatives, precautionary measures, and to affecting ozone policy. As pointed out by Committee Chairperson, the Honourable David MacDonald, the success of a program to accelerate the phase-out of ozone-depleting chemicals depends upon the participation of a well-informed public.

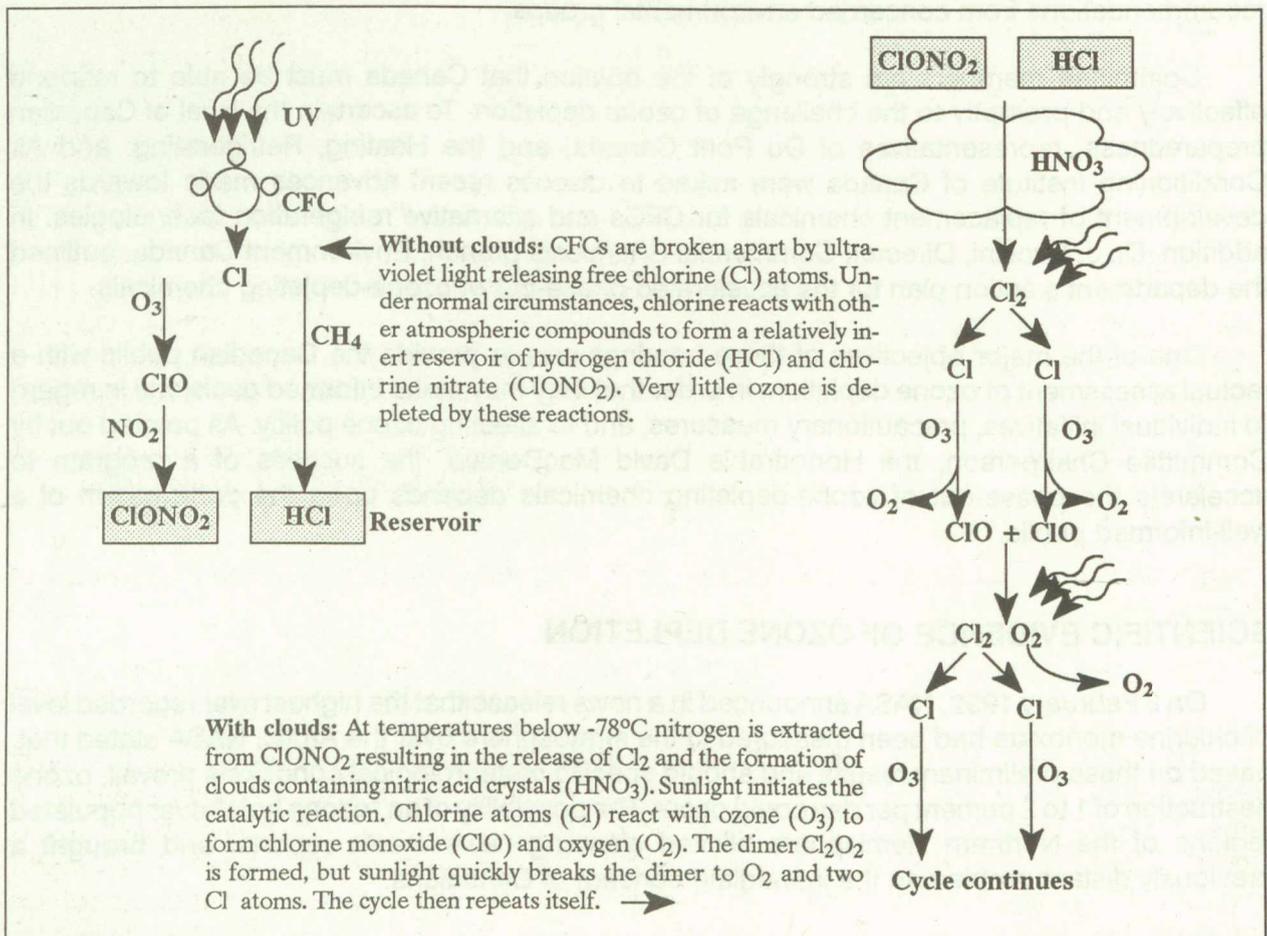
SCIENTIFIC EVIDENCE OF OZONE DEPLETION

On 3 February 1992, NASA announced in a news release that the highest ever recorded level of chlorine monoxide had been measured in the stratosphere over the Arctic. NASA stated that, based on these preliminary results and should specific meteorological conditions prevail, ozone destruction of 1 to 2 percent per day could occur. The possibility of an "ozone hole" over populated regions of the Northern Hemisphere elicited alarming news media reports, and brought a previously distant problem to the immediate concern of Canadians.

The Committee heard scientific evidence from Dr. D. Wardle, Chief, Experimental Studies Division, Atmospheric Environment Service, and Dr. J. McConnell, Professor of Atmospheric Science, York University, that in February 1992 weather conditions were conducive to severe ozone depletion within an Arctic vortex of extreme cold stable air. Chlorine in the stratosphere above the Northern Hemisphere is at a concentration of approximately 3.0 parts per billion (ppb). Dr. McConnell stated that 0.7 ppb of this chlorine (23%) is of natural origin while 2.3 ppb (77%) is from man-made sources. This chlorine is usually present as hydrochloric acid or chlorine nitrate, relatively stable molecules that do not deplete ozone. However, at temperatures of -78°C and lower, polar stratospheric clouds, basically made up of nitric acid crystals, are formed. This cold-temperature phenomenon releases active chlorine molecules from hydrochloric acid and chlorine nitrate. Chlorine monoxide is formed and the chemical scenario is then set for rapid ozone depletion to be initiated by the first rays of sunlight (Figure 1).

FIGURE 1

How Polar Stratospheric Clouds Help Destroy Ozone



Source: Scientific American, 1991, Vol. 264, pp. 68-74.

NASA initially measured a chlorine monoxide concentration of 1.5 ppb but subsequent measurements were only 0.5 ppb. Fortunately, by the end of February warmer temperatures and unstable weather conditions disrupted the polar vortex. As a result only very minor ozone depletion occurred. Although ozone was not substantially depleted this year, it is now known that a large repository of chlorine exists in the stratosphere over the Northern Hemisphere. Consequently, the potential for bouts of large-scale ozone depletion will persist long into the foreseeable future. Further, the continued release of ozone-depleting chemicals to the stratosphere may increase the severity of such events.

The Committee continues to believe that the depletion of stratospheric ozone is one of the most critical environmental problems facing the world and humanity today. Accordingly, we are encouraged by the government's commitment to end halon production and import by 31 December 1994, and to accelerate the phase-out of all CFCs by the end of 1995. However, as previously recommended in *Deadly Releases CFCs* (recommendation 1b):

Recommendation No. 1

The Committee reiterates its recommendation for a complete phase-out in the production and consumption of carbon tetrachloride and methyl chloroform by 1995, except for their use as a feedstock for CFC or halon substitutes and as organic laboratory solvents.

Conditions in the stratosphere are known to undergo large day-to-day variation, and NASA has been severely criticized for the disclosure of preliminary data based on a one-day observation. The Committee appreciates that the measurement of chlorine monoxide at an unexpectedly high concentration was important scientific news and, to a degree, understands the fervour with which the NASA information was made public. However, it is of prime importance that scientists protect their credibility. Scientific data must be verified and the significance of findings be exposed to peer review and consensus, prior to public disclosure. Further, scientists must appreciate the goals of the news media and act responsibly in their interactions with the press. As Dr. J. McConnell said:

"There is a problem with how scientists present their data. That data is processed by the press, and how that is viewed by the public is a problem." (*Minutes of Proceedings and Evidence*, Issue No. 35, 6 April 1992, p. 25)

This problem was very aptly summarized by Dr. T. Ball, Professor of Climatology, University of Winnipeg:

". . . scientific speculation becomes prediction." (*Minutes of Proceedings and Evidence*, Issue No. 35, 6 April 1992, p. 12)

While it is essential that scientists become more prudent in their dealings with the news media, it is of even greater importance that the news media report environmental events in a responsible manner. The news media has an obligation to provide the public with objective and factual information. Committee members assert that the issues of human health and environmental quality must be treated with the accuracy and respect these profoundly important concerns deserve.

POTENTIAL EFFECTS OF OZONE DEPLETION

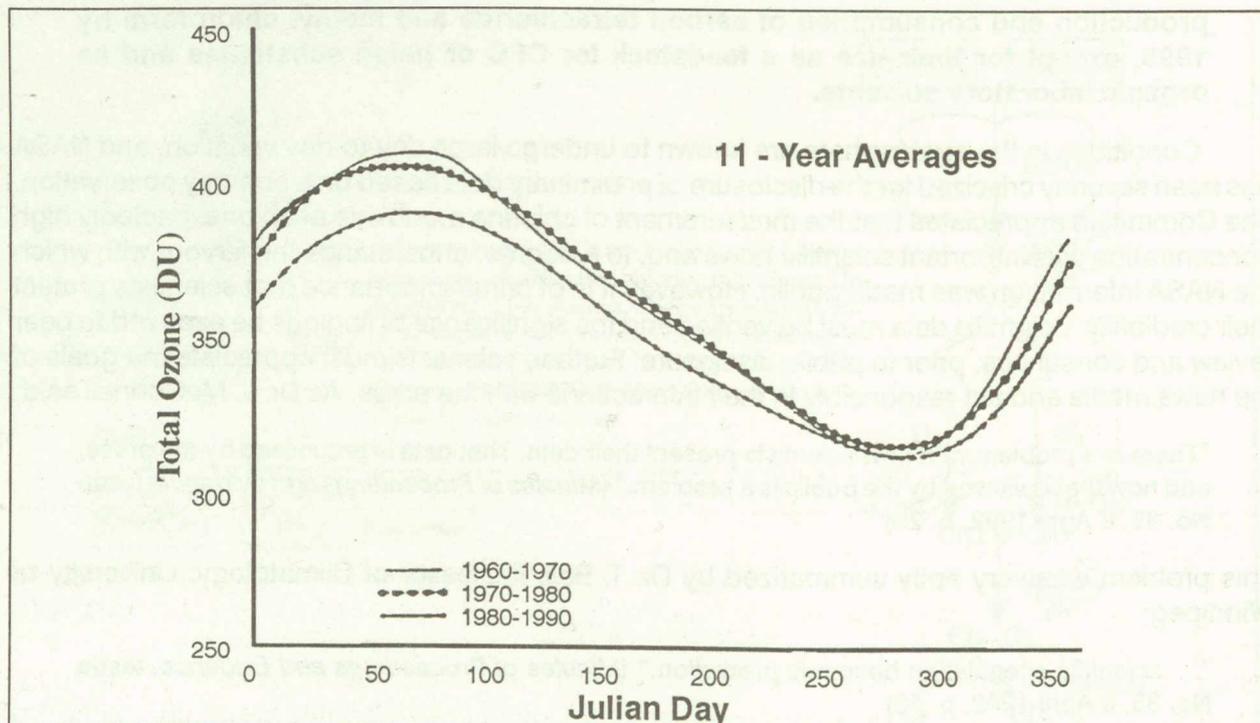
It has been suggested that each 1% loss of ozone will result in a 2% increase in UV light reaching the earth, and a 1% reduction in crop yields in such UV-B sensitive plants as soybeans, corn, rice and wheat (United Nations Environment Program, *Environmental Effects of Ozone*

Depletion: 1991 Update, November 1991, 52 p.). In addition increased UV-B over the Antarctic Ocean has been found to have an adverse effect on phytoplankton populations. Even a temporary decrease in primary productivity could result in decreased biomass at the end of the aquatic food chain. A 1% decrease in ozone could lead to a 0.6% increase in cataracts; while exposure of experimental animals to increased levels of UV-B has been correlated to various degrees and forms of immunosuppression. According to Dr. J. Rivers, National Director of Sun Awareness and Screening Programs, the Canadian Dermatology Association, it is predicted that a 1% loss of ozone will correspond to approximately a 2.5% increase in non-melanoma skin cancers each year.

Dr. D. Wardle presented data showing that during the past decade vernal ozone levels have been depressed by 4% over Toronto, resulting in an approximate 4% increase in UV-B during the months of April through July (Figures 2 and 3).

FIGURE 2

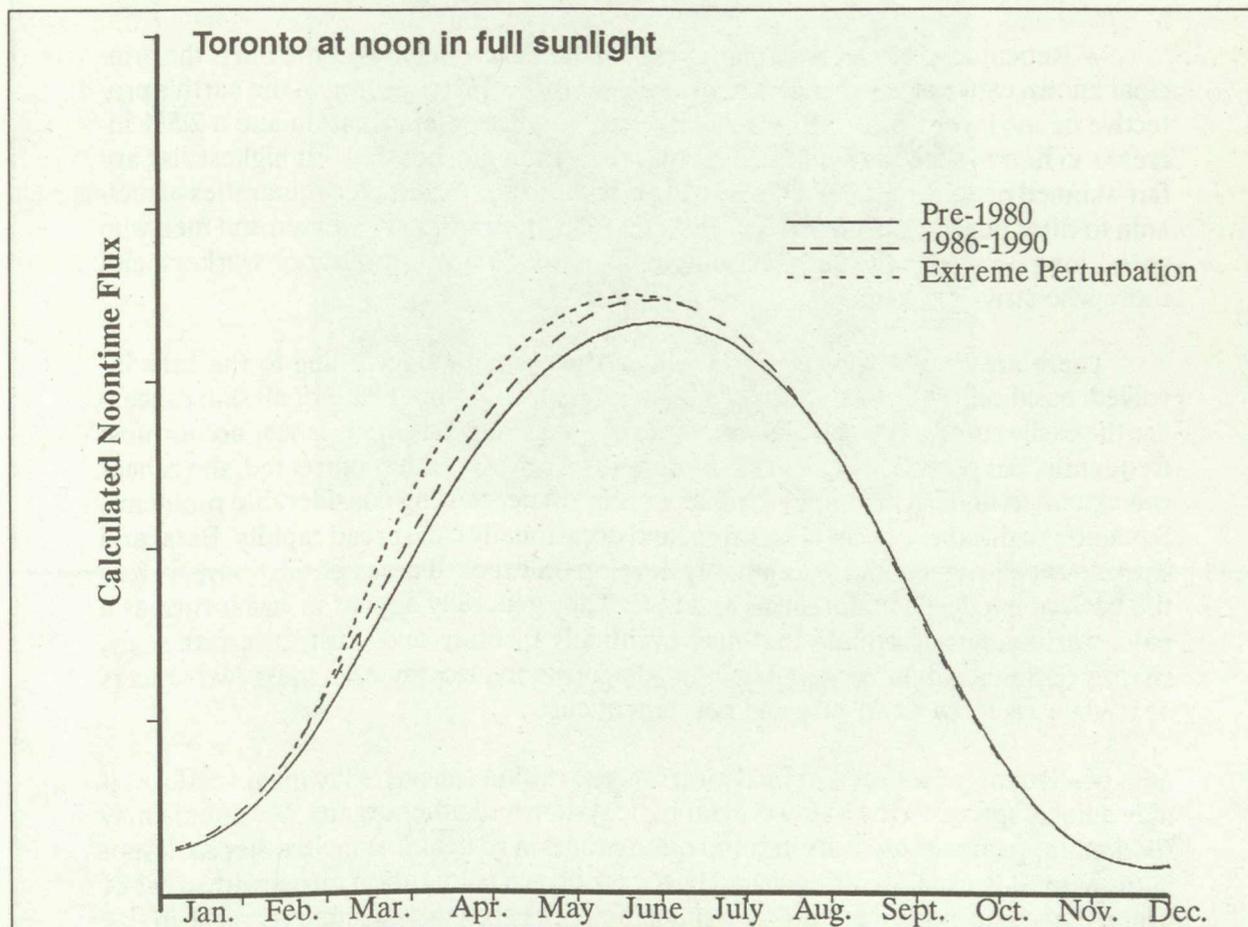
Total Ozone Toronto



Average total ozone as a function of time of year through three 11-year cycles of the solar cycle

FIGURE 3

Calculated UV-B Radiation



In spite of this fact, there have been no significant increases in health or agricultural problems associated with ozone loss. As yet, ozone loss appears to be well below any critical level that might cause a measurable effect. While the Committee believes in the "precautionary principle"; that is, when in doubt, act rather than wait; we also believe that every effort must be made to obtain sound scientific data upon which to base policy making. The Committee welcomes the announcement of increased Green Plan funds to support ozone research and monitoring activities. In addition:

Recommendation No. 2

We recommend that the effects of increased UV-B on human health and on food-crop productivity be considered a priority research area.

Skin cancer is both the most common and fastest growing type of cancer in Canada. It is estimated there will be 50,000 new cases of skin cancer this year. However, these new cases are occurring independent of ozone depletion, as 20 to 30 years generally elapse between the initiating event and the onset of the disease. The increase is believed to be largely due to the increasing preoccupation of Canadians, during the past 40 to 50 years, in acquiring deep

SKIN CANCER

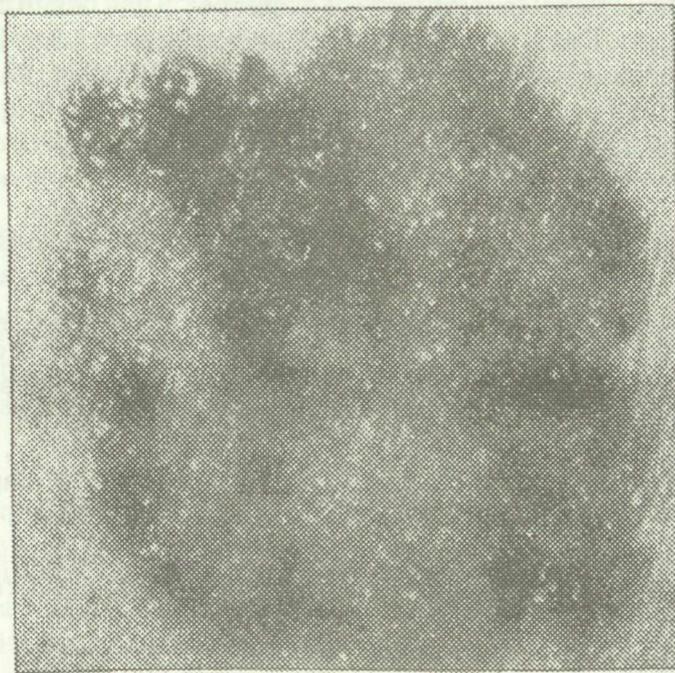
— Repeated exposure over many years to the ultraviolet rays of the sun is the principal known cause of skin cancer. It is predicted that a 1% reduction in the earth's protective ozone layer will result in a 2% increase in ultraviolet radiation and a 2.5% increase in non-melanoma skin cancers. No one is immune, but those at highest risk are fair-skinned people, notably redheads and blonds, who lack sufficient quantities of melanin to filter out the harmful rays of the sun. Also at high risk are women and men who spend long hours in the sun; for example, fishermen, farmers, outdoor workers, and those who strive for deep tans.

There are three major types of skin cancer, classified according to the cells involved: basal cell, squamous cell and melanoma. Luckily, about 93% of all skin cancers are the easily cured basal cell and squamous cell varieties. Basal cell cancer occurs most frequently, but grows slowly and rarely spreads. However, if left untreated, the cancer can extend to underlying bone or adjacent skin tissue, causing considerable problems. Squamous cell cancer occurs less often, and occasionally can spread rapidly. Basal and squamous cell cancers most commonly develop on exposed areas of the body, such as the back of hands, neck, forearms and face. They generally appear in two forms: as a pale, waxlike, pearly nodule that may eventually ulcerate and crust; or a red, scaly, sharply outlined patch. Prompt detection, diagnosis and treatment of these two cancers nearly always leads to an easy and permanent cure.

Malignant melanoma, while the rarest type of skin cancer, is the most deadly as it may quickly spread to the blood or lymphatic system and other organs. Melanoma may suddenly appear without warning, and often occurs in or near a mole or other dark spot in the skin. It is usually distinguished by a dark brown colouration mixed with areas of white, pink, blue or grey. It starts as a small mole-like growth which may increase in size or change colour or shape. It may become itchy, and occasionally a minor injury may cause it to bleed. If the melanoma is discovered and treated at an early stage there is an excellent chance for cure. If, however, the melanoma has become raised and has formed nodules, the tumor may spread to other organs.

Melanoma may spread rapidly, so it is essential, particularly for those who have spent long periods of time in the sun, to be able to identify the indicators of malignant melanoma. The easy to remember "A, B, C, D" signs of a malignant melanoma are:

- A. ASYMMETRY — one half unlike the other half;
- B. BORDER IRREGULAR — scalloped or poorly circumscribed border;
- C. COLOUR VARIED— from one area to another, shades of tan and brown, black, and sometimes white, red and blue;
- D. DIAMETER LARGER — than 6 mm as a rule (diameter of a pencil eraser).



HOW TO HELP PROTECT AGAINST SKIN CANCER

- Avoid prolonged exposure to the sun especially between 10:00 a.m. and 3:00 p.m.
- Wear protective clothing, such as long-sleeved shirts, and wide-brimmed hats.
- Use a sunscreen with a SPF of 15 or higher to absorb ultraviolet rays. Sunscreens are rated in strength, and the higher the number, the greater the protection.
- For the nose or lips, use a sun block preparation containing zinc oxide or titanium dioxide that will deflect ultraviolet rays. However, since it is heavy and completely coats the skin, a sun block is suitable only for small areas.
- The key to saving lives from skin cancer is first prevention and then early detection and prompt treatment of any skin abnormality ■■

Source: Facts on Skin Cancer, Canadian Cancer Society, January 1990.

summer and vacation tans. Behaviour is therefore at the root of this health problem, but fortunately behaviour can be changed. This is particularly important as possible future increases in UV-B could mean a dramatic increase in skin cancers and health costs. Tremendous cost-benefit savings could be achieved by changing the public's attitude to the sun and tanning. As discussed by Dr. J. Rivers, education is the key to "making people take responsibility for their own health" (*Minutes of Proceedings and Evidence*, Issue No. 35, 6 April 1992, p. 92).

Recommendation No. 3

We recommend that the government, in cooperation with industry, and the medical profession, immediately embark upon a public education program to inform Canadians of the link between skin cancer and unsafe exposure to the sun.

As pointed out by both Dr. Rivers, and by Dr. A. Cullen, Director, School of Optometry, University of Waterloo, a number of countries have taken steps to standardize and promote sun-care products. For example, both Australia and the United States have developed UV-B standards for sun glasses, and Australia has exempted suntan lotion from taxation. In Canada, it is very difficult to determine the degree of UV-B protection that a pair of sun glasses provides.

Recommendation No. 4

We recommend that Health and Welfare Canada establish UV-B standards for sun glasses and for suntan and sunscreen lotions.

TECHNOLOGICAL ADVANCES

Mr. R. Hornung, Acting Executive Director, Friends of the Earth, very correctly observed: "We have consistently underestimated . . . the rate and extent of technological change that would allow us to end the production of ozone-depleting chemicals" (*Minutes of Proceedings and Evidence*, Issue No. 35, 6 April 1992, p. 110). Tremendous advances have been made toward the development of CFC-replacement chemicals. HCFC-123 is now commercially available as a "drop-in" refrigerant. The Committee appreciates the usefulness of HCFC-123 as a transitional refrigerant; but does not wish to see the long-term use of this chemical as it has a low, but significant, potential to deplete ozone, and it is a greenhouse gas.

Subsequently, the Committee has learned that a number of manufacturers in Japan and the United States are already producing car air conditioners that run on HFC-134a. This compound is a greenhouse gas but does not deplete ozone. Du Pont is sponsoring research at the National Research Council of Canada (NRC) directed toward the development of new compressors to use HFC-134a. NRC scientists feel that they are quite close to the point where new domestic appliances could be built with a coefficient of performance equal to present-day cooling appliances. Further, North America's largest manufacturer of domestic freezers, W.C. Wood Company, Guelph, Ontario, has found that in new, fine-tuned compressor systems, HFC-152a is as efficient as CFC 12. At present, only a minor safety concern appears to be impeding the introduction of HFC-152a into the marketplace.

Recommendation No. 5

We recommend all car air conditioners built in or imported into Canada after 31 December 1993 be manufactured with HFC-dedicated compressors. Further, we reiterate our recommendation (*Deadly Releases CFCs*, recommendation 6) that air

conditioning units for the passenger compartments of all motor vehicles be leak-proof. Also, we recommend that domestic refrigerators, freezers and air conditioners, built with HFC-dedicated compressors, be introduced into the Canadian marketplace as soon as possible.

Recommendation No. 6

We recommend that replacement of CFCs in car air conditioning units by drop-in HCFCs be encouraged the first time the air conditioning unit is serviced.

Dr. Zelonka, General Manager, Fluorocarbon Products, Du Pont Canada, stated that the pace of research to find environmentally-safe substitutes for CFCs and for HCFCs is progressing at the maximum possible rate, and that the further acceleration of deadlines is unlikely to hasten new discoveries.

Recommendation No. 7

We recommend that Environment Canada closely monitor and assess scientific achievements made towards the replacement of CFCs and HCFCs, and accelerate the phase-out date on a case-by-case basis.

Du Pont introduced a reclamation program to recover and reprocess CFCs from commercial equipment. Du Pont pays for both the recovered material, and freight, and they reclaim the product. Du Pont claims that their customers in the refrigeration and air-conditioning businesses have a viable economic and environmental solution for dealing with spent refrigerant. In spite of this program, out of the 5.5 million kg of CFCs produced last year, only 20,000 kg, or 0.36%, were recycled. The program does not work because neither financial incentives nor regulations exist to promote the three Rs, recovery, recycling and reuse.

Environment Canada and the provincial environment ministers have worked together to develop a National Action Plan, that highlights the specific steps that need to be taken to implement the three Rs. However, the National Action Plan has not been officially endorsed or approved by all participants. Mr. W. Heeley, President, The Heating, Refrigerating, and Air Conditioning Institute of Canada, believes that:

"...the most effective way to establish the concept of the three Rs in our industry is to provide training to the service people who are handling refrigerants on a daily basis. However, it is clear to us that unless training is mandatory and regulated, the three Rs will not be performed in the industry at the levels required to protect the environment and ensure product for future service purposes" (*Minutes of Proceedings and Evidence*, Issue No. 35, 6 April 1992, p. 52).

Recommendation No. 8

We recommend that the federal government, in conjunction with the provinces, endorse, approve and implement the National Action Plan for the complete management of ozone-depleting chemicals.

Recommendation No. 9

We recommend that the provinces use the National Action Plan as a guide to enact harmonized regulations, no later than 31 December 1992, that mandate the recovery, recycle, reuse and destruction of refrigerants, and the training of service personnel handling refrigerants.

POLICY

As stated by Robert Hornung:

"...[E]very year of continued global CFC production adds three to four years to the ozone layer's recovery time". (*Minutes of Proceedings and Evidence*, Issue No. 35, 6 April 1992, p. 111)

The Committee recognizes the benefits of early CFC phase-out, and is greatly encouraged by the accelerated timetable that did not look possible less than two years ago. Success for further accelerated phase-out depends upon a maximum effort by politicians, industry, scientists, environmental groups, and particularly by the individual citizen. Mrs. K. Anderson, Environmental and Planning Manager, Fluorochemicals, Du Pont Canada, held that the informed individual has a major responsibility and role to play:

"through such things as demanding CFC-free new appliances; ensuring their place of work . . . recycles CFCs during equipment service; and ensuring their refrigeration and air-conditioning systems are either retrofitted to use alternatives or are replaced with CFC-free technology if they're older and less efficient. Consumers need to ask questions and select only dealers that can recover and recycle CFCs when doing maintenance on their car or refrigerator". (*Minutes of Proceedings and Evidence*, Issue No. 35, 6 April 1992, p. 49)

Recommendation No. 10

We recommend the development and implementation of an education program that informs Canadians of their role and responsibilities in the campaign to bring about an early and effective phase-out of ozone-depleting chemicals.

To date research has focused on the development of CFC-replacement chemicals, and on compressor modification for use of new refrigerants with limited or zero potential for ozone depletion. In many cases this approach may be seen as treating the symptom rather than offering a cure. Alternatively, as Mr. R. Hornung said: "we can change the job in such a manner that chemicals are no longer required" (*Minutes of Proceedings and Evidence*, Issue No. 35, 6 April 1992, p. 114). While industry is certainly interested in the possibility of second-generation cooling technologies, they do not feel confident that the pay-back would justify R&D costs. It is generally felt that such high-risk research belongs in federally-funded university and government laboratories.

Recommendation No. 11

We recommend that the development of second-generation cooling technologies be recognized as a priority research area.

The phase-out of ozone-depleting chemicals has as its final goal the collection and ultimate destruction of these chemicals. In spite of this intent very little effort has been directed at determining how destruction will be accomplished. CFCs are extremely stable compounds, that are not readily broken down by chemical means. At present high-temperature incineration, which can achieve "six-nines" of destruction efficiency (99.9999%), appears to be the logical solution.

Recommendation No. 12

We recommend that Environment Canada immediately initiate test CFC burns in high-temperature incinerators, with exacting emission monitoring. Further, independent monitoring under the direction of various environmental groups should verify incinerator efficiency. This information should then be presented to the public.

The Committee's review of ozone depletion was described by one of the participants as a cry for responsible behaviour. Scientists have the professional responsibility of subjecting their findings and conclusions to the scrutiny of the scientific community. The news media has an obligation to provide the public with objective, and factual information. The environment is not an area where the press can abrogate itself of responsibility. Health care professionals must provide non-alarmist and factual information so that Canadians can take responsibility for their own health. Industry has the very onerous task of ensuring that their activities do not impair human health or degrade environmental quality; and, as in the case of CFCs, to implement mitigative action when previous activities, assumed to have been benign, prove to have negative environmental impacts. Governments have the responsibility of developing and implementing policies that safeguard human health and the environment. In addition, there is an obligation to provide public education programs so that Canadians can make informed environmental decisions. Finally, it is up to the individual citizen to do what is right. The rapid phase-out of all ozone-depleting chemicals is a formidable task, but one which can be facilitated if we all act responsibly.

Ottawa, Ontario

Dear Mr. Chairman:

Pursuant to Standing Order 209 of the House of Commons, I am pleased to advise the enclosed Government response to the recommendations of the Fourth Report of the Standing Committee on Environment, titled "The House of Commons Report on Ozone Depletion" (Ozone Department: Acting Secretary General).

This document summarizes the progress of the implementation of the strategy outlined in the report of the Standing Committee on Environment, and is particularly appropriate to the current review of this report by the Standing Committee on Environment. The report was prepared by the Standing Committee on Environment and is a global challenge to the international community. The report is a significant contribution to the global challenge of ozone depletion, which the world community is currently addressing. The House of Commons Report on Ozone Depletion is also very important in that it is the first of its kind. It is a landmark document, which will be a significant contribution to the global challenge of ozone depletion.

I am also pleased to advise that the Committee's report was published in the House of Commons on October 1, 1988. The report is a landmark document, which will be a significant contribution to the global challenge of ozone depletion. The report is a landmark document, which will be a significant contribution to the global challenge of ozone depletion.



DEC 10 1992

The Honourable David MacDonald, P.C., M.P.
Chairman
Standing Committee on Environment
House of Commons
Room 333, West Block
Ottawa, Ontario
K1A 0A6

Dear Mr. Chairman:

Pursuant to Standing Order 109 of the House of Commons, I am pleased to send you the enclosed Government response to the recommendations of the Fourth Report of the Standing Committee on Environment, tabled in the House of Commons, June 22, 1992 entitled "Ozone Depletion: Acting Responsibly".

This second examination of the issue of protection of the stratospheric ozone layer by the Standing Committee on Environment comes at a particularly appropriate time. In the two years since the first review of this issue by the Committee, new evidence gathered by the world's scientists has confirmed the serious and long term nature of this threat to the global environment. As a result, the international response has been marked by rapid change and significant acceleration of the time frame within which the use of ozone-depleting substances is to cease. The theme of the Committee's report - acting responsibly, is also very appropriate to the situation as it now exists, since responsible behaviour by governments, industry and the public will be the key to the successful resolution of the issue.

I was also pleased to see that the Committee's report touched on another facet of the need for responsible action, protection of scientific credibility and the obligation of the news media to report in a factual manner. Certainly, this issue is of sufficient import for the global environment that an exaggerated or alarmist approach could have serious consequences.

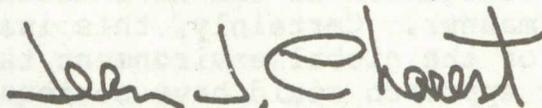
Canada has continued in, and enlarged upon, its leadership role in the development of international programs to protect the ozone layer. Following on our major contribution to the development of the Montreal Protocol, the government has, and is continuing to advocate the acceleration of the phase out schedules for ozone-depleting substances included in the Protocol to bring them into line with Canadian targets. The availability of assistance to developing nations who are signatories to the Protocol is now becoming a reality through the Protocol's Multilateral Fund. The Secretariat for the fund has been successfully established in Montreal and the major users of ozone depleting substances in the developing world are in the process of establishing country programs.

On the domestic scene, the Canadian control program compares very favourably with any in the world, and will be strengthened even more as technological advances permit. The consumption of CFCs in Canada for the period July 1, 1991 to June 30, 1992 has been reduced by 58% from 1986 levels which is well ahead of our obligations under the Montreal Protocol. The achievement of a complete phase out of CFC consumption in Canada by the end of 1995 is now our goal, and I am confident that we will meet that target.

The attached response clearly shows that the Government's policies and action on this issue are consistent with the recommendations in the Committee's report. The report represents a very useful contribution to the ongoing development and implementation of the Canadian program for which I am grateful.

Please convey my appreciation of their efforts to the members of the Committee. I will look forward to their assistance in the development of Canada's programs to respond to the major environmental issues of our time.

Yours sincerely,



Jean J. Charest

encl.

GOVERNMENT RESPONSE

Recommendation No. 1

The Committee reiterates its recommendation for a complete phase-out in the production and consumption of carbon tetrachloride and methyl chloroform by 1995, except for their use as a feedstock for CFC or halon substitutes and as organic laboratory solvents.

Response:

- The Government is committed to phasing out the production and import of carbon tetrachloride, except for feedstock and laboratory usage by December 31, 1994. For methyl chloroform (MCF), the Government is committed to the following phase-out schedule:
 - (1) consumption of MCF to be frozen at 1989 levels by 1993;
 - (2) consumption of MCF to be reduced by 85 percent by 1995; and
 - (3) consumption of MCF to be reduced by 100 percent by 2000.
- Regulations to implement these phase-out schedules have recently been proposed in the Canada Gazette, Part I. Adjustments will be made to conform with the decision taken by the Parties to the Montreal Protocol in Copenhagen in November 1992 to totally phase out MCF by January 1, 1996, subject to consideration of possible exemptions for essential uses.
- Because of the widespread use of MCF by a large number of small users in Canada, a communication strategy is being developed to make all users aware of Canadian and international plans to restrict and eventually eliminate its use. This Plan will provide adequate time for industry to develop strategies and/or find appropriate alternatives to eliminate their dependence on MCF prior to its removal from the market place.

Recommendation No. 2

We recommend that the effects of increased UV-B on human health and on food-crop productivity be considered a priority research area.

Response:

- The Government accepts this recommendation. In March 1992, the Health Protection Branch of Health and Welfare Canada hosted a Symposium on Ultraviolet Radiation Related Diseases. Fifty national and international experts in the field of dermatology, ophthalmology and epidemiology, as well as representatives from the Canadian Cancer Society and various Canadian and provincial public health organizations attended this Symposium in Ottawa, leading to an action plan currently being implemented by Health and Welfare Canada. Projects include: the establishment of a national data collection system for ultraviolet

- As to impact on farm crops, the Research Branch of Agriculture Canada, has become involved in this area. The Plant Research Centre at the Central Experimental farm is undertaking consultations with researchers at the University of Guelph where research projects are underway on the impact of UV-B rays on plants. A research project is being developed by the Plant Research Centre in collaboration with Guelph University to ensure that their respective activities mesh so as to enable rational utilization of resources. This work will be part of Agriculture Canada's contribution to the Green Plan, particularly within the framework of the study examining the impact of climate change on agricultural production. It is considered essential for Canada to have expertise in this field. Agriculture Canada will review the situation periodically, and the possibility of allocating additional resources to this area will be considered.
- At the fourth meeting of the Parties to the Montreal Protocol, held November 23 to 25, 1992 in Copenhagen, Minister Charest announced that Canada will establish an international data collection centre for ultraviolet radiation on behalf of the World Meteorological Organization. It will be an expansion of the World Ozone Data Centre established in Toronto at the end of the fifties. The World Ozone and Ultraviolet Radiation Data Centre will provide the data required to assess possible effects that changes to the ozone layer will have on physical and biological systems.

Recommendation No. 3

We recommend that the government, in cooperation with industry, and the medical profession, immediately embark upon a public education program to inform Canadians of the link between skin cancer and unsafe exposure to the sun.

Response:

- The Government has recognized the necessity of educating the public as to the health risks associated with exposure to the sun. In March of this year, the Minister of the Environment launched a new program, "Ozone Watch" as a Green Plan initiative, which provided Canadians, on a weekly basis, with up-to-date information on the status of the ozone layer. As a second step, beginning in late spring, information has been provided to the public, through publication in major newspapers on a daily basis, of the level of risk from unprotected exposure to the sun's UV-B rays.
- In June 1992, Health and Welfare Canada (HWC) co-published with Chatelaine Magazine's New Mother Group of Publications, a booklet for parents entitled The sun, your baby and you. 1.3 million copies have been distributed, supported by a poster, and reprints are necessary to meet continuing demand. HWC has also widely distributed two Issues documents: Thinning of the Ozone Layer, The Health Effects (April 1992); and Preventing Skin Cancer — It's Up to You (July 1992). Demand remains high for both of these documents.
- The publications were reviewed by the Environment Canada (EC), the Canadian Cancer Society and the Canadian Dermatology Association before press to ensure message consistency to the public. HWC also collaborated with EC on its health messages on UV exposure used as media bulletins supporting the daily UV Index reading, and reviewed and commented on EC's brochures on UV.
- Public education in collaboration with all stakeholders is a strong recommendation from the Symposium on UV-Related Diseases and it is emphasized in the follow-up action plan. In concert with this recommendation, EC hosted a meeting September 22-24 to

discuss this issue, as well as to review the UV Index program. HWC attended this workshop and continue to support the collaborative approach to its public education program in this area.

- HWC's national spokesperson on the health effects of UV exposure, Dr. Yvon Deslauriers, has given and continues to receive requests for, frequent and extensive radio, television and print interviews reaching a broad public audience.

Recommendation No. 4

We recommend that Health & Welfare Canada establish UV-B standards for sun glasses and for suntan and sunscreen lotions.

Response:

- The Government agrees with this recommendation. HWC has asked the Canadian Standards Association (CSA) to investigate developing Canadian standards for sun glasses along the lines of ANSI Z80.3. CSA has tentatively agreed to undertake this work provided that funding can be found. The CSA is currently identifying other interested parties and potential sources of funding.
- All sunscreen products marketed in Canada claiming to protect against the adverse effects of the sun are regulated as drugs and subject to pre-market review: if a manufacturer makes a SPF (sun protection factor) claim, there must be data to support the claim. SPF is determined using a standard test protocol, but only indicates protection against UV-B radiation.
- Proposed changes to the guidelines on cosmetic labelling will ensure that no reference, either direct or implied to the presence of sunscreens and/or sunblocks, or to protection from the sun's rays, will be permitted on the labels of cosmetic products.
- In addition, the Health Protection Branch is developing and assessing possible protocols for determining the protection of sunscreens against ultraviolet radiation.

Recommendation No. 5

We recommend all car air conditioners built in or imported into Canada after 31 December 1993 be manufactured with HFC-dedicated compressors. Further, we reiterate our recommendation (Deadly Releases CFCs, recommendation 6) that air conditioning units for the passenger compartments of all motor vehicles be leak-proof. Also, we recommend that domestic refrigerators, freezers and air conditioners, built with HFC-dedicated compressors, be introduced into the Canadian marketplace as soon as possible.

Recommendation No. 6

We recommend that replacement of CFCs in car air conditioning units by drop-in HCFCs be encouraged the first time the air conditioning unit is serviced.

Response:

- The Government agrees that the earliest possible conversion to non-CFC technology in refrigeration and air conditioning equipment is an essential component of Canada's ozone protection program. The automobile manufacturing industry has begun the

conversion to non-CFC technology with the 1992 model year and is planning to complete the conversion by the 1995 model year. Environment Canada's ozone protection regulatory program provides for a regulation under the *Canadian Environmental Protection Act* making the conversion to non-CFC technology mandatory by the 1995 model year.

- Since all new cars will be using HFC technology in the 1995 model year and after, refrigerant leaks from new automobile air conditioning systems will not be a threat to the ozone layer.
- The Government agrees that replacement of CFCs in existing automobile air conditioning systems should take place as soon as possible. In-use vehicles operating with CFC air conditioning systems represent a steadily increasing share of the consumption of CFCs in Canada and are a serious concern. However, the industry has been unable to date to develop a drop-in replacement for all in-use vehicles. A number of HCFC/HFC blends are being tested and standards for conversion from CFC systems are under development. The inability of the industry to develop more reliable leak proof air conditioning systems, and the common service practice of topping-up the refrigerant rather than repairing the leak has resulted in growing criticism of the industry by environmental interest groups. As well, industry concerns about a CFC shortage for servicing in-use vehicles and provincial regulations are forcing the introduction of recovery and recycling during servicing of car air conditioners. These initiatives will significantly reduce consumption of CFCs and their release to the environment from this source.
- The government also agrees that early introduction of HFCs into refrigeration and air conditioning equipment is important. HCFCs are now being used extensively in place of CFCs in commercial/retail refrigeration and domestic air conditioning. An HFC replacement for HCFCs in these areas is regarded by the industry as a long term (10-15 years) possibility. For domestic refrigeration, development of non-CFC refrigerants which can meet the stringent demands of the appliance manufacturers in regard to both refrigeration and energy efficiency, is continuing. Because of the very high performance records of these appliances extending for periods of 15 to 20 years, the Government is of the view that research and development resources should be directed at more significant sources of CFC releases to the atmosphere.

Recommendation No. 7

We recommend that Environment Canada closely monitor and assess scientific achievements made towards the replacement of CFCs and HCFCs, and accelerate the phase-out date on a case-by-case basis.

Response:

- The Government agrees with this recommendation by the Committee. Environment Canada, through an extensive consultative approach to this issue, is and will continue to be well informed of progress in the development of replacements for CFCs and HCFCs. In those situations where successful replacements technology is developed, an accelerated phase-out of the ozone-depleting substance will be considered.
- An important aspect of the development of replacements for ozone-depleting chemicals is a thorough knowledge of the potential effects of such alternatives on human health and the environment. To this end, the world-wide chemical industry have joined together

to form the Alternative Fluorocarbons Environmental Acceptability Study (AFEAS) and the Program for Alternative Fluorocarbon Toxicity Testing (PAFT). These programs were established to enable in-depth research into the effects of alternatives through international cooperation with independent scientists, government research programs and between the companies concerned. The companies' objectives in combining their resources and cooperating with other research programs are to substantially reduce the usual period of time required for environmental and toxicity testing of new chemicals, and thus allow the more rapid phase-out of CFCs.

Recommendation No. 8

We recommend that the federal government, in conjunction with the provinces, endorse, approve and implement the National Action Plan for the complete management of ozone-depleting chemicals.

Recommendation No. 9

We recommend that the provinces use the National Action Plan as a guide to enact harmonized regulations, no later than 31 December 1992, that mandate the recovery, recycle, re-use and destruction of refrigerants, and the training of service personnel handling refrigerants.

Response:

- The National Action Plan has been endorsed by Canada's Environment Ministers through the Canadian Council of Ministers of the Environment (CCME) and will shortly be published as a CCME publication. The plan emphasizes that recovery and recycling of CFCs is a key element in the early phase-out of CFCs and will enable a concerted national effort to establish an effective recovery and recycle infrastructure.
- This plan was developed by a federal provincial working group established to facilitate harmonization of regulations to protect the ozone layer. Deliberations within this group resulted in the conclusion that the provinces were best placed to regulate recovery and recycle of CFCs and other ozone-depleting substances.
- In accordance with the action plan all provinces are committed to begin implementation of recovery and recycle programs by the end of 1992. Provinces also recognize the importance of mandatory recovery and recycling programs for CFCs already in use, to Canada's efforts to protect the ozone layer. At the same time, most provinces are establishing technician training programs to promote the proper handling of refrigerants.

Recommendation No. 10

We recommend the development and implementation of an education program that informs Canadians of their role and responsibilities in the campaign to bring about an early and effective phase-out of ozone-depleting chemicals.

Response:

- The Government endorses the Committee's recommendation on the need for a public education program on this issue. The use of CFCs and other ozone-depleting chemicals is involved in a wide variety of individual and personal aspects of lifestyle in Canada as well as having significant impacts across many large and small industries. It, therefore, follows that having a knowledgeable and supportive public will be beneficial.

- Through a federal/provincial working group, an educational program is being developed as part of the National Action Plan. The program will be developed to allow the federal and provincial governments to jointly and separately inform the public from both the national and regional points of view.

Recommendation No. 11

We recommend that the development of second-generation cooling technologies be recognized as a priority research area.

Response:

- The Technology for Solutions Program, recently established by Industry, Science and Technology Canada and Environment Canada under the Green Plan, is available to industry in Canada, and can be used to support and promote the development of second generation cooling technologies.
- The international nature of many of the industries concerned has led to significant international cooperation by both industry and governments in technology development. Industry in this country and the government of Canada are actively involved in much of this development work.
- The Energy Diversification Laboratory (EDRL) of the Department of Energy, Mines and Resources Canada is undertaking research and development into the development of non-CFC heat pump and chiller technologies with a focus on novel absorption technology that uses heat rather than electricity as a driving force. EDRL and its partners are also working on novel fluids to replace CFCs including refrigerant mixtures.

Recommendation No. 12

We recommend that Environment Canada immediately initiate test CFC burns in high-temperature incinerators, with exacting emission monitoring. Further, independent monitoring under the direction of various environmental groups should verify incinerator efficiency. This information should then be presented to the public.

Response:

- Environment Canada is now examining the possibility of carrying out a CFC test burn at a Canadian destruction facility to ascertain whether the emission standards can be met. As usual, the resulting information will be in the public domain. The Report of the United Nations Environment Program (UNEP) Technical Advisory Committee on CFC destruction technologies, which was chaired by Canada, concluded that high temperature incineration is the only operational technology in existence at this time which is able to meet the exacting emission standards established by that Advisory Committee on behalf of UNEP.

PREPARE

RECOMMENDATIONS

GOVERNMENT RESPONSE

FROM WORDS TO ACTION

STANDING COMMITTEE ON ENVIRONMENT

SUB-COMMITTEE ON ACID RAIN

**The Honourable David MacDonald, P.C., M.P.
Chairperson**

**Stan Darling, M.P.
Chairperson
Sub-committee on Acid Rain**

December 1992

Some 13 years have now passed since the problem of acid rain was first brought to the attention of the public. It is now clear that the ecosystems in the Great Lakes basin were being threatened by acid rain. The report of the Commission on the Environment and the Great Lakes Basin, published in 1981, was a landmark document. It was the first time that the scientific and policy communities in the Great Lakes basin were being informed by acid rain. Long-range transport of acid rain was first identified by the Commission on the Environment and the Great Lakes Basin in 1981.

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Since 1981, the problem of acid rain has become a major environmental issue in Canada. In 1984, a report of the Commission on the Environment and the Great Lakes Basin, published in 1984, was a landmark document. It was the first time that the scientific and policy communities in the Great Lakes basin were being informed by acid rain. Long-range transport of acid rain was first identified by the Commission on the Environment and the Great Lakes Basin in 1981.

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PREFACE

Some 13 years have now passed since the problem of acid rain was first brought to the collective attention of Canadians. In July 1979, the Great Lakes Science Advisory Board warned that the aquatic and terrestrial ecosystems in the Great Lakes Basin were being threatened by acid rain and the first report of the United States-Canada Research Consultation Group on the Long-Range Transport of Air Pollutants, jointly released by the Governments of Canada and the U.S., recognized acid precipitation as "a problem of the greatest common concern at the present time."

A Sub-committee on Acid Rain was first established in 1980 and reported to the House of Commons through the Standing Committee on Fisheries and Forestry. It released its first major report, *Still Waters*, in the fall of 1981. In this report, the Sub-committee recommended large reductions of emissions of sulphur dioxide (SO₂) and nitrogen oxides (NO_x) in Canada from the non-ferrous smelting industry, the fossil fuelled power plants of Ontario Hydro, Nova Scotia, and New Brunswick, and the transportation sector. The report expressed the conviction that Canada "had to put its own house in order," before hoping to persuade the U.S. to control its own emissions.

In 1984, a second major report, *Time Lost* was issued by a Sub-committee on Acid Rain. This report drew attention to the fact that, while public awareness of the issue of acid rain had increased in the three years since *Still Waters*, only limited progress had been made toward a solution. *Time Lost* made 16 recommendations, all of which focused on stricter standards for NO_x and other pollutants from motor vehicles, and on ways to assist the smelting sector to finance controls for its SO₂ emissions.

In 1988 the *Report of the Special Committee on Acid Rain* was released. At that time, the Committee was able to report that, although the acid rain problem in North America was far from a final solution, Canada had made important progress in the control of domestic SO₂ and NO_x emissions. The Committee also expressed optimism that "while the Reagan administration had resisted all appeals, from within and outside the United States, to develop an acid rain control program. . . that the next administration will be more inclined to deal constructively with the issue."¹

That optimism was well-founded. In November 1990, President George Bush signed into law the *Clean Air Act Amendments* of 1990, Title IV of which, Acid Deposition Control, scheduled reductions of 10 million tons of annual SO₂ emissions and of two million tons of annual NO_x emissions to come into effect by the end of the century.

In addition, Canada and the United States entered into a bilateral accord. The Canada-U.S. Air Quality Agreement was signed by Prime Minister Brian Mulroney and President George Bush on 31 March 1991. The Agreement committed Canada and the United States to scheduled reductions of acid rain-causing emissions and established a framework to deal with transboundary air pollution problems.

The seven eastern Canadian provinces are already approaching their 1994 target for SO₂ emissions. Achievement of this, together with implementation of the acid deposition control provisions of the 1990 *Clean Air Act Amendments*, will ensure significant reductions in the most damaging effects of acid rain over a large portion of eastern Canada.

¹ Canada, House of Commons, Special Committee on Acid Rain, *Report of the Special Committee on Acid Rain*, Queen's Printer for Canada, Ottawa, 1988, p. 2.

Progress in dealing with the menace of acid rain has been slow and often frustrating but, thanks to the persistence and tenacity of a great many organizations and individuals in Canada and the U.S., significant progress has been made. There is, however, still much to be done before the issue of acid rain can finally be laid to rest. In the words of the Minister of Environment, the Honourable Jean Charest:

The good news is that the major elements of a permanent solution are finally being put into place. . . There's a sense that maybe because a framework of a solution has been found, that the solution is upon us when in fact it's important to pursue these matters. . . The simple answer . . . is that acid rain is not solved and . . . much more work needs to be done.²

Many sensitive areas in central Canada and in the Atlantic provinces do not have the capacity to buffer acid precipitation. They will still be vulnerable and may remain in need of additional measures if their aquatic ecosystems are to be protected. In addition, many of the impacts of acid precipitation, particularly those on terrestrial ecosystems, on trees and forests, on agriculture, and on human health, are still inadequately understood. The economic and social burden of acidification is still far from being fully accounted for. Canada must maintain the resolve to see this issue through until acid rain is no longer a threat to its waterways, its forests and agricultural lands, and to the health of its citizens.

This present Sub-committee on Acid Rain was struck on 13 June 1991 by the Standing Committee on Environment. Its mandate is to study and report from time to time on the Canadian acid rain program and the new acid rain initiatives of the Green Plan, with particular emphasis on evaluating Canadian sites that are threatened despite Canada-United States acid reduction programs.

The subject of acid rain has been extensively documented in recent years. The Sub-committee decided therefore not to revisit the technical aspects of the issue but to concentrate its efforts on an overview of the status of acid rain initiatives in Canada and the United States. To accomplish this objective, we relied primarily on hearings with a relatively small number of witnesses, existing documentation, and information obtained during the Sub-committee's visit to Washington D.C.

This report outlines the activities of the Sub-committee on Acid Rain since October 1991 and summarizes the major issues that arose in hearings. It provides a brief overview of progress on acid rain initiatives and the challenges that remain.

² Canada, House of Commons, Sub-committee on Acid Rain, *Minutes of Proceedings and Evidence*, Ottawa, May 7, 1992, 7:4.

RECOMMENDATIONS

The Canadian Acid Rain Control Program was originally intended to achieve a deposition level of not more than 20 kg/ha/year of wet sulphate in the sensitive areas of the Canadian environment. This target level was an estimate, based on the best science of the time, of what would be sufficient to protect a moderately sensitive aquatic system, and was conceived as a goal that was achievable technically and scientifically. The emphasis has now changed from the concept of a target load to a "critical" load, which is defined in terms of a deposition level that will not cause long-term harmful effects on the aquatic ecosystem. For the most sensitive areas, this level may be as low as 8 kg/ha/year.

The Canadian acid rain program is already approaching its goal of 3.2 million tonnes and will achieve it possibly as soon as 1994. With the implementation of the second phase of the U.S. acid rain control program by the end of the century, atmospheric transport models predict that deposition levels will be below 20 kg/ha/year over virtually all of eastern Canada. Nevertheless, there are regions of southeastern Quebec and Atlantic Canada which may still be vulnerable. The ability of models to forecast deposition rates and to predict the response of ecosystems is still limited. In addition, establishing emissions trading systems will introduce a further degree of uncertainty to the distribution of acidic deposition. For these reasons, the Sub-committee recommends:

Recommendation No. 1

That the federal government, in cooperation with the provinces, devise least cost options and implement further reductions to SO₂ emissions as required to ensure that acid deposition not exceed critical loads or target loads, whichever is the lesser.

Recommendation No. 2

That the federal government undertake to negotiate further reductions of SO₂ emissions with the United States as required, to protect Canada's ecosystem.

Recommendation No. 3

That the design and implementation of any SO₂ emissions trading system in Canada, include all necessary measures to protect the environment and human health according to Canada's national and international obligations.

One of the difficulties facing the Sub-committee in its assessment of the status of the Canadian Acid Rain Control Program was the unavailability of recent SO₂ emissions levels for Canadian provinces. The most recent data available to the Sub-committee, which included all Canadian provinces, was for the year 1985. Except for the 1990 SO₂ emission levels for eastern Canada, presented in the 1992 Progress Report of the Canada-U.S. Air Quality Committee, which were described as preliminary, the most recent estimate of eastern Canadian SO₂ emissions was

for 1987. In the Sub-committee's view, it is essential to have more up-to-date information on SO₂ emissions in order to verify the effectiveness of acid rain control measures and to assure that Canada is meeting its national and international obligations to reduce SO₂ emissions. The Sub-committee therefore recommends:

Recommendation No. 4

That the federal government, in cooperation with the provinces, develop and implement a national system of tracking, compiling and reporting on SO₂ emissions; that yearly summary reports on national SO₂ emissions levels be published within one year of the year to which the report applies; and that such a system be in place in time to report on national SO₂ emissions levels for the year 1994.

Under Article VIII of the Canada-U.S. Air Quality Agreement, the first progress report of the Canada-U.S. Air Quality Committee was to be submitted to the parties by 13 March 1992. It was not released to the public until 17 June 1992. The federal-provincial agreements on acid rain mandate that yearly progress reports covering the preceding year up to 31 March, are to be produced by the federal government by 31 July each year. Only the report covering the year up to 31 March 1990 was available to the Sub-committee. The Sub-committee recognizes that production of reports is an onerous task, particularly when different departments, different levels of government, and international cooperation are required. The Sub-committee believes, however, that reporting on progress is vital to the public interest and is an essential and integral part of acid rain control programs. It therefore recommends:

Recommendation No. 5

That the federal government assign top priority to the preparation of progress reports and ensure that sufficient resources are available for reports to meet agreed deadlines.

The Canadian forest-products industry is one of the most important sectors of the Canadian economy, accounting for 20% of manufacturing output and 3.6% of the gross domestic product. The cost of acidification to the Canadian forest industry has not yet been determined, but the potential for loss through even a modest decrease in yield is clearly very significant. Owing to the complex nature of the interaction of different stresses, it has not been possible to determine unambiguously the role of acidification in the health of Canada's forests. Evidence of decline of northern locations of hardwood forest in Ontario and the decline of white birch in the Bay of Fundy region suggests that acid pollutants may play a significant role. The Sub-committee, noting that the federal government in the Green Plan commits itself to reporting by 1994 on the causes of forest decline and whether further emissions reductions are needed, recommends:

Recommendation No. 6

That the federal government, regardless of the prevailing economic policies, ensure that sufficient support is provided for research into the effects of acidification on Canada's forests in order to meet its commitment to report on this issue by 1994.

The federal government has similarly committed itself to reporting by 1996 on the effects of acid-rain-causing pollution on human health. Acid rain is not believed to pose a direct risk to human health; however, there is evidence that the inhalation of acid aerosols can irritate the respiratory

tract and aggravate respiratory ailments. Human health may also be indirectly harmed by exposure to elevated levels of toxic metals in drinking water and foods. Although the health risks of acidic pollutants will not normally be severe, the potential exists for large numbers of people to be affected and the overall impact can therefore be significant. The Sub-committee therefore recommends:

Recommendation No. 7

That, following research into the effects of acid pollutants on human health, the federal government, through the Minister of Health and Welfare, present to Parliament an interim report on its findings before the end of 1993 and a final report before the end of 1995.

Although some attempts have been made to quantify the economic costs of acidification, notably to the recreational fishery and the forest industry, these estimates are, at best, imprecise. The subject of the costs of acidification appears, in general, to be poorly understood. Agricultural losses have not been estimated. Human health care costs resulting from exposure to acidic pollutants are difficult to separate from costs from the effects of other atmospheric pollutants but are likely to be significant. Other costs of acidification, such as the loss of enjoyment of nature or damage to artifacts of cultural significance, may not manifest themselves in direct economic terms but are nonetheless real. The Sub-committee believes that a better understanding of the costs of acidification will help better identify desirable emissions levels and serve as a guide to the future development of acid rain control programs. It therefore recommends:

Recommendation No. 8

That the federal government, in addition to its work on the economic impact of acid rain, also examine the other costs of acidification including where there is a loss in the quality of life; where there is a loss of the enjoyment of nature; or where there is damage to artifacts of cultural or historical significance.

The adoption of the California standard for automobile emissions, by California itself and by a number of states in the northeastern U.S., creates a unique incentive for the development of clean transportation technologies. By 1999, 2% of the cars sold in California will have to be battery-powered. This figure rises to 5% in 2001 and 10% in 2003. Other measures will include alternative fuels, such as alcohol or natural gas. The window of opportunity will be brief and others will be quick and willing to exploit it; accordingly the Sub-committee recommends:

Recommendation No. 9

That the federal government, regardless of the prevailing economic policies, increase support for research and development into clean transportation in the near term, particularly in the areas of alternative fuels and electric transportation (battery/fuel cell) technologies.

The Sub-committee believes that energy conservation and environmental goals are intimately related and that objectives in both areas can be more effectively achieved by a harmonization of policy and programs and therefore recommends:

Recommendation No. 10

That the federal government consider adopting fuel efficiency and emissions standards for mobile sources similar to those existing in the northeastern United States.

Recommendation No. 11

That the Minister of the Environment and the Minister of Energy, Mines and Resources work in cooperation to pursue an integrated policy approach to energy policies and environmental goals.



CANADA

The Honourable David MacDonald, P.C., M.P.
Chairman
Standing Committee on Environment
House of Commons
Room 333, West Block
Ottawa, Ontario

Dear Mr. Chairman,

Pursuant to Standing Order 109 of the House of Commons, I am pleased to submit the enclosed response to the recommendations of the fifth report of the Sub-Committee on Acid Rain, tabled in the House of Commons, December 7, 1992, entitled "From Words To Action".

Your report reflects the input of many expert witnesses and careful deliberation by the Sub-Committee members and provides the Government and my Department with your objective and balanced review of our programs and actions to solve Canada's acid rain problem.

As the Sub-Committee has acknowledged, the Acid Rain Program has been quite successful. Since recognizing the problem, federal and provincial governments have jointly and separately put in place measures which have gone a long way to combatting the problem. Controls were put in place to reduce emissions and they have succeeded. Our efforts to establish a mechanism to deal with transboundary air pollution resulted in the historic Canada-United States Air Quality Agreement. Finally, our scientific research was and continues to be an essential component of the program, documenting the extent of the problem as well as ecosystem recovery.

Overall, the Sub-Committee's recommendations concur with the direction we have taken on the Acid Rain Program. I acknowledge that there has been some slippage in the delivery dates of certain reports, that emissions inventories have yet to be completed and that additional scientific research is required.

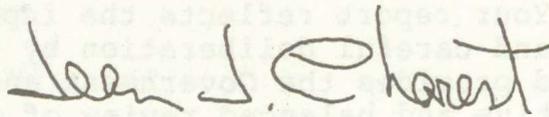
Under Canada's Green Plan, new acid rain resources have been obtained and deployed. However, as you are aware, the delivery of many of our initiatives, in particular federal-provincial agreements and emissions inventories, will depend on the cooperation of the provinces.

Ottawa, Canada K1A 0H3

Every effort will be made to adhere to Canada's Green Plan and our international commitments and we will continue to demonstrate the federal government's continued commitment in this area.

In closing, I would like to thank the members of the Sub-Committee on Acid Rain for their continuing contribution to resolving the acid rain problem in Canada. I particularly wish to offer a special thanks to the Chairman of the Committee, Mr. Stan Darling, for his consistent dedication to this important environmental issue. I look forward to working with you and your Committee in developing further measures that will assist in preserving and enhancing Canada's environment.

Yours sincerely,



Jean J. Charest

GOVERNMENT RESPONSE

INTRODUCTION

1. The following text is provided to the Committee to describe the design of the Acid Rain Program and to highlight some of its successes. Since the main thrust of the Sub-Committee's report deals with policies and programs aimed at solving the acid rain problem in Canada, it seemed appropriate to outline as an introduction, the framework that the Government's responses are based on. This framework is the core program as described in *Canada's Green Plan* and it has three thrusts, each of which stand alone in its own right in addition to contributing to the success of the others. They are: expanding emission controls, meeting international commitments and verifying progress. The revised Acid Rain Program was announced in September, 1991 as a six-year extension to acid rain research, monitoring and control efforts.

Expanding Controls

2. In response to public outcry and scientific findings, Canada introduced a domestic program in 1985 to control acid rain-causing emissions of sulphur dioxide (SO₂). Canada and the seven provinces east of Saskatchewan agreed to cap emissions at 2.3 million tonnes by 1994, representing a 40 percent reduction in Eastern Canada from 1980 levels. The federal and provincial governments are now working to extend this Eastern Canada cap to the year 2000 through federal-provincial agreements with each of the seven Eastern provinces. *Canada's Green Plan* commits us to a 3.2 million tons national cap, in the year 2000.
3. Several activities within the program contribute to the determination of appropriate SO₂ controls within Canada. First, emission inventories are being created and maintained in order to keep track of where the sources of SO₂ emissions are located and how much they emit. Second, deposition monitoring measures are required to identify the amount and location of acidification. Source-receptor relationships are identified so that we can ascertain where additional SO₂ reductions should take place in order to achieve regional critical loads. (Critical loads are the highest deposition of acidifying compounds that will not cause chemical changes leading to long term harmful effects on the aquatic ecosystem). New ways of controlling emissions, such as through the use of economic instruments/emissions trading are also being considered. Future reduction scenarios are being developed and explored with the provinces.
4. Scientific evidence is starting to reveal that, even with the currently planned levels of controls, about 500,000 square kilometres of eastern Canada will remain affected by acidification. If, as expected, these projections of continued acidification are supported by monitoring of the actual effects of the emissions reductions, additional SO₂ reduction measures may be warranted. Any further measures would require considerable discussion with provinces and external stakeholders.
5. In summary then, the "expanding controls" segment of the Acid Rain Program demonstrates that we have made progress, but there are still measures which will have to be undertaken in order to completely resolve the issue.

International Commitments

6. It is broadly acknowledged that at least 50% of the acid rain falling in Eastern Canada comes from sulphur dioxide emissions in the United States. *Canada's Green Plan* goal to conclude a transboundary air quality agreement with the United States was fulfilled on March 13, 1991 when the Prime Minister of Canada and the President of the United States signed the *Canada-United States Air Quality Agreement*.
7. As a member of the United Nations Economic Commission for Europe, Canada signed the Helsinki Protocol, agreeing to reduce annual sulphur dioxide emissions by 30 percent from 1980 levels by 1993. This targets Canadian SO₂ emissions at 3.2 million tons in 1993.
8. In addition, Canada and 24 other member countries signed a protocol agreement in 1988, committing Canada to maintain nitrogen oxide emissions at 1987 levels by 1994. These commitments will be largely met through implementation of Canada's NO_x/VOC Management Plan to control smog.
9. As part of the *Canada-United States Air Quality Agreement*, Canada will extend the cap of 2.3 million metric tons of sulphur dioxide emissions (for the seven provinces east of Saskatchewan) from 1994 to 2000. In substance, the agreement also re-affirms the UN ECE SO₂ Protocol under the Convention on Transboundary Air Pollution (1985), commonly referred to as the Helsinki Protocol commitment. By the year 2000, Canada will limit national sulphur dioxide emissions to 3.2 million tons. Progress under the Agreement was reported in 1992, and will be reported every two years thereafter.
10. The United States is committed to reducing annual SO₂ emissions by about 10 million tons from 1980 levels by the year 2000. This represents a reduction of about 40 percent in SO₂ emissions compared to levels in 1980.

Verifying Progress

11. Verifying progress includes a range of largely scientific activities whose goal it is to verify that the control program actually achieves the desired effects.
12. A strong science program has always been an integral part of the Canadian Acid Rain Program. A well founded scientific base contributed to the identification and definition of the problem and was instrumental in devising and negotiating solutions. Next, science's contribution will be to verify that these solutions are effective and to help determine whether or not control mechanisms require adjustment to respond to measured results.
13. During the seventies, the aim of the research and monitoring programs, both in Canada and in the U.S., was primarily to quantify the acid rain problem and recommend options to minimize it. The knowledge generated through these programs helped to shape Canada's position during the negotiations that led to the UN ECE SO₂ Protocol under the Helsinki Protocol.
14. During the 1980's scientific efforts were directed at obtaining information required to convince the United States government of the seriousness of the problem in Canada, and the contribution of United States sources to acid rain in Canada.
15. Now that the United States government has passed amendments to their *Clean Air Act* and that former President Bush and Prime Minister Mulroney have signed the *Canada-United States Air Quality Agreement*, scientific efforts are focused on describing the effectiveness of

SO₂ controls in both countries, on determining the response of very sensitive aquatic and forest ecosystems to decreases in the deposition rates of acidifying pollutants, and on evaluating potential effects on human health.

16. Monitoring of air and precipitation chemistry has shown that reductions in emissions of acidifying pollutants will result in reductions in deposition. However, several years of data are required in order to detect trends in areas that are not affected primarily by the emissions from a local source. Deposition values are highly variable on a year-to-year and site-to-site basis. This variability is related not only to annual variations in emissions, but also to variations in meteorology - especially wind and precipitation patterns. Sulphate in precipitation at Canadian sites generally decreased from the early to late 1980s (roughly 1986-1987), after which time, it stayed relatively constant to 1990. In contrast, nitrate deposition generally showed little change during the decade, although some sites registered increases.
17. Monitoring of the water quality of lakes in the Sudbury area has shown that the chemical condition of surface waters can improve with decreased sulphur deposition. It was the observations of aquatic effects in the seventies that initiated the widespread scientific and political interest in acidic precipitation. Now, studies near Sudbury, where local sulphur deposition has decreased by as much as 75% since 1950, have shown rapid reversal of chemical acidification. Similarly, some lakes outside of the direct influence of local sources of acidifying pollutants have also been very responsive to changes in deposition. Others have not. Monitoring has shown that these latter differences may be explained in part by changes in climatic conditions.
18. Evidence of the reversal of biological effects is less extensive. Research carried out by Fisheries & Oceans at the Experimental Lakes Area (ELA), near Kenora, Ontario, has demonstrated that food-chain disruption begins very early in the acidification process and leads to the deterioration of fish stocks. The acid rain experiments continue at ELA to simulate reductions in atmospheric sulphate deposition, and help predict what to expect in an aquatic ecosystem when acid rain is reduced. In Nova Scotia, earlier studies had shown that one-third of the available Atlantic salmon habitat has been lost due to acidification since 1950. Improvement in Atlantic salmon productivity can be expected, but slowly. Natural recolonization will lag water chemistry improvements by approximately one decade. Complete recovery could take 50 to 100 years. In the meantime, annual stocking is the only way to maintain this threatened species in Nova Scotia.
19. Effects of continued acid deposition to large areas of forests are not well known. Air pollution is considered to be an additional stress on the forest; other stresses include extreme weather events (notably drought and frost), insects and diseases. The health of Canada's forests has been monitored since 1984 to detect early signs of damage from air pollution. To date no large-scale sign of damage related to air pollution has been observed. There has been branch dieback observed on white birch near the Bay of Fundy during the 1980's and the area of affected trees is coincident with the distribution of acidic fog in the area. The possibility that there is a link between the two is under study. The well-known dieback on sugar maple in Ontario and Quebec during the 1980's has been attributed to unusual weather conditions and insect damage, however, acid rain is undoubtedly an additional stress on the forest.
20. The effects of acid rain on human health are less well known than effects on ecosystems. We know, however, that acid aerosol particles suspended in air are small enough to enter deeply into lungs as we breathe. The most vulnerable to the effects of acid particles are children, asthmatics and individuals with hyperresponsive airways. These individuals develop problems with lung functions when exposed to high ambient acid aerosol concentrations.

21. Since the full Canadian and American control programs will not be in place until 2000, governments must be committed to continuing the existing monitoring programs at least for the next decade to verify that the control programs actually achieve the desired effects. The long-term commitment is required because there is a lag of several years between the time when emissions are reduced, and the time that reductions in the effects of acid rain are verifiable. Several years will be required to document improvements in the water quality of lakes in affected areas; and additional time and data will be needed to verify the biological recovery in these waters and more time will also be needed to determine the contribution of air pollution to forest decline.
22. A number of issues must be resolved before the scientific community is in a position to determine whether or not existing controls are sufficient. One issue is whether critical loads or levels can be determined for protecting human health or the health of Canadian forests. Another emerging acid rain issue is to determine whether acidification by deposition of nitrogen, another acidifying agent, will negate some of the benefits of current controls of emissions of sulphur dioxide. On this last point, scientists have recently observed that nitrogen stored in forest soils may be leaching into our lakes and rivers. More study is needed to assess the implications of this phenomenon.

GOVERNMENT RESPONSE

Recommendation No. 1

That the federal Government, in cooperation with the provinces, devise least cost options and implement further reductions to SO₂ emissions as required to ensure that acid rain deposition not exceed critical loads or target loads, whichever is the lesser.

Response:

- The Government agrees in principle with the Sub-Committee's recommendation. We are working with the provinces and industry to develop and implement programs to reduce SO₂ emissions and to develop a strategy to permanently limit these emissions in regions which are affected by acid rain damage.
- These critical load estimates need to be and will be further refined, and will be based in part on the response of the environment to decreased deposition levels. Additional work is required to further define critical loads and to analyze the implications of a control program based on achieving these critical loads.
- The target load of 20 kilograms per hectare per year of sulphate in precipitation was established in the early 1980s as a goal for moderately sensitive ecosystems. Science has since developed regionally-based critical loads, many of which are below the current 20 kilograms per hectare per year.
- As the Sub-Committee notes, emission reductions under the current program in Canada and the United States might not be enough to protect some regions of Canada, especially sensitive ecosystems.
- Optional emission control schemes are presently being assessed jointly with the provinces and stakeholders. A future control regime will be based upon a system within which emissions would be limited in order to protect sensitive receptor areas. Such a scheme would cost-effectively target the largest emissions reductions to areas where they would have the greatest environmental benefit. Federal and provincial governments will work together to develop control options. Existing consultation structures, such as the Canadian Council of Ministers of the Environment, are proving to be an excellent forum for discussion of the options.

Recommendation No. 2

That the Government undertake to negotiate further reductions of SO₂ emissions with the United States as required, to protect Canada's ecosystems.

Response:

- While further negotiations with the United States may be necessary in the long term, for the moment, the emphasis is on tracking and ensuring the full implementation of the *Clean Air Act*. We recognize that the United States is making important progress in the implementation of Phase 1 of its Acid Rain Program and that this is expected to have a positive impact on the acid rain problem in Canada.
- Should further negotiations be required, Canada and the United States have established, through the *Canada-United States Air Quality Agreement*, a mechanism for tracking the implementation of the control measures and evaluating effects on

ecosystems, for sharing and discussing scientific findings, and for negotiating any additional measures that may be needed to protect each country from the effects of transboundary air pollution. Given that this mechanism is in place, and that implementation of the United States emission reduction and emission trading program is only just beginning, it is too early to accurately evaluate the magnitude of acidic deposition reduction which will occur in various regions. As the location and size of actual emissions decreases become better known, we will be evaluating the likely impact on sensitive Canadian ecosystems and monitoring deposition rates. Should further Canada-United States action be required, the *Canada-United States Air Quality Agreement* provides the appropriate bilateral framework.

Recommendation No. 3

That the design and implementation of any SO₂ emissions trading system in Canada, include all the necessary measures to protect the environment and human health according to Canada's national and international obligations.

Response:

- The Government agrees that the design and possible implementation of any SO₂ emissions trading system in Canada would respect Canada's national and international commitments to protect the environment and human health.
- The Sub-Committee's recommendation coincides with the Government's consideration of the establishment of an emission trading system which protects Canada's ecosystems, protects Canadians from airborne pollution and ensures that Canada meets its international commitments. The United States has embarked on an experiment in SO₂ emission trading. Canada (i.e. the federal government and the provinces) is closely monitoring the implementation and effectiveness of this program in the United States while conducting its own evaluations for a possible scheme in Canada.

Recommendation No. 4

That the federal government, in cooperation with the provinces, develop and implement a national system of tracking, compiling and reporting on SO₂ emissions; that yearly summary reports on national SO₂ emissions levels be published within one year of the year to which the report applies; and that such a system be in place in time to report on national SO₂ emissions levels for the year 1994.

Response:

- The Government agrees that timely reporting is a necessary component of its domestic Acid Rain Program. A report on the implementation of the Acid Rain Program in Eastern Canada is issued annually. Estimates of SO₂ emissions for the major source sectors by province and for Canada as a whole have been published for the year 1990. Work is underway to accelerate the process for 1991 and 1992. Since most of the emissions data are collected, reviewed and reported by the provinces, our success is contingent on provincial timeliness.
- Reporting requirements consistent with the Sub-Committee's recommendation are part of both the amended eastern Canada federal-provincial agreements and of the new comprehensive federal-provincial air quality agreements now under negotiation.

- In general, emissions estimates can be produced within an acceptable time, consistent with the Sub-Committee's recommendation. The level of detail that is available in such a short timeframe will be limited but is sufficient to track the progress of programs and to estimate potential acid deposition levels. Provinces and electric utilities are moving towards continuous monitoring of SO₂ and other emissions within the next three years.
- With respect to inventories, work on an SO₂ inventory for the year 1990 is nearing completion; agreement in principle has been reached for federal-provincial integration of emissions estimates in order to prepare a 1994 inventory.
- A wider use of automated computer-based data systems will help data collection. The federal Government is committed to providing sufficient resources to ensure that adequate SO₂ emissions data is available to permit tracking of progress, to verify that program participants' progress can be assessed to evaluate environmental effects and to guide development of additional measures, should they be needed.

Recommendation No. 5

That the federal government assign top priority to the preparation of program reports and ensure that sufficient resources are available for reports to meet agreed deadlines.

Response:

- The Government is committed to regular, effective, and accessible reporting on all aspects of the acid rain issue. There are several reports to keep the public and technical audiences informed on the issue of acid rain.
- First, as noted in our response to Recommendation No. 4, production of the annual report required under the federal-provincial acid rain agreements is being accelerated. This report is being broadened in scope to provide the reader with a better overview of the Canadian effort, including scientific research, as called for in federal-provincial agreements.
- Second, the first acid rain report required under *Canada's Green Plan* was released in late 1992. This report targets a broad readership and provides an excellent overview of the entire acid rain program including emissions, government and industry response, ecological impacts, and the current state of acid rain science. This report will be updated regularly so that Canadians can be well informed.
- Third, the Government released its second State of the Environment Report in 1992. This provides a comprehensive and accessible review of Canadian ecosystems resources, environmental issues, scientific understanding and program status. This report will be regularly updated and includes a chapter on acid rain.
- Fourth, every two years, a progress report will be issued on the implementation of the *Canada-United States Air Quality Agreement*. The first such report was published in 1992 and the next one will be released in 1994.
- While not all of the reports were issued within publicized deadlines, the Government will continue to provide whatever information can be usefully made available on a timely basis.

Recommendation No. 6

That the federal government, regardless of the prevailing economic policies, ensure that sufficient support is provided for research into the effects of acidification on Canada's forests in order to meet its commitment to report on the issue by 1994.

Response:

- The Government supports the recommendation on the basis that it will continue its broad-based program of research to understand and quantify the potential impact of acid rain and other pollutants on Canadian forests. Actions and strategies will be taken to mitigate the effects and preserve our forest ecosystems for the benefit of all Canadians. The Government's commitment to produce a report on the contribution of air pollution to forest decline continues. Research has demonstrated that ambient levels of pollution affect both forest soils and trees, however, this has yet to result in large-scale forest decline. Forestry Canada has been monitoring forests since 1984 with the Acid Rain National Early Warning System (ARNEWS), and results show that forest health has generally remained good despite a number of stresses, including acid rain.
- *Canada's Green Plan* expanded the effort to determine the causes of forest decline. Forestry Canada is monitoring the health of Canada's forests, conducting research into the effects of air pollution on forest vegetation and soils and determining the contribution of pollution to forest decline. The work began with investigating the effects of sulphate and has expanded into the study of the effects of nitrates and ozone. The work to date has demonstrated direct effects between ambient levels of pollution and damage to forest trees and soils.

Recommendation No. 7

That, following research into the effects of acid pollutants on human health, the federal government, through the Minister of Health and Welfare, present to Parliament an interim report on its findings before the end of 1993 and a final report before the end of 1995.

Response:

- The Government remains committed to studying the human health effects of acid rain-related pollutants, and reporting by 1996 on its findings and on the possible need for further emissions controls. Research in this area is being coordinated by National Health and Welfare Canada and includes alliances with many health organizations in Canada and abroad. While research is ongoing and final conclusions may not emerge before 1995, the Minister of Health and Welfare is prepared to report to Parliament on the acid rain health program and on the progress made to date by year-end 1993.

Recommendation No. 8

That the Government, in addition to its work on the economic impact of acid rain, also examine the other costs of acidification, including where there is a loss in the quality of life; where there is a loss of the enjoyment of nature; or where there is damage to artifacts of cultural or historical significance.

Response:

- The Government agrees in principle with the recommendation and will be undertaking socio-economic studies as part of its work to redesign the SO₂ control program. Work is underway in the Department of Health and Welfare to examine the costs associated with air pollution episodes. Environment Canada also plans to undertake an assessment of the costs and benefits associated with achieving critical loads. In making this commitment, the Government also recognizes the difficulty in both qualifying and quantifying subjective impacts such as "loss of quality of life". Such studies can incur very large costs and offer little potential for producing consensus assessments. However, the Government will consider the feasibility of such further study in the context of currently planned work and in keeping with current resource availability.
- Assessment and evaluation of the social costs and benefits of acidification and the control program is an ongoing concern of the Government. A significant amount of work in this area has already been conducted by several departments (Environment Canada, Fisheries and Oceans, Health and Welfare, and Forestry Canada), by provinces and at universities. Work in this area is echoed by research in the United States and in other countries and by institutions such as the United Nations Economic Commission for Europe. As socio-economic evaluation methods become better established, a better assessment of the full value of the Canadian Acid Rain Program may become feasible.

Recommendation No. 9

That the Government, regardless of the prevailing economic policies, increase support for research and development into clean transportation in the near term, particularly in the areas of alternative fuels and electric transportation (battery/fuel cell) technologies.

Response:

- The Government supports the recommendation in that it is already putting more funds into research on transportation fuels through *the Green Plan*.
- The Federal Program of Energy Research and Development is supporting and coordinating the research and development of clean alternatives to traditional gasoline and diesel transportation fuels. Departments involved include Environment Canada, Energy, Mines and Resources, Agriculture Canada, Forestry Canada, Transport Canada, Health and Welfare Canada, and the National Research Council.
- The research and development is planned, conducted and financed in partnerships with provinces, industry, all the major associations representing producers of alternative transportation fuels, and the international research community, principally through the International Energy Agency.
- Topics being addressed include advanced batteries, fuels derived from biomass, natural gas conversion to liquid fuels, alcohol fuels (methanol, ethanol), compressed natural gas, reformulated gasolines, propane, hydrogen, fuel cells and the use of electricity in the transportation sector.

- Research is also identifying the potential environmental impacts and health related constraints associated with the production and use of alternative fuels and establishing fuel standards, emission limits and safety codes.
- In addition, demonstrations of alternative transportation fuel technologies are being conducted under *the Green Plan* and the Market Development Incentive Program.

Recommendation No. 10

That the federal government consider adopting fuel efficiency and emissions standards for mobile sources similar to those existing in the Northeastern United States.

Response:

- The Government supports this recommendation and, indeed, has harmonized its standards for vehicle emissions with those in most of the United States.
- In 1992, the Government of Canada signed Memoranda of Understanding (MOU's) with automobile manufacturers which ensure that vehicles sold in Canada in 1994 and 1995 will meet the same exhaust emission standards as required in the United States under the *Clean Air Act* (CAA). These American federal emission standards, referred to as Tier I standards, apply to vehicles sold in the 49 states other than California. California was granted approval to adopt more stringent requirements. Bill S-8 to amend the Motor Vehicle Safety Act, now before the House of Commons, will provide the necessary authorities to enact similar regulations to those of the United States.
- The United States' CAA requires that individual states achieve the National Ambient Air Quality Standards (NAAQS) for a variety of pollutants according to specific timetables. In addition, states are required to submit State Implementation Plans (SIPs) which contain emission control measures that will be adopted and implemented by the state to achieve attainment of the NAAQS. The failure of a state to submit an attainment SIP can result in the imposition of federal sanctions. It is for this reason that several Northeastern States with serious "non-attainment" problems are pursuing the adoption of the more stringent California standards as part of their SIPs.
- Effective measures of a regional nature can be implemented by provincial or municipal governments to reduce emissions in Canada's most polluted areas. A number of these types of measures were identified in the Federal/Provincial NO_x/VOC Management Plan, including vehicle inspection and maintenance programs, reduction of gasoline vapour pressure in summer months, and gasoline vapour recovery at storage depots and service stations. Some initiatives have been implemented since the Plan was adopted in principle by the CCME Ministers in 1990.
- The responsibility for setting fuel efficiency standards lies with the federal government in both Canada and the U.S. Current Canadian fuel consumption objectives under the Joint Government-Industry Voluntary Motor Vehicle Fuel Economy Program are equivalent to the U.S. fuel economy standards.

Recommendation No. 11

That the Minister of the Environment and the Minister of Energy, Mines and Resources work in cooperation to pursue an integrated policy approach to energy policies and environmental goals.

Response:

- The Government fully endorses the recommendation of the Sub-Committee and is already acting on it. Energy, Mines and Resources and Environment Canada are working closely on a number of fronts to ensure a strong and vibrant energy industry and a healthy environment. Indeed, an integrated and cooperative approach between the Ministers and between their respective departments is a fundamental premise behind *Canada's Green Plan*. For example, scientists and engineers from both departments have been working together to conduct research, development and demonstration of new clean energy technologies. Green Plan resources are supporting major programs to enhance energy efficiency and deployment of alternative energy forms which are designed to address a number of the environmental issues including that of global warming. The two departments are working in partnership with the provinces, industry and other stakeholders to elaborate the National Action Strategy on Global Warming.
- A new air issue management mechanism is being jointly established by the Federal/Provincial Ministerial councils of energy and environment to ensure better integration.
- The Government continues to be committed to ensuring that the energy industry operates in an attractive investment climate, and that it does so in an environmentally responsible manner.

REPORT OF THE STANDING COMMITTEE ON ENVIRONMENT

A GLOBAL PARTNERSHIP

**Canada and the Conventions of the United Nations
Conference on Environment and Development (UNCED)**

April 1993

**The Honourable David MacDonald, P.C., M.P.
Chairperson**

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THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

From 3-14 June 1992, Rio de Janeiro hosted the United Nations Conference on Environment and Development (UNCED). Never before had so many countries come together in a spirit of concern and cooperation. The conference focused on current development and economic practices and their impact on the global environment, and on the development of a common strategy to integrate environmental considerations into economic and development decision-making worldwide. The conference concluded with the Earth Summit, at which leaders of 105 nations rallied behind a global commitment to sustainable development.

However, deep disappointment about UNCED has also been expressed by many participants and commentators. The conference is said to have failed to recognize and grapple with the link between the world's environmental crisis and its dominant model of economic development. Developing countries, in particular, would charge that the crucial issues of transfer of resources and transfer of technology did not begin to be examined. Other global concerns such as population growth, poverty of developing countries, overconsumption of resources, and the relationship between these issues and environmental problems, were not adequately addressed. Désirée McGraw, former UNCED Youth Ambassador, identified debt, militarization and nuclear energy as "non-agenda" items crucial to achieving UNCED's stated goal of sustainable development.¹ Even the praise of those expressing pleasure at the outcome of Rio is guarded; it is agreed that the degree to which the conference can be considered a success will only be known in time. The nature of the follow-up process by which decisions taken at Rio are implemented by governments and international bodies will determine the conference's ultimate significance.

Canadians have expressed a high level of concern about their natural environment. Our commitment was demonstrated by the lead role Canada took at the Earth Summit. Ten months have now passed since UNCED, and the challenge facing Canadians is how may we profit from the work begun at Rio? What action and direction must Canadians take to improve those areas where Rio failed, and to make significant and lasting environmental advances both at home and internationally? The House of Commons Standing Committee on Environment has endeavoured to address this challenge.

The Committee followed the events at Rio closely. Many of the members attended Rio and were active participants in the UNCED process, tracking the goals of the conference and its accomplishments, as well as the areas where success was not achieved. Because of the crucial importance of immediate, effective follow-up to Rio, in Canada as well as elsewhere, the members of this Committee wished to study the Conventions which Canada signed, and the steps which are being taken or considered by Canada for the coming months. Through the recommendations contained in this report, the Committee attempts to define Canada's future course of action toward the implementation of sustainable development.

¹ Désirée McGraw, "Making Sense of UNCED," Paper submitted to the House of Commons Standing Committee on Environment, December 1992, p. 6.

A. HISTORY OF THE SUMMIT

In 1972, Stockholm, Sweden, hosted the first *United Nations Conference on the Human Environment*, which was attended by 113 delegates and two heads of state (Olaf Palme of Sweden and Indira Gandhi of India). This first-ever world conference on the environment raised a generation's awareness of an issue hitherto little talked about, the global environment. The Stockholm conference secured a permanent place for the environment on the world's agenda and led to the establishment of the United Nations Environment Program (UNEP). Although the international nature of the environment was now understood, environmental concerns were compartmentalized at Stockholm, where issues like pollution and species problems were high priorities.

Since the 1972 conference there have been a number of significant international conferences, as well as a number of international environmental agreements, some of which have been ratified by Canada. In 1976, the first-ever global conference on human settlements was held in Vancouver; and 1977 marked the important United Nations (UN) Conference on Desertification in Nairobi, as well as the UN Water Conference at which the *Mar del Plata Action Plan* was adopted. Other major international agreements include the 1978 *Great Lakes Water Quality Agreement*; the 1979 *Geneva Convention on Long-range Transboundary Air Pollution*; the 1985 *Helsinki Agreement* (a 21-nation commitment to reduce sulphur dioxide emissions); the 1988 *Montreal Protocol on Substances That Deplete the Ozone Layer*; and the 1989 *Basel Convention on Transboundary Movements of Hazardous Wastes*.² In 1992, it was this kind of international cooperation that UNCED sought, but on a larger scale.

The world community proceeded along a parallel track through the 1970s and 1980s in the effort to promote the development of developing countries. Beginning in the 1960s, which was declared the United Nations Development Decade, broad policies for the improvement of the standard of living in the developing world were created, and these policies and programs were revised and expanded during the succeeding two decades, also declared Development Decades.

Several key events occurred during the 1960s. The World Food Programme (WFP) was established as a joint undertaking of the UN and the Food and Agriculture Organization (FAO) in 1963. The WFP provides food to support development activities and emergency food in times of crisis. The General Assembly convened the United Nations Conference on Trade and Development (UNCTAD) in 1964, which became one of the UN's permanent bodies. Its aim is to analyze the practices of international trade and to enhance economic development wherever possible. UNCTAD met five times between 1964 and 1983. The United Nations Development Programme (UNDP), the world's largest multilateral technical grant assistance program and the central coordinating organization of the UN for development activities, was established in 1965. In 1967, the United Nations Industrial Development Organization (UNIDO) was established to promote the industrialization of the developing countries.

In 1970 the General Assembly adopted the *International Development Strategy*, which called for joint action by developing and developed countries and set specific goals for progress in all sectors of economic activity. The target that was then set for transfers of funds from economically advantaged countries has never been met by more than a few countries: developed countries were to endeavour to transfer financial resources to developing countries of at least one percent of gross national product (GNP). By the mid 1970s, at least 0.7% of GNP was to be transferred in the form of official development assistance (ODA)—long-term, low-interest loans—to developing countries.

² Environment Canada, "Canada and the Earth Summit: Green Plan Goes Global," 1991.

In the 1970s, the prevailing international monetary system broke down, partly because of the oil crisis, which caused increased prices of other goods, shortages of goods, imbalances of trade and growing debt burdens. The Movement of Non-Aligned Countries and the Group of 77 (the central negotiating body for the developing countries) proposed extensive reforms, and in 1974 the General Assembly agreed that the prevailing economic order was in conflict with the goals of international equity that had been developed through international political and economic relations. The Assembly adopted the *Declaration and Programme of Action on the Establishment of a New International Economic Order*.

The new international economic order was intended to correct inequalities and eliminate, ultimately, the gap between developed and developing countries. The seventh special session of the General Assembly, held in September 1975, focused on issues of development and international cooperation, and a framework for UN work in several economic areas was outlined. However, by December of that year, the economic growth rate of the developing countries was beginning to fall short of targets. Since 1975, largely due to international economic recession and the failure of most developed countries to reach even half of the 0.7% target, and in spite of repeated UN resolutions urging developed countries to improve their performance, ODA levels have remained stagnant.

In 1976, UNCTAD established a Committee on Economic Cooperation among Developing Countries to assist in meeting its objective of enhancing mutual self-help among developing countries. In 1979, UNCTAD launched a new Programme of Action for Least Developed Countries, and in 1981, the UN Conference on the Least Developed Countries met and adopted the Programme, and called on all States to implement it as part of the new International Development Strategy for the Third UN Development Decade.

Proposals for the new international economic order were incorporated in the International Development Strategy for the Third United Nations Development Decade adopted by the General Assembly in 1980. The Strategy calls for changes in the world economy, in order to achieve a fairer distribution of the world's wealth. Development projects were growing in number by this decade: by 1983, UNDP was involved in 5,000 development projects in partnership with the governments of some 170 developing countries.

However, all of the institutional and other efforts to alleviate international development inequities had failed to have a significant impact. Developed countries have, for the most part, failed to increase contributions to UNDP, and ODA levels have not increased. In addition, other dynamics of the world economic system have been identified as contributing to the problems facing the global community. Tim Drainin, of the Canadian Council for International Cooperation, told the Committee that protectionism by the Organization for Economic Cooperation and Development (OECD) countries causes the South to lose up to \$500 billion in trade opportunities per year. Also, crippling third World debt has contributed to negative financial flows, whereby the South makes a net payment of \$40 to \$50 billion per year to the developed countries of the North.³

In fact, the two parallel tracks of development and environment were both running out of steam in the 1980s, and a new approach to both problems was needed. In 1983 the UN General Assembly established *The World Commission on Environment and Development*, better known as the *Brundtland Commission* after its chairperson, Norwegian Prime Minister, Gro Harlem Brundtland. Its aim was to link environmental issues to the findings of the 1980 Brandt report on North-South relations. The Brundtland report, published in 1987 as *Our Common Future*, declared that the time had come to recognize the linkages between the environment and the economy.

³ *Minutes and Proceedings of the Standing Committee on Environment*, Issue No.46, 17 November 1992, p. 13.

The concept that our economic needs can only be met by ensuring the protection of natural systems, which has come to prominence since the Brundtland Commission embraced the term "sustainable development", evolved in the early 1980s. Its roots are much older: Thomas Malthus, the English political economist, warned in 1798 that population growth could not continue forever without outstripping available natural resources. In 1972, the year of the UN Conference on the Human Environment in Stockholm, the Club of Rome issued a report entitled *The Limits to Growth*, its message being that fresh water, arable land, forests, minerals and the oceans are "the ultimate determinants of the limits to growth on this earth".⁴

The *World Conservation Strategy*, prepared in 1980 by the International Union for the Conservation of Nature along with the UNEP and the World Wildlife Fund, warned that negative consequences for humankind would result from the destruction of natural resources. The *Strategy* advocates the conservation of living resources for sustainable development. The *World Charter for Nature*, which was passed by the UN General Assembly in 1982, elaborated upon the idea, and although it did not use the words "sustainable development", the concept as we now understand it is clearly reflected throughout. For example, the Charter reaffirms that we must use natural resources "in a manner which ensures the preservation of the species and ecosystems for the benefit of present and future generations".⁵

The theme of sustainable development became a cornerstone of the work of the Brundtland Commission, which began in 1983. Inherent in the use of this new term was the merging of environment and development issues. Richard Sandbrook, of the International Institute for Environment and Development, told the Commission in June 1985:

It has not been too difficult to push the environment lobby of the North and the development lobby of the South together. And there is now in fact a blurring of the distinction between the two, so they are coming to have a common consensus around the theme of sustainable development. . . In effect, there is a political community of interest, North and South, in the concept of sustainable development that you can build upon.⁶

The report of the Brundtland Commission, *Our Common Future*, was influential, and its importance gave new emphasis to the term. The Commission's definition of sustainable development is widely used: "development which meets the needs of the present without compromising the ability of future generations to meet their own needs".⁷

The Brundtland Report called for an international conference to be convened by the UN General Assembly. This suggestion was considered and adopted by the UN General Assembly at the close of its 44th session in December 1989. The resolution, which established the conference, states that the purpose of the conference was to:

⁴ Club of Rome, *The Limits to Growth*, cited in Michael Keating, *Toward a Common Future*, Ottawa, Environment Canada, 1989, p. 24.

⁵ United Nations, *World Charter for Nature*, United Nations General Assembly Resolution 37/7, 28 October 1982.

⁶ World Commission on Environment and Development, *Our Common Future*, ("the Brundtland Report"), April 1987, Oxford University Press, p. 2-20.

⁷ *Ibid.*, p. ES-7.

elaborate strategies and measures to halt and reverse the effects of environmental degradation in the context of increased national and international efforts to promote sustainable and environmentally sound development in all countries.⁸

The first UN Conference on Environment and Development—UNCED for short, but better known as the “Earth Summit” after its final three days—was the culmination of two and a half years of world-wide consultation. The conference was attended by representatives of 178 nations, many non-governmental organizations (NGOs) and other interested parties (approximately 30,000 in total, including members of the media). Although successful as an assembly, in that so many heads of state and other participants were present, the conference failed to produce firm commitments by governments, either to specific targets in international agreements, or to specific levels of funding.

After the Brundtland Report was released in 1987, it became clear that the developed countries of the North understood it to be a document about environmental problems, while the developing countries of the South saw it as a development study. This dichotomy was not resolved at Rio. Although neither the development side nor the environment side were left out of the conference there was a failure to really integrate the two separate agendas as part of one inextricable relationship. As Christine Debrah, former Executive Director of the Environmental Protection Council of Ghana, has said,

The underlying causes of the crisis of our civilization—the disparity between rich and poor, between developing and developed nations, unsustainable patterns of production and consumption, and, most importantly, population growth—have not really changed and would need a much greater political commitment from world leaders as well as individual citizens.⁹

B. CANADIAN PREPARATION AND GOALS

Canada's preparations for the Earth Summit were coordinated by the National Secretariat in cooperation with Environment Canada and External Affairs and International Trade Canada (EAITC) and the Canadian International Development Agency (CIDA). The preparations also received input from a large number of interest groups connected to the environment, development, business, industry, labour, the churches, universities, women, natives, and youth, as well as all levels of government.¹⁰

An interdepartmental committee on UNCED was established and co-chaired by Environment Canada and EAITC with representation from 20 federal departments and agencies. This group was responsible for coordinating the federal government's preparations for both UNCED and the International Preparatory Committee Meetings (PrepComs). Groups were organized to address each of Agenda 21's 115 issues, synthesizing departmental interests into drafts of the Canadian positions and identifying desirable outcomes from UNCED. Recognizing the need to hear from all stakeholders, the Canadian government financially assisted the formation of the Canadian Participatory Committee for UNCED. This Committee coordinated the participation of approximately thirty NGO groups.

Canada attended the PrepComs with specific objectives in mind. Canada emphasized the importance of national reports, and provided assistance to Indonesia, Guinee Conakry, Nigeria, Peru and the Central American region in the preparation of their national reports for UNCED.

⁸ United Nations Resolution 44/228, part 1.3, New York, 22 December 1989.

⁹ Lt. Col. (Rtd.) Christine K. Debrah, “The Earth Summit and the South”, *Rio Reviews*, Geneva, The Centre for Our Common Future, 1992, p. 10.

¹⁰ Environment Canada, “Canada and the Earth Summit, Green Plan Goes Global,” 1991.

Canada worked for the establishment of binding conventions on climate change, conservation of biodiversity, and on sustainable development of all forest types. Also of paramount importance to Canada was the state of the high-seas fishery. At the PrepComs, Canada attempted to get beyond the causes, the finger-pointing, and look to solutions and embody them in a convention on sustainable development of the seas. Canada planned and worked toward an "Earth Charter", a one-page credo or global doctrine that would have succinctly established the concept of sustainable development. Finally, with the knowledge that most developing countries can not afford to pay for the real integration of environmental protection within viable development programs, Canada proposed that assistance be provided to these countries through debt conversion projects and improved North-South trade.

C. THE GLOBAL GOALS

The global objectives were broad and comprehensive. Environmental issues included the protection of air, land and water; conservation of biological diversity, forests, and natural resources; and the sound management of wastes and technology. These goals identified to world leaders the human activities that are threatening the planet, that are bringing about pollution of land, ocean and atmosphere, drought, desertification, thinning of stratospheric ozone, climate change, and the extinction of plant and animal species.¹¹

Also on the agenda were the concerns that have led to serious differences between countries of the North and South: patterns of development that cause stress to the environment, poverty in developing countries, economic growth, unsustainable patterns of consumption, and demographic pressures and their impact on the international economy. Ultimately, the most crucial of issues divided countries of the North from those of the South: the need for fairness in the transfer of resources and technology; and the call for an end to unjust patterns of international trade.

D. WHAT HAPPENED AT RIO?

The Summit was the largest gathering of world leaders ever to take place, and it received a great deal of media coverage around the world. Expectations were high, often too high; and there has been much criticism of the final outcome of UNCED. To the extent that the aim of Rio was really to find ways to bring the developing world out of poverty without contributing to environmental degradation, the conference was not a success. Tim Draimin, of the Canadian Council for International Cooperation, quoted Norwegian Prime Minister Gro Harlem Brundtland,

We owe the world to be frank about what we have achieved here in Rio: progress in many fields, too little progress in most fields, and no progress at all in some fields.¹²

The successful aspects of Rio have to do primarily with the open, transparent and inclusive processes of consultative decision-making which began with the Brundtland Report, and were carried through the preparatory process for UNCED. New leadership, consensus and understanding were developed in the NGO communities: business, labour, environmental groups, women, aboriginal peoples and youth. An unprecedented degree of high-level political involvement and public attention were garnered. These are the sources of the hope that many have expressed since leaving Rio. As the Minister of the Environment, Jean Charest said:

¹¹ "A Greener Commonwealth: Special Earth Summit Edition," *Commonwealth Currents*, June/July 1992, p. 3.

¹² *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 46, 17 November 1992, p. 9.

The UNCED process concluded with a sense of accomplishment, realism, I think, and hope. The biggest accomplishment was the extent to which different concerns converged around a common agenda and countries rallied behind a global commitment to sustainable development. . . . For the first time, nations everywhere acknowledged that the problems are real, and they agreed on a common course of action to combat them. A collective enterprise crystallized in Rio. Precedents were set and irreversible networks and partnerships were formed. A global consensus was reached that practical solutions are available, not quick fixes; no short cuts, but progressive steps in the right direction.¹³

The single most important fear expressed by NGOs, developing countries and other observers critical of UNCED's real results was the failure of governments from the developed countries, including Canada, to commit money to sustainable development. Tim Draimin told the Committee that Canada's ability to meet its pledge to maintain and hopefully increase ODA in the next budget will be a key indicator of our commitment. This is particularly alarming given the announcement in the government's "mini-budget" of 2 December 1992 that Canada's foreign aid budget will be cut by 10%.

Overall, Rio cannot be said to have been successful in integrating, in practice or in theory, the two areas in which the international community has worked to achieve change; environmental protection and international development. Jim MacNeill, who was the Secretary General of the Brundtland Commission, based his evaluation of Rio on the expectations that Commission had for it:

The Commission intended that Rio would provide an opportunity for governments to map out a global transition to more sustainable forms of development. It proposed that governments take strong measures to tame our terminal propensity to multiply our numbers, tackle mass poverty and change the consumption, production and trading patterns that underlay the dismal trends that put human civilization at increasing risk. As a minimum first step, the Commission called for a range of measures to integrate environmental and economic considerations at the centre of decision-making in the cabinet chambers of government, the board rooms of industry and the kitchens of our homes. Clearly, the Summit did not achieve those goals.¹⁴

The following documents were the tangible products of UNCED:

1. Agenda 21

Agenda 21 is considered the key document of the Conference. Its content was largely negotiated during the PrepComs, starting from Maurice Strong's visionary concept of it as an integrated action plan for governments and international organizations to deal with the specific sectoral issues on the UNCED agenda. It is a 700-page, 40-chapter inventory of environment and development issues, including action programs and cost estimates for their implementation. It represents an attempt to restructure human thinking and activities in order to integrate the environment and the economy. Although government leaders, by signing Agenda 21, may have committed themselves to an intention to implement these programs, no financial or other binding commitments were made.

Agenda 21 addresses environmental issues on a sectoral basis; for example, poverty reduction, technology transfer, climate change and hazardous waste disposal. The Agenda also contains key chapters that (i) recommend the establishment of a UN-related commission to track the progress of nations and (ii) outline financing mechanisms and structures to assist countries in their sustainable development efforts.

¹³ Ibid., Issue No. 45, 16 November 1992, p. 5-6.

¹⁴ Jim MacNeill, "The 1992 Rio Conference: Setting the Global Compass," *Rio Reviews*, 1992, p. 34.

This wordy environmental blueprint contains some positive sections, but also some disappointing and out-dated concepts. For example, Janine Ferretti of Pollution Probe told the Committee that the Agenda 21 chapters on waste and toxic chemicals are out-dated because they do not refer to the concept of "sunsetting," or phasing-out, of toxic chemicals, which is a process which has already begun in Canada and other countries. However, as Arthur Hanson, President and CEO of the International Institute for Sustainable Development (IISD) advised us, most of Canada's domestic environmental initiatives are not up to the standard of achievement demanded by Agenda 21, and will have to be reviewed and improved. The UNCED Secretariat estimated that to make Agenda 21 happen would cost over US \$100 billion per year throughout this decade. The new money committed at Rio will not make possible the commencement of the Agenda 21 action plans. Beyond the lack of financing, Agenda 21 was further weakened by the absence of commitments to concrete actions; prioritization of issues; and mechanisms for technology transfer, monitoring and reporting.

Along with Agenda 21, three follow-up conferences were negotiated at Rio:

- At the urging of African nations it was agreed to immediately begin negotiations on a Convention to combat desertification for finalization by June 1994.
- The UN Environment Program will convene a conference on land-based sources of marine pollution.
- Nations agreed on a number of principles to regulate the conservation of high-sea fisheries, and also agreed to a conference on this issue to be held in 1993. On the issue of overfishing Canada achieved a major concession from European nations who agreed to the immediate halt of fishing for Northern Cod off the Grand Banks. Subsequently, other distant fishing nations also agreed to a fishing moratorium.

2. Statement of Forest Principles

This document is a non-binding statement of principles to be used as a global guide for the management, conservation and sustainable development of all types of forests. The immediate goal of the document is to encourage individual nations to take action to preserve their forest resources. The fact that the work of the Canadian delegation at UNCED did not result in a legally binding forestry convention was a disappointment for Canada. The forestry negotiations represented one of the biggest North-South struggles of UNCED: to northern industrial countries, tropical forests are seen as greenhouse gas "sinks" that absorb CO₂, helping slow climate change; while to developing countries of the South the forest is one of the few important resources they can exploit, as potential farmland, a source of fuel, and as a product they can trade internationally. Having worked hard for a binding international convention, the ineffective statement of principles which was signed is disappointing. Canada agreed to it on the unspoken understanding that international negotiations toward a Forest Convention would follow Rio.

3. The Commission on Sustainable Development (CSD)

It was agreed at the conference that a Sustainable Development Commission be established to coordinate and follow-up international action toward the achievement of sustainable development goals. The Commission is to be part of the United Nations and is to report to the General Assembly through the United Nations Economic and Social Council (ECOSOC). The Commission is expected to receive *National Reports*, compile information provided by national governments on their implementation of Agenda 21, and consider the problems faced by individual nations in their efforts to implement and achieve sustainable development.

UN General Assembly Resolutions setting up the CSD were endorsed in December 1992. The Commission's Secretariat is to be located in New York in the new Department of Policy Coordination and Sustainable Development. The Department will be headed by Nitin Desai (India), who served as Deputy to Maurice Strong when he was the Secretary-General of UNCED. The Commission will be made up of high-level representatives of 53 UN Member States. The issue of NGO involvement in the CSD, which is of concern to the members of this Committee, has not yet been resolved. The UN Secretary-General will submit guidelines in 1993, but indications are, and it is the hope of this Committee, that NGOs and other interested parties will continue the active role they had in UNCED. The Commission's first substantive session is expected to occur in May or June 1993.

4. The Rio Declaration

The Rio Declaration was the outcome of the negotiations for what had been envisioned by the Brundtland Commission as a global charter by which the countries of the world would commit themselves to sustainable development. Agreements reached in UN fora demand consensus, which can have the unfortunate result that the lowest common denominator prevails, as was the case with the Rio Declaration. The Rio Declaration on environment and development lists 27 major principles with the purpose of establishing "a new and equitable global partnership" to manage the resources of the earth in a sustainable fashion. This declaration enshrines the rights of individual nations to exploit their own resources pursuant to their own environmental and development policies. However, nations have the responsibility to ensure that their activities do not cause damage beyond their national jurisdictions. Further, the declaration states that development must proceed so as to meet the needs of today without compromising future generations, and states that development should never proceed without consideration for environmental protection.

Canada settled for The Rio Declaration but had negotiated for an "Earth Charter", a succinct global doctrine that enshrined the concept of sustainable development, and of environmental rights and responsibilities. At the Earth Summit, Prime Minister Brian Mulroney said "the idea of an Earth Charter which slipped beyond our grasp at Rio should be revived". As a target date for concluding the negotiation of an Earth Charter, the Prime Minister proposed 1995, the 50th anniversary of the founding of the United Nations. This suggestion met with widespread support at Rio. The creation of a negotiated Earth Charter should continue to receive Canadian support and be recognized as a priority item on Canada's post-Rio agenda.

Recommendation No. 1

The Committee recommends that the Government of Canada maintain its objective of establishing an Earth Charter by 1995, and work toward this goal by pressing the newly-formed United Nations Commission on Sustainable Development to initiate and direct new international negotiations for the development of a visionary Earth Charter.

5. Convention on Biodiversity

The convention contains provisions that are intended to ensure effective national action to curb the destruction of biological species, habitats and ecosystems. Significant provisions include:

- the requirement that countries adopt regulations to conserve their biological resources;

- the legal responsibility of nations for the environmental impact that their private companies might have in other countries;
- the promotion of technology transfer where such transfer does not infringe upon intellectual property rights or patents;
- regulation of biotechnology firms;
- access and ownership of genetic material;
- compensation to developing countries for extraction of their genetic material;
- and, an obligation on developed countries to assist developing countries both financially and with know-how, where this support is in addition to current assistance. Further, the convention urges each nation to set up a network of protected areas where the first beneficiaries of conservation and sustainable-use are indigenous peoples and rural communities.

6. Framework Convention on Climate Change

The aim of the convention is to stabilize the concentration of greenhouse gases in the atmosphere at a level that would prevent dangerous interference with the climate system. It is hoped that this level can be reached within a time frame that will allow world ecosystems to adapt naturally to climate change. The final document did not provide specific timetables or targets for limiting the emission of these gases by industrialized countries.

IMPLEMENTING SUSTAINABLE DEVELOPMENT

The Prime Minister, in his address to the Earth Summit, proposed a number of steps to quick-start the implementation of sustainable development:

- Canada committed \$2 million to "Capacity 21", a new program to assist countries in the creation of national plans for sustainable development. Canada had argued that formulation of a "green plan" was the first national step toward sustainable development. Canada agreed to share with other countries its green plan experiences.
- Canada pledged to ratify¹⁵ both the Biodiversity and Climate Change Conventions before the end of 1992. On 4 December 1992, Prime Minister Brian Mulroney signed in Delta, British Columbia, the ratification documents for these international conventions.
- Canada suggested a package of measures to assist developing countries make the transition to sustainable development. These included liberalized North-South trade, environmental emphasis at the next round of GATT negotiations, conversion of \$145 million in Latin American debt to sustainable development projects, and the negotiation of new agreements with the Global Environment Facility (GEF) and the International Development Association (IDA).
- Canada supported the prompt creation of the Commission on Sustainable Development, within the United Nations infrastructure, as a means of holding all countries, sectors and people accountable for progress on the Rio Agenda, and in particular, on Agenda 21.
- The mandate of Canada's International Development Research Centre (IDRC) was broadened to assist in the infusion of sustainable development research and technological capacity into developing countries.
- Canada called for a renewed international effort to agree on an Earth Charter by 1995.

The UNCED process was the genesis of a new way of doing things. This new direction in achieving consensus and commitment has been called "The Rio Way". It is characterized by transparency, inclusiveness and accountability. The process must be transparent and accessible to all people who may be affected by the decisions. The second key to ensuring progress is the inclusion of all sectors of society in a decision-making partnership. From open negotiation and inclusive consensus flows all-sector accountability.

¹⁵ Ratification involves the formal indication of a state's consent to be bound by an international convention.

Witnesses before the Committee were consistent in their praise of the manner in which consensus and the Canadian agenda were achieved. As Tim Draimin told the Committee:

Canada provided important leadership in the UNCED process leading up to Rio. . . . Canada set an example by encouraging NGO access to the process, sharing information, and allowing for important participation in policy development.¹⁶

This praise was echoed by Janine Ferretti:

The involvement of NGOs in the UNCED process at the national level by the Canadian government and at the international level by the UN system has set new standards for more open policy-making. We can't go back; we can only go forward.¹⁷

Nicole Senécal, Vice-President, Policy Branch, Canadian International Development Agency, said of the Canadian delegation to Rio:

. . . we led the way by including individuals from NGOs, the business community, and other major groups, including women and indigenous people, in our delegation.¹⁸

The Committee is in agreement that the participation of all sectors of Canadian society not only strengthens the decision-making process but through increased accountability also ensures a higher level of ultimate success.

Recommendation No. 2

The Committee recommends, as Canada embarks upon the transition to sustainable development, that the Rio Way (transparency, inclusiveness and accountability) become established as the fundamental basis for decision-making and policy development.

During the introductory portion of the Committee's hearings a number of individuals, both witnesses and a Committee member, expressed concern that a national body no longer exists to coordinate the follow-up to Rio. In preparation for UNCED, the National Secretariat coordinated the activities of CIDA, External Affairs International Trade and Commerce, and Environment Canada, and facilitated NGO input through the Canadian Participatory Committee. The National Secretariat was officially disbanded 20 November 1992. As Tim Draimin reported to the Committee:

Important institutional changes and reform need to come about if existing institutions are to promote sustainability effectively. At the national level, the federal government must be able to guarantee ongoing inter-ministerial policy coordination. It is distressing to watch both the dissolution of key structures, such as the UNCED interdepartmental working groups, and the departure of key personnel, without the emergence of any meaningful replacement coordinating structures. The coordination vacuum, if allowed to remain, will undermine the sustainability agenda.¹⁹

¹⁶ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 46, 17 November 1992, p. 10.

¹⁷ *Ibid.*, p. 16.

¹⁸ *Ibid.*, p. 5.

¹⁹ *Ibid.*, p. 11-12.

According to Minister Jean Charest, the focal point for coordination of UNCED follow-up at the federal level continues to be the cabinet committee on the environment, in cooperation with the cabinet committee on foreign policy and defence and also the cabinet committee on economic and trade policy.²⁰ Cabinet coordination, however, does not integrate provincial and NGO activities.

A multi-stakeholder "Post-Rio Follow-Up" meeting was held in Ottawa, 5-6 November 1992. This meeting, chaired by George Connell, chairperson of the National Round Table on the Environment and the Economy (NRTEE), was convened to consider how Canada could sustain the momentum UNCED had created, and to make recommendations on Canada's Post-Rio priorities. The need for a national organization to coordinate Canada's Post-Rio activities was recognized as a national priority. Toward this end, the federal government, the Canadian Council of Ministers of the Environment (CCME), the NRTEE, IDRC and IISD agreed to financially support a working group called *Projet de Société : Planning for a Sustainable Future*. Project goals include an analysis of Agenda 21 and preparation of a report to the stakeholders on the progress of Canadians in meeting the commitments made at UNCED. The project participants are working toward defining a process that will carry on from UNCED to establish an inclusive and effective approach to sustainable development. The Committee recognizes the need for such an organization and commends the efforts of all involved in this worthy task.

One of the underlying themes of *Canada's Green Plan* is the need for all Canadians to be environmentally responsible in their decision-making. "We face problems today because our past decisions did not adequately reflect environmental considerations."²¹ Janine Ferretti stated that the federal government is still making financial decisions without consideration of the environmental impact, and described the government's recently announced program to upgrade and expand Canadian highways and airports as such a decision. Janine Ferretti suggested this funding could have been allocated, with the same potential for job creation, to the expansion and improvement of energy-efficient transit systems. It is obvious if Canada is to truly embark upon a course leading to sustainable development, then more than lip service must be paid to environmental decision-making.

The problem of integrating environmental considerations into economic decision-making was also addressed at the multi-stakeholder "Post-Rio Follow-Up" meeting. The development of a National Sustainability Plan was identified as a major priority. The *Projet de Société: Planning for a Sustainable Future* has accepted the task of developing and drafting a sustainability plan for Canada. As outlined by Janine Ferretti, this plan:

... should have as its focus the economic and the ecological renewal of Canada through sustainable development. It should be a framework for concrete action, and it should help guide and direct the activities and actions of every sector of Canadian society, ... and it should also articulate priority areas for action. . . The plan should be a primary instrument for guiding and directing domestic and foreign policies, and should apply the primacy of sustainability to national economic and social programs.²²

The Committee would like to broaden this vision of a National Sustainability Plan to embody a set of sustainable development standards against which all decision-making and actions, present and past, can be judged. The Committee appreciates that this will be a formidable and long-term

²⁰ Ibid., Issue No. 45, 16 November 1992, p. 10.

²¹ Environment Canada, *Canada's Green Plan*, 1990, p. 11.

²² *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 46, 17 November 1992, p. 16-17.

task, for an effective set of standards will require the development of sustainable development criteria, methodologies, economic instruments, indicators, and the perfecting of environmental audits and full-cost accounting. When this plan comes to fruition it will not only serve as a practical guide to sustainable development in all aspects of Canadian life, but it will also symbolize to other nations Canada's commitment to sustainable development. The Committee recognizes the immense nature of this task and strongly commends those who would undertake this initiative.

There have been previous UN conferences on renewable energy, the human environment, and desertification. These conferences resulted in reports and recommendations; however, there was little follow-up and even less in the way of tangible results. This situation should change with the establishment on 9 December 1992 of the UN-affiliated Commission on Sustainable Development (CSD). Canada supported the proposal that the commission meet at a high level, preferably at the ministerial level, to ensure that the commission has political influence. The General Assembly established that the commission will be made up of high-level representatives. The mandate of the CSD was determined at the General Assembly on 5-25 November 1992. It will:

- monitor implementation of Agenda 21—recognizing that it is a dynamic document which could evolve over time—and sustainable development activities in the UN system;
- consider implementation of Agenda 21 by Governments, on the basis of information provided by them, including problems relating to financial resources and the transfer of environmentally-sound technology;
- review commitments made by donor countries in Agenda 21, including the provision of new and additional financial resources and the transfer of technology on favourable terms; and monitor progress made by States in reaching the target of giving 0.7% of GNP in Official Development Assistance to developing countries;
- review and analyze relevant input from competent non-governmental organizations, and enhance the dialogue with non-governmental and independent sector groups.²³

The Committee heard that, while regionalized sustainable development is possible in developed nations, the achievement of sustainable development at the global level is precluded until the crippling poverty of the Third World is alleviated. As Tim Draimin said:

Sustainability requires our building partnerships with the world's poor. For them, in the short term the economic realities are paramount. An approach is needed that combines environmental protection with sustainable economic models capable of providing basic well-being for the economically disenfranchised. We ignore the marginalized at our collective peril.²⁴

²³ United Nations Conference on Environment and Development, *Press Release*, "Assembly Establishes Commission on Sustainable Development, Takes Action to Ensure Effective Follow-Up to Rio," New York, 16 December 1992.

²⁴ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 46, 17 November 1992, p. 13.

The enormous needs of the South are undisputed, yet the Committee was informed that in the last eight years Canada has made cuts to its actual and projected ODA in the amount of \$3.7 billion. Prior to the government's "minibudget" Canada's ODA was 0.45% of GNP. The 2 December 1992 budget reduced Canadian foreign aid by 10%. This is well below the target of 0.7% GNP agreed to in Agenda 21.²⁵

The end of the Cold War has been recognized by many as an opportunity for countries to redirect military spending to projects of benefit to humanity. Many of the witnesses appearing before the Committee expressed the hope that the Canadian government would identify a "peace dividend" and reallocate a portion of defence funding to ODA. This is indeed a worthy consideration; however, it must be recognized that Canada is already an international leader in the provision of humanitarian aid through the large involvement of the Canadian military in the peacekeeping activities of the UN. To our credit Canada is the only country that has participated in all of the UN peacekeeping operations since 1947. Large numbers of Canadian troops are presently involved in the distribution of humanitarian aid. In Bosnia-Herzegovina, Canada provides armed escorts to protect food and medical relief convoys; while in Somalia, Canadians are assisting in the prevention of mass starvation.

Mahbub ul Haq, Special Adviser to the Administrator, United Nations Development Program (UNDP), told the Committee that tremendous "peace dividends" are potentially available in even the desperately poor countries of the developing world. An UNDP study estimated that a freeze in military spending in developing countries could potentially release \$50 billion over the next decade. The liberation of such an enormous sum would greatly enable poor nations to finance their own development agendas.

It has been suggested that developed nations are partially responsible for the large military expenditures made by many poor nations. Mahbub ul Haq stated that the present allocation of ODA reflects an old pattern of military alliances, when developed nations fought the Cold War by proxy. The UNDP study showed that today in developing countries twice as much aid per capita goes to the highest military spenders as compared to low military spenders.

Mahbub ul Haq stated that tremendous benefits could be realized in developing countries if aid was linked to real objectives:

...the objective of reducing poverty, the objective of increasing human development, the objective of discouraging military spending, the objective of encouraging human rights.²⁶

The restructuring of ODA is, perhaps, as important as the level of aid going to developing countries. Mahbub ul Haq asserted that aid must be directed to where it will do the most good, to human development, to health care, education and population control.

... we can have population control, but human development itself is the strongest contraceptive, particularly female literacy.²⁷

The issues of poverty, population control, health and education, are often overlooked as genuine environmental concerns. However, as serious as pollution, climate change, and biodiversity loss are, they are in reality only the symptoms of a greater environmental malaise, overconsumption, desperate poverty and overpopulation. The impoverished peasant, whose immediate problem is family sustenance, has little time or interest for the concept of sustainable development.

²⁵ "Rio Earth Summit: Meeting ends with hope, disappointment", *Chemical and Engineering News*, Vol. 70 (25), 1992, p. 4.

²⁶ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 51, 2 February 1993, p. 14.

²⁷ *Ibid.*, p. 15.

Recommendation No. 3

The Committee recommends that the Government of Canada meet the Agenda 21 target of 0.7% of GNP for Official Development Assistance (ODA) by the year 2000, or sooner if possible. In addition, the Committee recommends that the Government of Canada consider the advisability of (i) using ODA as an inducement to discourage military spending, and (ii) linking ODA to programs in developing countries that support environmental protection, sustainable development, and human development (health care, education, population control, and in particular the empowerment of women through literacy).

It is to be noted that this recommendation did not receive unanimous Committee approval. One Committee member chose not to support the recommendation because it was felt that (i) the recommendation supported population control, and (ii) the use of ODA as an inducement to discourage military spending might affect the domestic and national security of a sovereign state.

Direct financial aid is but one of the mechanisms needed to assist developing countries. Witnesses before this Committee urged Canada to use its influence in the international arena to effect change. Tim Draimin pointed out the need for OECD countries to liberalize trade with the South, and to take action to alleviate Third World debt. This sentiment was reflected by Mahbub ul Haq:

I think it is true that what the poor ultimately need is not charity, except as a temporary measure, but access to markets, whether domestically or internationally.²⁸

Art Hanson highlighted the need for technology transfer:

The science and technology of sustainable development is still at quite an early stage, and without a doubt the needed technology sharing will require an immense additional political effort. The important findings emerging from organizations such as the Business Council for Sustainable Development, the International Union for Conservation of Nature, and the various world scientific bodies that engaged in UNCED preparations suggest the need for an expanded global effort, including much better information sharing and technology transfer.²⁹

Chapter 2 of Agenda 21 elaborates the decision by all States to establish a new global partnership in which they are committed to working toward a more efficient and equitable world economy, with sustainable development as a priority item on the international community's agenda. The Chapter recognizes the relevance of domestic and international economic policies for sustainable development, and the need to relate the elements of the international economic system with the human need for a safe and stable natural environment. Development in the countries of the South requires a supportive international economic environment, and will not progress if developing countries are hampered by external indebtedness, if there is inadequate financing, if there is restricted access to markets, or if commodity prices and the terms of trade for developing countries remain depressed.

The international community agreed in paragraph 2.3 of Agenda 21 that

[t]he international economy should provide a supportive international climate for achieving environment and development goals by:

²⁸ Ibid., p. 15.

²⁹ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 46, 17 November 1992, p. 21.

- CHAPTER 3
- (a) Promoting sustainable development through trade liberalization;
 - (b) Making trade and environment mutually supportive;
 - (c) Providing adequate financial resources to developing countries and dealing with international debt;
 - (d) Encouraging macroeconomic policies conducive to environment and development.³⁰

Witnesses before the Committee called for a renewal of the institutions of the United Nations, and of international funding agencies, such as the International Monetary Fund (IMF) and the World Bank. Of prime importance, the traditional approaches and ways of thinking and doing things must be adjusted. Decision-making at all levels must now be assessed against the international goals of sustainable development. It was pointed out that the IMF and the World Bank are institutions of the North. They do not necessarily reflect the needs or goals of the South. This statement was reinforced by Mahbub ul Haq, who informed the Committee that in 1992 the World Bank transferred \$22 billion to the Third World, but in turn collected debts of \$23.7 billion. Tim Drayman called for democratization and reform of the IMF, the World Bank, and the General Agreement on Tariffs and Trade:

These supranational institutions must have accountability to southern as well as northern populations.³¹

Recommendation No. 4

The Committee recommends that the Government of Canada assist in addressing the problems of developing nations (external indebtedness, restricted access to markets, depressed commodity prices and inequitable terms of trade) by pressing in the international arena for reforms in the United Nations and international financial institutions which would fulfil the Agenda 21 goal of promoting sustainable development through trade, foreign aid, and other economic policies.

³⁰ Agenda 21, Chapter 2. Final advanced version of the chapter, as adopted by the Plenary in Rio de Janeiro, on 14 June 1992.

³¹ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 46, 17 November 1992, p. 12.

(a) Promoting sustainable development through the promotion of...

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Recommendation No. 4

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THE CONVENTION ON BIOLOGICAL DIVERSITY

BIODIVERSITY

Biological diversity refers to the variety among living organisms and the ecological communities which they inhabit. Biodiversity encompasses three different concepts: ecosystem diversity (the range of different interacting systems present in a region, nation or the world); species diversity (the range of species in a given area); and genetic diversity (the range of possible heritable characteristics, genes, found in a population or species).³²

The Chair of this Committee, David MacDonald, opened the hearings on the Biodiversity Convention by saying:

The biodiversity convention, which was signed in June at the Earth Summit by, I believe, more than 150 countries, represents a major advance in international agreement with respect to an issue of growing concern. It is estimated that 15% of the earth's species could be lost over the next quarter century. In fact, it is thought that something like 100,000 species each year are now being lost.

The causes of this rapid rate of extinction are in part because of tropical rain forest destruction, destruction of wetlands, coral reefs, and the loss of temperate forest habitats. Of course, some of the more specific causes are habitat alteration or destruction, over-harvesting, improper use of agricultural chemicals, poverty, population growth, inequitable land distribution, excessive resource consumption, and on and on and on.³³

THE UNITED NATIONS CONVENTION ON BIOLOGICAL DIVERSITY

A. Review of the Convention

The need to conserve biological diversity has become urgent. It has gone beyond the laboratory, and as UNCED demonstrated, it has become an issue debated in political arenas.

The objectives of this Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by the appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.³⁴

³² Environment Canada, *Backgrounder, Proposed Global Convention on Biological Diversity*, 19 May 1992, p. 1.

³³ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 47, 23 November 1992, p. 6.

³⁴ Convention on Biological Diversity, United Nations Environment Programme, Na.92-7807, 5 June 1992.

For further detail on the Convention the reader is referred to Appendix A, where the *Convention on Biological Diversity* appears in its entirety.

Discussions for a convention on biological diversity were initiated in 1988 by the United Nations Environment Programme's Governing Council and concluded on 22 May 1992 in Nairobi. Negotiating teams from 100 countries were involved in formulating the international accord on biodiversity that was further debated and finally signed in Rio on 11 June 1992. Canada was the first country to express its intention to sign the Convention, which ultimately ensured the decision of a further 162 countries to sign by the end of the day on 14 June 1992. As of 5 April 1993, 167 countries had signed the Convention and 12 countries had ratified it (Mauritius, Seychelles, Marshall Islands, Maldives, Canada, Saint Kitts and Nevis, Ecuador, Fiji, Antigua and Barbuda, Mexico, Papua New Guinea and Vanuatu).

Conservation of biodiversity is more than an aesthetic or moral issue; it is integral to our health and economy. Species loss threatens the natural resources upon which sustainable development depends. Genetic material from plant and animal species (many still undiscovered) is the foundation for the agricultural, pharmaceutical and other biotechnology-based industries. It is estimated that one-quarter of all the pharmacological products used in North America contain ingredients derived from wild plants. Biodiversity is integral to the maintenance of the environment and supports water purification, soil production, carbon cycling and oxygen production.

The UNCED *Convention on Biological Diversity* represents a global attempt to address what should be done and at whose expense. Participants developed a global strategy with guidelines for action by international, national and local governments and institutions to save, understand, and use biodiversity sustainably and equitably.

Under the Convention, countries make a commitment to protect endangered species and their habitats. Measures include the compilation of inventories of vulnerable and threatened species at two levels, global and national. The Convention sets rules for technology transfer to the South and for granting access to tropical plants and animals, many of which are essential to the genetic tailoring of ingredients for new drugs, pest-resistant crops, fast-growing trees and other products. The convention also calls for tropical countries to receive a share of profits from the development of such products and for financial assistance in meeting their obligations under the Convention.

B. The Convention and Canada

Several witnesses before this Committee emphasized the important role Canada had played in the negotiation of the Convention, and urged the Committee to reiterate the importance of a continuation of Canada's leadership role in the conservation of biodiversity. As Don McAllister, Senior Biodiversity Advisor, Canadian Museum of Nature, told the Committee:

Canada can contribute to saving life on earth. We can launch a new era. It's in the Canadian character to care for nature. It will help nature, the planet and ourselves to survive. If we ratify soon and take early significant actions, Canada will continue to lead.³⁵

The Committee was encouraged by the ratification of the Convention on 4 December 1992 and hopes that the Canadian government will continue to work toward the goals of the Convention at home and abroad. As Walter Reid of the World Resources Institute in Washington, D.C. told the Committee: "The convention is an important first step toward coordinated international action, but it falls short of what is possible and what is needed."³⁶

TOWARD A NATIONAL BIODIVERSITY STRATEGY

A. Information Resources

The protection of ecosystems, and the species which inhabit them, is a prerequisite for sustainable development. The need for the industrial countries to deal with their own environmental crises is evident. There is also a need for unprecedented international cooperation as most of the world's biological wealth, and those that depend on it, reside in the developing tropical nations. Witnesses before this Committee suggested a number of ways in which Canada could assist in this cooperation.

Don McAllister gave testimony to support the establishment of a Canadian Biodiversity Centre. In his testimony to the Committee, he stated that Canada's federal capabilities in biodiversity research, rather than remaining scattered in several different departments, should be strategically and cost-effectively re-grouped. A central department or institution could act as a centre which would serve the needs of government and industry in conservation, resource management and biotechnology. It would focus on research, biological inventory, and the communication of knowledge on biosystematics and biodiversity both within and outside Canada. The Committee recognizes the complex nature of biological diversity. This necessitates the need for communication and networking between all levels of government, institutions and interested parties.

Recommendation No. 5

This Committee recognizes the importance of organizing Canada's scientific resources and expertise in order to optimize our capacity and effectiveness in meeting our international obligations under the Biodiversity Convention. The Committee recommends that the Government of Canada examine the feasibility of re-grouping agencies and professionals working in the area of biodiversity in various federal departments to ensure effective communication and networking.

Our witnesses agreed that a problem in measuring impacts on biodiversity is that there are few baselines: no one knows how many species exist in Canada or elsewhere. There is no country that has anything approaching a national inventory of biodiversity. Witnesses suggested that the acquisition of knowledge about species worldwide, as well as the communication of this knowledge internationally, would both assist in the preservation of biodiversity and in developing bio-industries.

³⁵ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 47, 23 November 1992, p. 12.

³⁶ *Ibid.*, p. 60.

Recommendation No. 6

The Committee considers that one of the fundamental building blocks of an effective National Biodiversity Strategy will be a National Inventory of Canada's Biological Diversity, and we recommend that the development of such an inventory be facilitated by the Government of Canada. The Committee further recommends that the Government of Canada support the creation of an international data bank of the world's species.

The importance of developing an inventory of species, in Canada as well as internationally, was the subject of agreement among witnesses, who also cautioned the Committee that attempts to develop inventories should not impede steps that should be taken in the meantime to preserve biodiversity. The Committee was reminded by John Herity of Environment Canada that: "We should bear in mind that there are actions that can be taken without complete knowledge of our inventory."³⁷ Nevertheless, the Committee is of the view that the development of an inventory of Canadian species is a worthwhile and important initiative.

In Canada alone, 230 animal and plant species, as well as valuable natural spaces, including old growth forests and wetlands, are known to be at risk. The most comprehensive census of living organisms to date in Canada can be found in the *Canada Country Study on Biodiversity*. The taxonomic census undertaken during the preparation of the study documented that a total of just over 70,000 species of microorganisms (not including viruses), plants and animals have been described or reported to occur in Canada (out to the 200-mile offshore limit, within Canada's Arctic sector and down to the sea floor). It is estimated that an equal number of species in Canada remain undescribed. The expertise needed to identify, interpret and assess Canadian biodiversity is at risk of being lost. The basic sciences of identification and taxonomy are the very foundations upon which our knowledge of biodiversity and its economic and social implications are built. Basic natural science courses and research groups are not being re-staffed after retirements at universities and institutions. Without training in the form of courses and programs there will not be specialists to carry on this work.

Recommendation No. 7

The Committee recommends that the Government of Canada ensure sufficient support of institutional research into the classification and study of the species of flora and fauna that make up the diversity of life.

B. The Economic Value of Biodiversity

1. Economic Instruments

Biodiversity is ultimately lost or conserved at the local level. Government policies, however, create incentives that facilitate or constrain local action. Governments regularly intervene in markets to increase agricultural production, spur industrial growth, provide a safety net for the poor, protect the environment, and support other public goods that the market place allocates poorly. Unfortunately, many industrial, transportation, natural resource and urban development policies fail to value environmental resources correctly and may even hasten resource depletion and biodiversity loss.

³⁷ Ibid., p. 18.

Diane Griffin, who spoke to the Committee on behalf of the Rural Renewal Task Force of the National Round Table on the Environment and the Economy, told us about the importance of making environmental and economic considerations integral parts of decision-making. There is an opportunity to develop cost-effective, market-driven approaches to strengthening Canada's agricultural industry and rural communities while enhancing environmental quality and biodiversity conservation.

The potential elements of trade-driven adjustment to agricultural policies and programs that may contribute to sustainable agriculture, rural renewal, and biodiversity conservation are as follows. Number one is the market forces. As international agricultural production subsidies are reduced or reprofiled, it is anticipated that commodity prices will increase. This in turn should encourage land use decisions that are more responsive to the market forces and to the sustainable capability of the land base. The second one is non-distorting commercial income support. The third one is conservation incentives.³⁸

Members of this committee are sensitive to the issues which raise tensions between urban and rural communities in regard to the conservation of biodiversity. It is understood that it is the responsibility of all Canadians to contribute to the conservation of biodiversity. *The Convention on Biological Diversity* reflects the international recognition of the intrinsic knowledge base of indigenous peoples, farmers and other groups who live off the land.

The aim of environmental management policies should be the optimal and sustainable use of natural resources, the conservation of biodiversity and the maintenance of ecological services. Policies that provide incentives for the wasteful and unsustainable exploitation of such resources, and the unnecessary reduction of biodiversity should be primary candidates for overhaul. Some policies may even invite over-exploitation of species, conversion of valuable natural habitats, and over-simplification of ecosystems. Reforming such policies makes economic sense as well as ecological sense. Inappropriate subsidies for resource use drain the national economy and impede development.

Recommendation No. 8

The Committee recommends that the Government of Canada begin the design and implementation of economic instruments for the conservation of biological diversity, and re-evaluate government subsidies, policies and programs that contribute to environmental degradation.

Examples of the type of economic instrument which may be developed to conserve biological diversity can be extrapolated from other areas of Canadian law and policy. One such example is found in Canada's tax treatment of donations of cultural property. The *Cultural Property Export and Import Act*³⁹ is designed to restrict the export of art, antiques and other objects important to Canada's cultural heritage. The objectives of the Act are met through certain provisions of the *Income Tax Act*⁴⁰ that allow cultural property to be sold, donated or bequeathed in certain circumstances without attracting capital gains tax, and that also create an income tax deduction for the fair market value of cultural gifts.

³⁸ Ibid., p. 28.

³⁹ R.S.C. 1985, c. C-51.

⁴⁰ S.C. 1970, as amended: sections 110 and 118.1.

Recommendation No. 9

This Committee recommends that the Government of Canada consider extending to donations of natural heritage property the same tax treatment that applies to donations of cultural property.

2. *Internalizing the Value of Biodiversity*

The Committee heard from Don McAllister, as well as other witnesses, about the economic value of Canadian biodiversity. We learned that Canada realizes \$70 billion annually from its biological resources, including raw biological resources, wood fibre, farm crops and fishes. Economic benefits are also realized by the development through biotechnology of products from our raw genetic resources. Many of our agricultural species are the product of breeding new varieties and genetic engineering, by drawing on wild relatives of crops, which offer increased pest, frost, cold, drought and heat resistance. These hybrids and engineered products also offer to increase the productivity and economic benefits realized by the agricultural sector of the Canadian economy. Discoveries of new pharmaceuticals also have been demonstrated to be economically valuable.

Arthur Campeau, who was Prime Minister Mulroney's personal representative to UNCED, gave the Committee an example of the unforeseen economic value of part of Canada's biodiversity. He spoke of the Western Yew (*Taxus brevifolia*), from Canada's Pacific coast.

The Western Yew was traditionally an unwanted tree species in the forest industry, because it doesn't grow very tall and its trunk tends to twist. However, we now know that its bark has a compound, taxol, that appears to be an important anti-cancer agent. Suddenly this tree has gone from being considered virtually worthless to being an extremely valuable asset in standard economic terms in a matter of months.⁴¹

Guarding biodiversity preserves future options of developing similar products of value in medicine, industry, agriculture and biotechnology.

There were 22 ecological services or functions of biological diversity identified in Canada's *Country Study*, such as soil production and water filtration. These functions define what organisms do to maintain the diversity, productivity, balances and health of ecosystems and the larger ecosphere. These biological functions create value and contribute services to the Canadian standard of living and gross national product but they have not been measured by traditional methods of representing value. We are failing to take into account the costs to the environment of the activities which have been traditionally seen as contributing to wealth.

Recommendation No. 10

The Committee recommends that the Government of Canada begin the process of determining the value of biological diversity, so that its value can be internalized in the calculation of our national accounts.

C. *Protect Species and Spaces*

Environment Canada describes 177 different eco-regions within Canada. These represent Canada's ecosystem diversity. Approximately one third are not represented by protected areas. This means these unique areas and the species they contain could be under varying threats of loss.

⁴¹ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 47, 23 November 1992, p. 42.

Major conversion of natural ecosystems occurs due to human land use and activities. Agriculture (mono-culture and utilization of marginal lands), ranching (importation of exotic species), urbanization (wetland loss), transportation, mining (strip mining, tailing leachate), industry (air, land and water pollution), energy production, fishing (overfishing, bottom trawler damage) and forestry (clear-cutting) are all examples of this. While contributing to the prosperity of Canadians and the strength of our economy it also results in varying degrees of loss to biodiversity and reduces the security of sustainable development.

The Convention calls for the preservation of 12% of each country's land as protected spaces, and the *Green Plan* outlines this long-term goal for Canada as well. Today Canada has allocated 3-4% of its territory for *in situ* conservation of biodiversity, but as the Committee heard from our witnesses, the preservation of isolated pockets of land is not a solution to the loss of biodiversity. Although national parks and protected spaces are necessary and desirable, Canada must manage all its land sustainably. As Diane Griffin advised the Committee:

... and while the 12% solution that's proposed in the name of protected areas and ecological reserves and parks is laudable, the other 88% of the landscape is something we're very concerned about.⁴²

Les Cooke, Deputy Minister of Saskatchewan Environment and Public Safety, reiterated this sentiment by advising the Committee:

... the loss of species and ecosystems ... putting that in a positive light, to look forward to the day when we have sound land and resource management for all the lands and resources that all of us in the world need to provide stewardship for.⁴³

On 25 November 1992 a tri-council meeting was held in Aylmer, Quebec, the participants were: Canada's Parks, Wildlife and Environment Ministers. The outcome of the meeting was a formal commitment to complete Canada's network of protected national areas by the year 2000. A public statement of commitment was endorsed at this, the first joint meeting of the three councils. The five areas of action in the statement are:

- complete networks of protected areas representative of Canada's land-based natural regions by the year 2000 and accelerate the protection of areas representative of Canada's marine natural regions;
- accelerate the identification and protection of critical wildlife habitat;
- adopt frameworks, strategies and time frames for the completion of protected areas networks;
- continue to cooperate in the protection of ecosystems, landscapes, and wildlife habitat;
- ensure that protected areas are integral components of all sustainable development strategies.⁴⁴

These actions reinforced the necessity of a joint effort between all levels of government and jurisdictions and launched Canada's follow-up action plan for meeting the commitments of the *Convention on Biological Diversity*. The Committee applauds the cooperation and efforts of the

⁴² Ibid., p. 27.

⁴³ Ibid., p. 25.

⁴⁴ Environment Canada, Press Release, *Tri-Council Meeting*, Aylmer, Quebec, 25 November 1992.

participants involved in the tri-council meeting. The Committee believes these initiatives are an effective method to meet the goal of the designation of 12% of Canada's territory, ensuring that all of Canada's eco-regions are represented, and to meet the related obligations under the *Convention on Biological Diversity*.

Recommendation No. 11

The Committee recommends that the Government of Canada, in cooperation with all levels of government, support the implementation of the five initiatives identified for action at the tri-council meeting:

- 1. complete networks of protected areas representative of Canada's land-based natural regions by the year 2000 and accelerate the protection of areas representative of Canada's marine natural regions;**
- 2. accelerate the identification and protection of critical wildlife habitat;**
- 3. adopt frameworks, strategies and time frames for the completion of protected areas networks;**
- 4. continue to cooperate in the protection of ecosystems, landscapes, and wildlife habitat;**
- 5. ensure that protected areas are integral components of all sustainable development strategies.**

D. Legislative Initiatives

Witnesses before the Committee largely agreed that Canada was able, without passing new legislation, to ratify the *Convention on Biological Diversity*. However, it was also agreed that legislation may be desirable or even necessary in order for Canada to honour its obligations under the Convention in the future. Elizabeth May, of the Sierra Club of Canada, said that while Canada did not need legislation to be competent to ratify the Convention:

We would certainly be in violation of the Convention, I believe, if we did not move quickly to article 8(k), which is the commitment that we develop the necessary legislation for the protection of threatened species and populations. In other words, we are not required, in order to implement this convention, to have such legislation in place. We are committed to developing it, and that's why I think this committee should recommend, out of this series of hearings you're having, that we move quickly to develop endangered species legislation.⁴⁵

Article 8(k) of the Convention requires countries to develop or maintain the necessary legislation for the protection of threatened species or populations.

One of Canada's legislative gaps, as identified by witnesses before this Committee, is that of federal legislation to protect endangered species. The problem of conserving biological diversity is much broader, of course, than the protection of individual species, but the endangerment of species is a signal of a threat to biodiversity. As Stewart Elgie of the Sierra Legal Defence Fund

⁴⁵ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 47, 23 November 1992, p. 38.

indicated to the Committee, "Perhaps the best barometer of declining biodiversity is the extinction of species."⁴⁶ It is one of the only indicators available to us. Therefore legislation for the protection of individual species and their habitat is an important method of protecting biodiversity.

The United States has had legislation in place to protect endangered species and their habitats since 1973. The *Endangered Species Act* has been strengthened several times over the years, and although its critics have charged that the Act has been used unreasonably by environmentalists to stall or impede development, it is seen by others as an essential tool for the protection of species that may be the "canaries in the coal mines" of the natural environment. The Act has as its objective the conservation of the habitats upon which endangered species depend, and its protections are extended to all members of the plant and animal kingdom. Under the Act, endangered or threatened species and their "critical habitat" are identified, and penalties are imposed for the "taking" of listed species. Federal actions which would adversely modify critical habitat are prohibited under the Act.

Walter Reid, although he was of the opinion that the U.S. would not need legislation to enable it to sign and ratify the *Convention on Biological Diversity*, identified several gaps in the current American legislative framework. These were areas that he suggested might be considered by the American government as subjects of implementing legislation under the *Convention on Biological Diversity*, after any decision is made by the new administration to sign it. These gaps included legislation which would require that biodiversity be inventoried and monitored, legislation to sort out potential intellectual property conflicts which may develop as a result of the ratification of the Convention, legislation to remove subsidies which encourage the destruction of biodiversity, and legislation to prevent negative impacts on biodiversity.

The convention suggests that appropriate economic incentives should be adopted for biodiversity conservation. I'm sure that environmental groups in the United States may construe this to mean that some of the subsidies we have that currently promote the destruction of biodiversity possibly should be removed. There might be legislation in that area.⁴⁷

There is already a legislative initiative underway in the American legislature, the proposed biological diversity bill, which would fill some of these gaps.

This Committee is of the view that these areas might also be considered as possible subjects of legislative initiatives in Canada, as part of Canada's National Biodiversity Strategy. As this Committee stated in its March 1992 report called *Environment and the Constitution*, Canada's constitutional framework is such that the area of biodiversity conservation involves the overlapping jurisdictions of several levels of government.⁴⁸ Indeed, the threats to biodiversity, as well as to species and their habitats and ecosystems, are so complex and interrelated, that the members of the Committee are of the view that to be successful, any legislative initiative in this area must fully involve all levels of government. Therefore, the members wish to stress the importance of full consultation with other levels of government, as well as other interested parties, in the development of any such legislation. The Committee would suggest that the task of developing legislative strategies to protect biological diversity might be assigned to the Canadian Council of Ministers of the Environment, but only to the extent that all provinces and territories will be reached through this forum.

⁴⁶ Ibid., p. 29.

⁴⁷ Ibid., p. 64.

⁴⁸ Report of the Standing Committee on Environment, *Environment and the Constitution*, March 1992.

Recommendation No. 12

The Committee recommends that the Government of Canada, working with the provinces and territories, consider the necessity of legislation to conserve biological diversity within Canada, and take immediate steps to develop an integrated legislative approach to the protection of endangered species, habitat, ecosystems and biodiversity in Canada.

The Committee was told that the preservation of biodiversity and impacts upon endangered species have not been expressly included as factors to be considered in environmental assessments under the *Canadian Environmental Assessment Act*, which has been passed by Parliament but is not yet proclaimed. Stewart Elgie suggested to the Committee that all federal environmental assessments should consider the effects of projects on biodiversity in general, and endangered, threatened and vulnerable species in particular. The members of the Committee are concerned that Canada's commitments under the Biodiversity Convention may have implications for the *Canadian Environmental Assessment Act* and its application. Indeed, the Committee expects that Canada's new obligations are being considered in the context of environmental assessment decisions under the existing regime, the *Environmental Assessment Review Process (EARP) Guidelines Order*.

Recommendation No. 13

The Committee recommends that the Government of Canada take whatever steps are necessary to ensure that its environmental assessments take full account of Canada's obligations under the Biodiversity Convention.

The Committee heard about, and has discussed above, the importance of preserving biodiversity by setting aside 12% of the eco-regions of Canada. Biodiversity should become an important criterion in the selection and management of Canada's national parks, according to Stewart Elgie, to implement paragraphs (a) and (b) of Article 8 of the *Convention on Biological Diversity*, which deal with the concept of setting aside protected areas where special measures need to be taken to protect biological diversity. Some members of the Committee felt it important to cast this suggestion in the light of the Committee's continued commitment to all the purposes of Canada's national parks, such as their important role in the education, enjoyment and recreation of Canadians.

Recommendation No. 14

The Committee recommends that the policies of Parks Canada and the regulations promulgated under the *National Parks Act* fully reflect and fulfill Canada's obligations under the Biodiversity Convention.

UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

SCIENTIFIC UPDATE ON CLIMATE CHANGE

The mounting evidence that human activities were beginning to alter the basic equilibrium processes of the Earth compelled the House of Commons Standing Committee on Environment in 1989 to launch an exhaustive study of global climate change. This comprehensive investigation resulted in the release of two reports. An interim report, *No Time To Lose: The Challenge of Global Warming*, was tabled to Parliament in October 1990, to be followed by the Committee's detailed report, *Out of Balance—The Risks of Irreversible Climate Change*, in March 1991. Two years have passed since our study and new scientific knowledge has been gained. Elizabeth Dowdeswell, Assistant Deputy Minister, and head of the Atmospheric Environment Service, Environment Canada, told the Committee:

... changes in our knowledge . . . are largely matters of degree, rather than matters of change in direction.⁴⁹

Climate change predictions are now being fine-tuned as more accurate information on cloud formation, ocean effects, plant-growth stimulation, sulphate pollution, carbon dioxide cycle and ozone depletion are accumulated and applied to models. The Intergovernmental Panel on Climate Change (IPCC) has been quick to respond to the new scientific data and in February 1992 issued a supplementary report to the original IPCC document. According to this supplement the major IPCC conclusions are:

- emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases: carbon dioxide, methane, chlorofluorocarbons, and nitrous oxide;
- the evidence for the modelling studies, from observations and the sensitivity analyses, indicate that the sensitivity of global mean surface temperature to doubling CO₂ is unlikely to lie outside the range 1.5° to 4.5°C;
- there are many uncertainties in our predictions particularly with regard to the timing, magnitude and regional patterns of climate change due to our incomplete understanding;
- global mean surface air temperature has increased 0.3° to 0.6°C over the last 100 years;
- the size of this warming is broadly consistent with predictions of climate models, but it is also of the same magnitude as natural climate variability. Thus the observed increase could be largely due to this natural variability; alternatively this variability and other human factors could have offset a still larger human-induced greenhouse warming;

⁴⁹ *Minutes of Proceedings and Evidence of the Standing Committee on Environment.*, Issue No. 48, 30 November 1992, p. 6.

- the unequivocal detection of the enhanced greenhouse effect from observations is not likely for a decade or more.⁵⁰

Elizabeth Dowdeswell informed the Committee that there has been one major change in our knowledge since 1990:

... and is that chlorofluorocarbons are believed to be much less significant contributors to global warming than previously thought.

That is not of great significance to the climate change convention itself, because in fact when we were designing the Convention, we had referred the greenhouse gases except for those controlled by the Montreal Protocol, so we had taken that into account.⁵¹

Although this reevaluation of the contribution of CFCs to global warming may have little significance in the context of the *UN Framework Convention on Climate Change*, the *1992 IPCC Supplement* has, from a scientific point-of-view, described this information as a "significant new finding". According to the *1992 IPCC Supplement*:

Depletion of ozone in the lower stratosphere in the middle and high latitudes results in a decrease in radiative forcing which is believed to be comparable in magnitude to the radiative forcing contribution of chlorofluorocarbons (CFCs) (globally-averaged) over the last decade or so.⁵²

This information is also of considerable significance to the Environment Committee. This Committee has extensively studied the threat of stratospheric ozone depletion and has tabled two reports to Parliament on this problem, *Deadly Releases CFCs* (June 1990) and *Ozone Depletion: Acting Responsibly*, (June 1992). CFCs are known to have the highest global-warming potential of all the greenhouse gases. Yet CFCs are now thought to be so effective at destroying ozone as to neutralize their own global warming effect. This information reaffirms the Committee's concern regarding the serious nature of stratospheric ozone depletion.

As the potential risks of climate change become more apparent to nations worldwide the level of scientific inquiry increases. To combat climate change effectively it is essential that Canadian policy be continually updated as new knowledge arises. Elizabeth Dowdeswell told the Committee:

All policy making related to climate change must be based on a solid scientific foundation.⁵³

Minister Jean Charest also confirmed this prerequisite for policy development:

On the question of carbon dioxide, our policy is described as a policy of a first step. Canada's policy of stabilization at 1990 levels for the year 2000 is one that will be called upon to evolve depending on the evolution of the science.⁵⁴

CONVENTION NEGOTIATIONS

Canada played a lead role during the negotiations for a convention on climate change. Well in advance of the climate change negotiations, the serious nature of climate change was apparent not only to the Environment Committee and federal government departments, but also to

⁵⁰ Intergovernmental Panel on Climate Change, *1992 IPCC Supplement*, February 1992, p. 6.

⁵¹ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 48, 30 November 1992, p. 6.

⁵² Intergovernmental Panel on Climate Change, *1992 IPCC Supplement*, February 1992, p. 6.

⁵³ E. Dowdeswell, Brief presented to the House of Commons Standing Committee on Environment, Appended to the *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 48, 30 November 1992, Appendix Env-18, p. 1.

⁵⁴ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 45, 16 November 1992, p. 29.

environmentalists and policy makers at the provincial and municipal levels. As a result the Canadian delegation brought a high level of knowledge and scientific expertise to the negotiating sessions.

The Canadian delegation included federal and provincial parliamentarians, premiers and ministers from British Columbia, Manitoba, Newfoundland, Prince Edward Island, Quebec, and the Northwest Territories. Women, youth, indigenous people, business, labour, and development and environmental NGOs were also represented. The Canadian negotiating team included officials from Environment Canada, EAITC, Fisheries and Oceans, Forestry Canada, Finance and CIDA. The Honourable David MacDonald, Chairperson of the Environment Committee, brought the Committee's concerns to all of the negotiations in his capacity as Advisor to the Canadian Delegation. Sound knowledge of atmospheric science was provided by Elizabeth Dowdeswell, who was Canada's principal delegate to the IPCC; and by officials from the Atmospheric Environment Service.

Canada had a clearly-defined position that paralleled our *Green Plan* commitment of stabilizing greenhouse gas emissions at 1990 levels by the year 2000. At the negotiations Canada pressed for targets and schedules, and pursued two main objectives:

- to conclude a framework convention as an effective tool for concrete, cooperative international action, agreed to by the maximum number of countries, equitable to all parties, and achievable in a cost-effective manner;
- to launch follow-on implementing steps, which should begin as soon as possible.

In addition, Canada went to the negotiations with three aims: (i) to preserve Canada's competitiveness; (ii) to provide opportunities for Canadian business; and (iii) to involve as many countries as possible using a common approach that allows differentiated action among countries.

The climate change negotiations began in February 1991 and ended in May 1992 after five negotiating sessions. During the early negotiations a number of countries, in particular some European nations, favoured well-defined emission reduction targets and timetables. It should be noted that well prior to UNCED negotiations Germany, Denmark and New Zealand had all adopted voluntary carbon dioxide reduction targets that were more ambitious than those of Canada. Based on 1987 carbon dioxide levels, Germany had proposed a 25% reduction in emissions by 2005. Both Denmark and New Zealand had pledged to reduce 1990 carbon dioxide emission levels by 20% in 2000. A similar target was proposed in the Environment Committee's 1990 report *No Time To Lose: The Challenge of Global Warming*. Specifically, we recommended a 20% reduction in 1988 carbon dioxide emissions by 2005. However, the Government of Canada chose to adopt the less rigorous goal of stabilizing Canadian greenhouse gas emissions at 1990 levels by 2000.

Initial drafts of the Convention were opposed by the United States and a number of oil-producing countries. The United States felt that the countries supporting the timetables did not have credible plans for stabilizing emissions, while the United States had already committed itself to an action plan that by the year 2000 would reduce emissions by 7-10% of a business-as-usual scenario. They felt that in the absence of sound scientific evidence it would be unwise to support emission-reduction programs that might impinge upon the United States economy. After much negotiation and compromise a convention lacking in firm targets and timetables was drafted. At the Earth Summit the United States signed *The United Nations Framework Convention on Climate Change*, and on 15 October 1992 it became the fourth nation (the first industrial nation) to ratify the Convention.

It is expected that the new Clinton-Gore Administration will alter the direction of United States environmental policy. According to a recent report on United States public policy issues the new administration will work toward strengthening *The United Nations Framework Convention on Climate Change*, address global warming through energy efficiency and technology transfer initiatives, and attempt to stabilize carbon dioxide emissions by the year 2000.⁵⁵

SCOPE OF THE CONVENTION

The final Convention text represented a compromise.

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant position provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.⁵⁶

Developed countries agreed (i) to assist developing nations with the technology and resources they would need to meet their obligations under the treaty; (ii) to limit emissions of greenhouse gases; and (iii) to publicly report on their progress. One of the central principles of the Convention states "that any policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost." The Convention was signed by 154 nations, and will become legally binding when ratified by 50 countries. For further detail on the Convention the reader is referred to Appendix C, where *The United Nations Framework Convention on Climate Change* appears in its entirety.

Minister Jean Charest informed the Committee that an analysis of the Climate Change Convention had been conducted. This analysis indicated that Canada could ratify the Convention without the passage of new legislation. In fact, Canada's *Green Plan* commitment to stabilize the emission of greenhouse gases at 1990 levels by 2000 already parallels the basic requirements of the Convention. Jean Charest spoke very positively about this initiative and pointed out:

... that what we are proposing to Canadians is something that makes economic sense in itself. We don't expect any undue hardship to come from this policy, quite the contrary. Our commitments in the area of climate change are all going to make good economic sense in themselves.⁵⁷

112. Prime Minister Mulroney signed the Framework Convention on Climate Change in Rio de Janeiro on 12 June 1992, and pledged that Canada would ratify the Convention by the end of 1992. In September, The Council of Energy Ministers advocated prompt ratification, and additional support for early ratification came in November from the CCME. On 4 December 1992, in an historic ceremony in Delta, British Columbia, the Prime Minister signed the document ratifying the *UN Framework Convention on Climate Change*.

113. Probably no other document coming out of UNCED has been so soundly and loudly criticized as the *UN Framework Convention on Climate Change*. Opponents of the final document, particularly environmental groups, claim that the lack of targets and timetables render the

⁵⁵ N. Maloley, "Environmental Issues in a Clinton/Gore Administration," *Washington in Transition*, Buron-Marsteller, Washington, D.C., December 1992, p. 5.

⁵⁶ U.N. General Assembly, *United Nations Framework Convention on Climate Change*, U.N. document A/AC.237/18, 1992, p. 5.

⁵⁷ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 45, 16 November 1992, p. 29.

Convention ineffectual. In contrast, proponents claim that the lack of arbitrary targets and rigid timetables are the Convention's saving grace. Quite simply, a document not open to flexibility would not have been signed by a large number of nations. On this point Elizabeth Dowdeswell told the Committee:

It won't do Canada or any other country much good if the Convention ultimately is a convention of 8 or 10 parties. We want to find a mechanism that helps to bring people to the table, rather than threatens to send them away. That is the essence of the positive nature of the Convention.⁵⁸

In further praise of the document, Elizabeth Dowdeswell said:

... it remains a very flexible instrument, one that is going to allow us to respond as the science becomes stronger, becomes better defined, and as countries are prepared to take the appropriate actions.⁵⁹

114. The Committee was encouraged to hear that Canada has initiated a "quick start agenda" to maintain international momentum on the climate change issue. According to Elizabeth Dowdeswell, Canada has pledged to:

- ratify the Convention by the end of 1992 (ratified 4 December 1992);
- promote a work plan to meet the scientific needs of the Convention (work plan accepted in November 1992);
- sponsor a meeting of officials of the Global Environment Facility and Convention negotiators to discuss interim funding for country studies (the meeting took place in late October 1992);
- host an international meeting on the application of a comprehensive approach to limiting greenhouse gas emissions;
- through contributions to a World Meteorological Organization Trust Fund, enhance climate observing systems in developing countries and assist at least two developing countries to build their capacity to meet the reporting requirements of the Convention;
- press for continued negotiations to resolve outstanding issues in time for the first meeting of the parties to the Convention. The negotiations will resume in Geneva from 7-10 December and continue through 1993; and
- prepare a National Report on Canada's actions to meet its commitments under the Climate Change Convention by June 1993.⁶⁰

REALISTIC MITIGATION OPTIONS

A. Domestic Action

Canadian action to slow climate change precedes the *UN Framework Convention on Climate Change*. Environment Canada has nearly completed a greenhouse gas inventory. The best available data indicates that in 1990 Canada emitted 461 million tonnes of carbon dioxide, 3.7

⁵⁸ Ibid., Issue No. 48, 30 November 1992, p. 7.

⁵⁹ Ibid.

⁶⁰ E. Dowdeswell, Brief presented to the House of Commons Standing Committee on Environment, Appended to the *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 48A, 30 November 1992, Appendix Envo-18, p. 2-3.

million tonnes of methane, and approximately 92 thousand tonnes of nitrous oxide. In addition, under a business-as-usual scenario it is believed that by the year 2000 Canadian emissions of carbon dioxide would grow by between 11 and 13%.

Elizabeth Dowdeswell, in her written brief, outlined to the Committee the many initiatives that the federal government has undertaken to limit the release of greenhouse gases. These include:

- setting minimum energy efficiency standards and enhancing Energuide labelling of appliances and products through the Efficiency and Alternative Energy program;
- encouraging a more energy-efficient Canadian building industry through the Homes and Building initiatives;
- improving and expanding the performance, availability and use of alternative transportation fuels technologies through Alternative Energy initiatives;
- encouraging and fostering the planting of up to 325 million trees over the next six years;
- providing Canadians with a better understanding of the climate change issue through the Atmospheric Change Learning Campaign of the Environmental Citizenship Initiative; and
- the release of a discussion paper on the use of economic instruments.⁶¹

In addition to action at the federal level, the issue of climate change is being addressed at both the provincial and municipal levels. Metropolitan Toronto has joined an international effort called the *Urban Carbon Dioxide Reduction Project*, sponsored by the United States Environmental Protection Agency and the International Council for Local Environmental Initiatives. The participating cities met in Toronto in the summer of 1991, where they launched a two-year project to create a blueprint for action applicable for cities to reduce carbon dioxide emissions. Their goal is to reduce emissions by 20% by the year 2000. Although not members of the *Urban Carbon Dioxide Reduction Project*, the cities of Vancouver, Regina and Ottawa have announced similar carbon dioxide reduction goals. Vancouver and Regina intend to reduce carbon dioxide emissions by 20% of 1988 levels by 2005. Ottawa will also attempt a 20% reduction by 2005, with 1990 as the baseline year. In addition, the Ontario Ministry of Environment and Energy is sponsoring a 10-city project called the Ontario Municipal Energy Collaborative. The goals of the Collaborative are to study, devise and implement conservation and efficiency initiatives to save energy and reduce carbon dioxide emissions. To date nine cities, Ottawa, Sudbury, Toronto, North York, Scarborough, Kitchener, Peterborough, Burlington and Mississauga, have joined the Collaborative.

At the provincial level, the CCME, in November 1990, released the *National Action Strategy on Global Warming*. This document was prepared under the joint auspices of provincial environment and energy ministers, and proposes a strategic framework for actions to be undertaken jointly by governments and all other sectors of the economy. The Provincial-Territorial Advisory Committee (PTAC), composed of provincial and territorial environment and energy ministers, was established to give advice and counsel to the federal government, through the CCME, during Canadian negotiations on the *UN Framework Convention on Climate Change*. It is expected that PTAC will continue to play an important advisory role and assist in coordinating future federal and provincial action to combat climate change.

⁶¹ Ibid., p. 3-4.

B. Further Direction

As stated earlier, one of the central principles of the Convention is that any policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. When the Environment Committee previously addressed this concern, two to three years ago, there was much debate as to whether mitigative action might award net positive benefits in the form of energy savings or be so expensive as to cause harsh economic hardship. Evidence provided to the Committee in this study indicate that these points are no longer a matter of intense debate. Efforts directed toward the reduction of all greenhouse gases should yield substantial benefits in the areas of pollution abatement, energy conservation, efficiency, and increased competitiveness.

Today, the hundreds of different mitigation strategies available to reduce greenhouse gas emissions have been subjected to comprehensive analytical evaluation. These strategies can be roughly grouped into three categories: (i) no-cost strategies, where the long-term financial return more than compensates initial cost, (ii) low-cost strategies, that are either revenue neutral or where the pay-back fails to fully cover the initial cost of implementation, and (iii) high-cost strategies where emission abatement and environmental benefits are achieved at considerable expense.

Erik Haites, Principal, Barakat and Chamberlin, cautioned the Committee:

Some of those studies suggest that the appropriate amount of energy efficiency can be had with net savings. Others suggest some relatively small net cost. I think it's important to recognize that most of those studies overlook some costs—for example, the administrative costs of implementing those measures—and some losses in economic efficiency. . .

Therefore, my sense is that those analytical studies tend to be underestimates of the cost.⁶²

However, Erik Haites does believe that the *Green Plan* goal can be achieved by the year 2000 at reasonable cost.

The three key approaches available to us . . . are improved energy efficiency, fuel switching from more carbon-intensive fuels to less carbon-intensive fuels, and some sort of offsets such as reforestation to offset carbon dioxide emissions.⁶³

The United States government, during the previous Bush-Quayle Administration, argued that current scientific understanding of global climate change was too crude and uncertain to warrant greenhouse gas stabilization programs.^{64, 65} In spite of this stand, the United States recognized the economic benefits to be gained through efficiency programs and committed itself to an action plan that is expected by the year 2000 to reduce the emission of greenhouse gases by 7-10% of a business-as-usual scenario. In addition, the United States Congress in 1988 asked the National Academy of Sciences to conduct an extensive study of the policy implications of greenhouse warming. Deborah Stine, of the United States National Academy of Sciences, who at the time was the study director for the mitigation panel of the study, addressed the Committee and outlined what the U.S. considers the realistic mitigation options to combat potential climate change.

Energy efficiency improvements in the building, transportation and industrial sectors emerged as the most cost-effective measures for reducing greenhouse gas emissions. Deborah Stine told the Committee:

⁶² *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 48, 30 November 1992, p. 15.

⁶³ *Ibid.*, p. 14.

⁶⁴ *Policy Implications of Greenhouse Warming—Synthesis Panel*, National Academy Press, Washington, D.C., 1991, 127 p.

⁶⁵ G. Porter, *Global Environmental Politics*, Westview Press, Boulder, Colorado, 1991, 208 p.

Adopting reasonable energy efficiency measures throughout the economy could actually save the United States \$10 billion to \$100 billion a year in U.S. dollars and also reduce current U.S. greenhouse gas emission by 10% to 40%. This is big money and a significant cut in emissions, but it will take political leadership to bring about this reduction in emissions at a net savings.⁶⁶

In addition, the mitigation panel found that reformed reforestation policies could contribute a further 3% reduction to 1990 U.S. carbon dioxide emissions.

The study showed that the corporate average fuel economy (CAFE) of United States automobiles could be increased from 18.2 to 32.5 miles per gallon (12.9 to 7.2 litres per 100 km) at a net cost savings. There is vehement disagreement from the automobile industry which claims that study researchers did not factor auto safety, consumer comfort and market behaviour considerations into their environmental decision making.⁶⁷ However, it should be noted that claims of decreased automobile safety may be at odds with the fact that in the United States between 1975 and 1988 the average weight of a car dropped by 455 kg, fuel efficiency doubled and traffic fatalities dropped by 40%.⁶⁸

In 1982 Parliament passed a series of energy related Bills. Among these was Bill C-107, the *Motor Vehicle Fuel Consumption Standards Act*, which addressed the issue of fuel efficiency in passenger vehicles. The Bill sought to impose mandatory CAFE standards on fleets of vehicles offered for sale in the Canadian market. The Canadian automobile manufacturing lobby was against proclamation of the Bill. They proposed to bring their fleet-average fuel-efficiency level to or below that proposed by regulation on a voluntary basis. The fleet has always met or surpassed the standards set. According to officials at the Department of Energy, Mines and Resources the average fleet efficiency of all new cars sold in Canada has been below the level established by the Department for each year. In fact, the 1989 objective was 8.6 litres per 100 kilometres⁶⁹ and the actual fleet average was 8.2 litres per 100 km. Bill C-107 has of April 1993, not been proclaimed and therefore does not have the force of law. The government has set progressively lower fuel consumption standards and monitors fleet efficiency on an annual basis.

It is recognized that a CAFE goal of 7.2 litres per 100 km is achievable using existing technology. These energy efficiency gains could be obtained without altering the overall fleet mix through improvements in engine designs, drive trains, transmissions, and car aerodynamics.⁷⁰ One problem with achieving vehicle efficiency improvements is that it takes years for their full effect to be felt. In North America a new vehicle takes 4 to 5 years to go from prototype to product.⁷¹ In addition, passenger car turnover rates are slow, on the order of 7 to 8 years.⁷² Accordingly, to achieve a reduction in automobile carbon dioxide emissions by 2000, a new CAFE standard must be established with all due haste.

⁶⁶ *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 48, 30 November 1992, p. 20.

⁶⁷ E.S. Rubin, et al., "Realistic mitigation options for global warming," *Science*, Vol. 257, 10 July 1992, p. 148-149 & 261-266.

⁶⁸ Michael Shepard, "How to Improve Energy Efficiency," *Issues in Science and Technology*, Summer 1991, p. 87.

⁶⁹ Personal Communication, Anthony Taylor, Director, Transportation Energy, Efficiency and Alternative Energy Branch, Energy, Mines and Resources Canada, 5 January 1993.

⁷⁰ E.S. Rubin, et al. (1992).

⁷¹ A.M. Altshuler, et al., *The Future of the Automobile*, Cambridge, Massachusetts, MIT Press, 1984.

⁷² M.C. Holcomb, et al., *Transportation Energy Data Book: Edition 9*, Report ORNL-6325, Prepared for the United States Department of Energy, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 1987.

Recommendation No. 15

The Committee recommends that the Government of Canada move toward a corporate average fuel economy standard of 7.2 litres per 100 km for passenger cars, and continuously tighten this standard as new technologies evolve.

The Committee continues to press for a concerted effort by government and industry to support alternative energy sources, such as solar, wind and hydrogen, through research and development funding. Toward the goal of a CAFE standard of 7.2 litres per 100 km, the Committee reaffirms the recommendation contained in its report, *From Words to Action* (December 1992), regarding alternative fuel and transportation technologies (battery/fuel cell):

The adoption of the California standard for automobile emissions, by California itself and by a number of states in the northeastern U.S., creates a unique incentive for the development of clean transportation technologies. By 1999, 2% of the cars sold in California will have to be battery-powered. This figure rises to 5% in 2001 and 10% in 2003. Other measures will include alternative fuels, such as alcohol or natural gas. The window of opportunity will be brief and others will be quick and willing to exploit it; accordingly, the Sub-Committee recommends: That the federal government, regardless of the prevailing economic policies, increase support for research and development into clean transportation in the near term, particularly in the areas of alternative fuels and electric transportation.⁷³

Under the United States Federal Vehicle Fuel Efficiency Program, federal agencies on April 17, 1991 (as part of the Executive Order on Federal Energy Management, issued by then President George Bush) were directed to reduce gasoline and diesel consumption by at least 10% by 1995, compared with the 1991 level. Executive Order 12759 on the same day required that the federal government acquire alternative-fuel vehicles (AFVs) as rapidly as practicable. The U.S. government plans to be operating 50% of its federal fleet as AFVs by 1998.⁷⁴ As of January 31, 1992 approximately 8.2% of the U.S. federal government fleet was comprised by AFVs, with plans to increase this to 20.2% by 1993.⁷⁵ Canadian figures reveal that in 1990 3.1% of the federal government fleet, excluding the Department of National Defence and Transport Canada, were AFVs.⁷⁶

Recommendation No. 16

The Committee recommends that the Government of Canada support the shift to alternative fuels and transportation technologies by converting as many federal vehicles as possible to alternative fuels, and by annually increasing the percentage of alternative-fuel vehicles in the government fleet; such that, where practicable, alternative-fuel vehicles comprise as close as possible to 100% of new vehicle purchases by 1998.

Deborah Stine informed the Committee that net cost savings would also accrue from fundamental improvements in industrial process design, the development of cogeneration systems and energy recovery systems and the development of more efficient motors, electrical

⁷³ House of Commons Standing Committee on Environment, *From Words to Action*, December 1992, p. 27.

⁷⁴ Government of the United States, *National Energy Strategy, Powerful Ideas for America, One Year Later*, February 1992, p. 18-19.

⁷⁵ Ibid.

⁷⁶ Personal communication, Marie Schingh, Advisor Alternative Energy, Efficiency and Alternative Energy Branch, Energy, Mines and Resources Canada, 17 February 1993.

drive systems, and furnaces. Fuels (energy) switching from electricity to natural gas and fuel oil for building appliances and heating systems is estimated to reduce emissions by 890 million tons per year at a cost savings of \$62 (U.S.) per ton. However, fuel switching from coal to natural gas or oil for electricity generation is expected to have a net cost of \$30-70 (U.S.) per ton of carbon dioxide not emitted. The American study also showed that fuel switching from coal to other non-carbon dioxide emitting technologies, such as nuclear, solar or wind, for electricity generation would reduce emissions by up to 1 billion tons per year, but would have an additional annual cost of \$30 billion.⁷⁷ In Canada in 1991 the energy mix for electricity generation was nuclear 16%, fossil fuels 22% (coal 16.7%) and hydro-power 62%.⁷⁸

Similarly, it is expected that fuel switching at Canada's large thermal-electric plants would reduce the emission of greenhouse gases but at a net cost. However, the opportunity does exist in Canada to produce a larger proportion of our electricity by cleaner means at reduced cost. Unlike electric utilities in the United States, Canadian electric monopolies are not obligated by law to purchase electricity from non-utility generators. In her written presentation to the Committee, Louise Comeau, Climate Change Campaigner, Sierra Club, called for grid access for independent power producers.⁷⁹ The guarantee of grid access would give additional encouragement to municipalities and entrepreneurs to tap a number of energy sources for the generation of electricity; for example, natural gas from sewage-treatment plants and landfill sites, industrial waste process heat, and renewable sources such as biomass, wind and solar energy.

Recommendation No. 17

In recognition of the electrical grid system as an asset of national importance, and as a means to facilitate the reduction of Canadian greenhouse gas emissions, the Committee recommends that the Government of Canada work with the provincial and territorial governments to improve grid access and fair market value for all electricity generated by non-utility generators from reclaimed and renewable energy sources.

Many of the initiatives described by Deborah Stine to improve energy efficiency in the building, industrial and commercial sectors have already been initiated in Canada with a high degree of success. Canada has been, and continues to be, a world leader in energy efficiency building design and standards. Canadian R-2000 technical standards offer significant energy savings, with a relatively small consequential increase in building costs.^{80, 81}

⁷⁷ Panel on Policy Implications of Greenhouse Warming, *Policy Implications of Greenhouse Warming - Mitigation, Adaptation, and the Science Base*, National Academy Press, Washington, D.C., 1992, Chapter 6, p. 48-64.

⁷⁸ Energy, Mines and Resources Canada, *Electric Power in Canada 1991*, Ottawa, 1992, p. 38-45.

⁷⁹ Louise Comeau, *Mitigative Action: The Economic Considerations of Implementing the Climate Change Convention*, Brief presented to the House of Commons Standing Committee on Environment, appended to the *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 48A, 30 November 1992, p. 9.

⁸⁰ L.C. Myers, *Energy Efficiency: Future Improvement*, Background Paper 310E, Research Branch, Library of Parliament, Ottawa, September 1992.

⁸¹ Jack Cole, Manager of the R2000 New Home Program at Energy, Mines and Resources Canada, advises that in 1992 just over 1% of new single family, semi-detached and row house units in Canada were built to R2000 standards. The extra cost involved in meeting these standards is between two and five percent of the total construction cost.

Energy management is clearly showing itself to be well worth the investment for those charged with operating hospitals, hotels, convention centres, office complexes and schools.⁸² For example, the Frontenac Board of Education implemented a 4-year energy efficiency improvement program at its 50 area schools. The program cost an estimated \$1 million, but achieved energy savings of \$1.2 million over the same time period.⁸³ The University of Guelph received a \$200,000 Ontario Hydro capital expenditure rebate after it spent \$400,000 on a new variable speed pump for the central heating-cooling facility. The new pump varies the flow of water through the system to match the demand for air conditioning and heating, and in the process saves the university \$100,000 per year in electricity.

In both the domestic and commercial sectors energy savings can be realized through investment in efficient fluorescent lighting. Replacement of a 75 watt incandescent bulb with a 15 watt compact fluorescent bulb will provide the same amount of light for 13 times longer, and cut energy consumption by 80-90% over the lifetime of the bulb.⁸⁴

Given that there are many energy-efficiency investments that are not only beneficial to the environment but also yield relatively short-term financial benefits, it seems unusual that more consumers and more businesses are not taking advantage of these opportunities. One of the hurdles confronting greater market penetration by new energy-efficient technologies is a lack of precise and readily available information on the cost-benefits of these technologies. For example, an additional \$20 added to the weekly grocery bill for the purchase of a compact fluorescent bulb is difficult for the consumer to justify if accurate pay-back information is not readily available. This need for public education and information programs was expressed by Deborah Stine.⁸⁵ The Canadian government already assists the consumer in finding products that ease the burden on the environment. The Environmental Choice program subjects products to a set of environmental life-cycle criteria. Products that meet certification criteria are identified to the consumer by the EcoLogo, three intertwined doves in the form of a maple leaf. While the actions of this program are laudable, Environmental Choice does not aggressively disseminate cost pay-back information, collect and publicize examples of energy efficiency success stories, or focus its information beyond the consumer to the industrial and commercial sectors.

Recommendation No. 18

The Committee recommends that the Government of Canada establish a program or expand the mandate of an existing program (i) to document successful energy efficiency initiatives, (ii) to maintain a record of current energy-efficiency programs provided by governments and public utilities, (iii) to conduct cost-benefit and investment pay-back analyses on new energy-efficient products and technologies, and (iv) to effectively disseminate this information to the domestic, commercial and industrial sectors.

According to the *1992 IPCC Supplement*, the approximate one-half degree of warming experienced during the past century is within the range of natural climatic variation. However, evidence also suggests that other human factors may be offsetting more extensive warming. Reduced radiative forcing due to ozone depletion is such an example.

⁸² L. C. Myers (1992).

⁸³ "Electric Options," *Ontario Hydro*, No. 45, September 1990.

⁸⁴ J. Cherfas, "Skeptics and Visionaries Examine Energy Saving," *Science*, Vol. 251, 11 January 1991, p. 154-156.

⁸⁵ D. Stine, *Scientific Assessment and Approaches to Curtailing Global Warming*, Written presentation to the House of Commons Standing Committee on Environment, 30 November 1992, p. 5.

This Committee accepts the preponderance of scientific evidence, and is of the opinion that the potential risks of climate change preclude waiting for scientific verification. There is strong support for the "precautionary principle", that is, when in doubt, act rather than wait. Mobilization of the no-cost mitigative actions is the sensible first approach. However, there is the feeling among environmentalists and some Committee members that we should be doing more, we should be implementing other mitigation options even though the net cost may be high.

Erik Haites suggested that during this decade we should place the no-cost first-line of defence into action, and at the same time funding should be directed to research and the development of a second line of no- or least-cost defences. The Committee is of the opinion that greater emphasis should be placed on research to stimulate the development of a second-generation of energy-efficient technologies.

Recommendation No. 19

The Committee recommends that the Government of Canada encourage private and public sector research initiatives for the development and introduction of a second-generation of energy-efficient technologies by the year 2000.

PRACTICAL CONCERNS AND POLICY DIRECTION

The Environment Committee's 1991 report, *Out of Balance—The Risks of Irreversible Climate Change*, described many if not most of the mitigation options outlined to the Committee in this study. However, it is clear that most of the possible mitigative actions have now been well studied, subjected to economic analysis and prioritized. The Committee believes that the major challenge presently facing decision makers is not what needs to be done, but rather how will it be done? What are the impediments and what policies must be developed to facilitate change?

Presentations from a major utility, TransAlta, and from the Canadian and Ontario Trucking Associations revealed one common concern. In essence, implementation of any policy that would put them at a competitive disadvantage, domestically or internationally, was unacceptable. The trucking industry is understandably quite concerned about the effect a potential carbon tax would have on their ability to compete. The difficulties surrounding a carbon tax were discussed by Minister Jean Charest:

In Canada, you have to remember, a carbon tax would apply in a different context from most countries. We already use our fuel distribution retail system for taxing purposes and we use it extensively. Provincial and federal governments do that. Whether or not we would choose to pursue that course is something we would want to think about very carefully. What I can tell you in terms of the carbon tax is that in this context it is certainly not contemplated as something the government would want to put forward. We are not interested in new taxes at this point in time.⁸⁶

There was general accord among the industrial and NGO witnesses before the Committee that the correct blend of economic instruments held the greatest promise for achieving cost-effective reductions in greenhouse gas emissions. Jim Leslie, Senior Vice-President, Corporate Services, TransAlta Utilities, built a strong case for the development and use of economic instruments:

For some time, we've been advocating to government, to our industry, and to stakeholders generally the usefulness and feasibility of harnessing the economic forces of the marketplace in order to deal with environmental issues such as climate change.

⁸⁶ Minutes of Proceedings and Evidence of the Standing Committee on Environment, Issue No. 45, 16 November 1992, p. 31.

The key considerations inherent in the climate change convention as we see them are cost-effectiveness, comprehensiveness, and joint implementation.

We think the cost-effectiveness issue is best reflected in the value of using economic instruments, which provide for flexible, cost-effective and innovative action by many decision makers.

In terms of comprehensiveness, it is most important that there be consideration and inclusion of all greenhouse gases, all sources, sinks and reservoirs, to take account of all factors that relate to this issue and enable cost-effective action.

Joint implementation relates to the potential benefits from global, not just national or regional action. We see the benefits of joint implementation, including the flow of funds from the developing countries to the South and technology cooperation between North and South.⁸⁷

Within the context of economic instruments, Erik Haites described how a carbon tax and a tradeable permits program could be used to assist in the transfer of resources to developing nations:

Both would provide incentives for fuel switching and adoption of energy efficiency measures and would also provide mechanisms whereby we could transfer resources to developing countries.

In the case of the carbon tax, we would have tax revenue to transfer to a Global Environmental Fund. In the case of tradeable permits, we could allow Canadian sources to comply with their emissions limits by acquiring permits from developing countries. In order to acquire those permits, they would obviously have to buy them, which represents a transfer of resources, but one that's accomplished without going through government accounts and a tax system.⁸⁸

There was general agreement that the potential exists for economic instruments to become an effective means of tackling many environmental problems. However, it was also recognized that our knowledge of economic instruments is as yet quite rudimentary and much work needs to be done to perfect these tools. In 1992 the federal government released a discussion paper entitled *Economic Instruments for Environmental Protection*. Some witnesses and one Committee member, however, expressed impatience with the slow pace of the federal government's efforts to build upon this document and design an effective economic instruments package.

Recommendation No. 20

The Committee recommends that the Government of Canada, in cooperation with all stakeholders (industry, environmental groups, provincial, territorial and municipal governments) (i) accelerate its program to develop an effective package of economic instruments with which to combat greenhouse gas emissions, (ii) test these concepts in localized pilot projects, and (iii) share Canadian expertise on a global basis through the United Nations Commission on Sustainable Development.

Where should Canada invest its funds to get the greatest return in terms of energy savings and reduction in greenhouse gas emissions? Although a seemingly simple consideration, this question raises both practical and ethical issues. Should Canada concentrate on putting its own

⁸⁷ Ibid., Issue No. 48, 30 November 1992, p. 23-24.

⁸⁸ Ibid., p. 16.

house in order first, and in so doing accrue the benefits of energy savings, increased competitive edge, and the prominence of world leadership? Or alternatively, should the money be directed to where it will have the most effect? For example, preservation and reforestation of the rain forest is known to be a more effective means of sequestering carbon than planting trees in Canada's boreal forest. Improvements to the operation of a Chinese coal-fired utility would likely yield far greater reductions in the emission of gaseous contaminants than would the same expenditure on a relatively modern utility in Canada.

Deborah Stine pointed out, that politically, this is a very difficult issue to resolve. It is definitely cheaper to assist a developing nation, as the gains to be realized in terms of reduction of greenhouse gas emissions are very large. However, you are paying for someone else's energy efficiency and it does not appear that you are reaping any of the benefits. Jim Leslie, on the other hand, revealed another side of the argument:

If the U.S. pursues an international policy and allows companies credits for offsets and Canada pushes ahead toward a domestic-reduction-only policy, our competitiveness will be at stake.⁸⁹

The Committee recognizes that there is probably no specific solution to this problem. However, just as witnesses before this Committee have recommended the use of a mixture of mitigative actions to combat global warming a blend of national and international actions may be in the best interest of all peoples. The Committee feels that it is essential that the Canadian government attempt to develop a balanced and integrated national-international policy for the reduction of greenhouse gas emissions, one that allows Canada to accrue benefits from mitigative actions, but one that also responds to international well-being.

Jim Leslie informed the Committee that the new United States energy bill contains a number of provisions that relate to climate change. In particular, the bill promotes the pursuit of voluntary reductions in greenhouse gas emissions.

In fact, the bill contains a provision for the documentation and voluntary reporting of greenhouse gas emission or mitigation actions, including the annual reductions in emissions and carbon fixation by any and all measures.⁹⁰

Jim Leslie asserts that a similar program is required in Canada. The Committee believes that the guarantee of retroactive greenhouse gas reduction credits would act as an inducement to proactive companies to begin their emission reduction programs now.

Recommendation No. 21

The Committee recommends that the Government of Canada institute a sunset program to (i) establish a greenhouse gas emission data base, (ii) receive emission reduction reports, (iii) assign value to emission reduction activities, and (iv) upon implementation of an appropriate economic instrument, retroactively credit industries for their reduction achievements.

One of the traditional barriers to increased market penetration of energy-efficient appliances, tools, pumps and furnaces is the initial higher capital cost. As pointed out by Deborah Stine:

⁸⁹ Ibid., p. 27.

⁹⁰ Ibid., p. 24.

Why should a landlord pay more for an efficient furnace when it is the tenant who pays the heating bill?⁹¹

The Committee recognizes that the recent passage of Bill C-41, *The Energy Efficiency Act* (an Act respecting the energy efficiency of energy-using products and the use of alternative energy sources) does provide for national minimum energy efficiency standards for a broad range of products and equipment. In addition, energy consumption labels alert the consumer to the long-term energy savings to be achieved from the purchase of energy-efficient products. However, this Act does nothing to assist consumers, and in particular financially-stressed consumers, to surmount the initial problem of higher capital cost. A financial policy is required to reduce the competitive advantage of energy-inefficient products. One possible resolution to this problem is the imposition of some form of financial penalty on energy-inefficient appliances. Although this action would remove the financial incentive to purchase appliances that are not energy efficient, it still does nothing to make energy-efficient products more accessible to the consumer with limited funds. The Committee sees this problem as one which should be addressed within the context of economic instruments, and challenges the government to deal with the problem of higher capital cost as it develops an effective economic instruments package.

The Committee notes that *The Energy Efficiency Act* does not mandate minimum energy efficiency standards for smaller products and equipment. For example, minimum energy efficiency standards are in effect for domestic refrigerators, and these appliances are affixed with an energy-consumption label. In contrast, minimum standards and energy-consumption labels do not exist for small bar refrigerators. The Committee believes that the Government of Canada should build upon *The Energy Efficiency Act* by continuously updating energy-efficiency standards and by extending energy-efficiency regulations and labelling to all energy-consuming products.

Recommendation No. 22

The Committee recommends that the Government of Canada (i) establish minimum energy-efficiency standards for all energy-consuming products and equipment, (ii) affix energy-consumption labels to all energy-consuming products and equipment, and (iii) continuously tighten the minimum standards as new technologies evolve. In addition, the Committee recommends that the *National Building Code* be reviewed and updated as new energy efficient building technologies evolve.

Canada has the dubious reputation of having the highest per capita emissions of carbon dioxide. This is in large part due to the enormous size of the country and the long distances that must be travelled by passengers and freight. It is no secret to Canadians that we must increase the efficiency of our modes of transport. However, according to Darrell Richards of Transport 2000 our transportation excesses are due largely to personal attitudes and government policy that encourages transportation by the most energy-intensive modes. Darrell Richards told the Committee:

⁹¹ D. Stine, *Scientific Assessment and Approaches to Curtailing Global Warming*, Written presentation to the House of Commons Standing Committee on Environment, 30 November 1992, p. 6.

... in order to reduce energy consumption and therefore contain the problem of global warming, it is necessary not to deal only with the technical aspects of transportation but perhaps more importantly to look at the people issues, that is, attitudes.⁹²

Prime among these attitudes is the North American preference for the family car, which offers personal freedom and usually quick and convenient transportation. This personal preference by the majority of the population is reflected in the political decision to spend a large share of tax revenues on highway maintenance and construction. Improvements to the road system seldom improve movement by bicycle or foot. Darrell Richards asserts that:

... we must cause a modal shift from the automobile to walking, cycling, urban transit, train and bus. And we must get at those cultural attitudes that are being translated into government policies that are preventing people from having equitable facilities for cycling, walking, transit, train and bus.⁹³

According to Darrell Richards the most important first step to enable this modal shift is to provide people a network. Just as there are highway networks to speed motorists from one destination to another, pedestrians, cyclists, and transit riders need their own safe, convenient, and largely dedicated networks. The first step toward this goal is the redirection of tax revenues and the development of a tax system more equitable to people who walk, bicycle or take transit to work. This need to redirect tax revenues was expressed by two other witnesses. Janine Ferretti identified the allocation of tax dollars to the government's new program to upgrade Canadian highways and airports as a form of subsidy that contributes to the deterioration of the environment.⁹⁴ Deborah Stine noted that strengthened federal and state support for mass transit was one of the specific energy conservation and efficiency recommendations presented by her study group to the United States government for consideration.⁹⁵ The Committee believes that the expansion and strengthening of urban transit infrastructures in major Canadian cities and towns will facilitate the modal shift of commuters to public transit and will assist Canada in achieving its greenhouse gas reduction goals.

As urban transportation is the responsibility of provincial governments, the federal government has always been reluctant to get involved, especially in the recent years of fiscal restraint. There is, however, no constitutional barrier to the federal government using its spending power to become directly involved in urban transit projects. We must ask whether it should be involved and whether it can afford to be. Certainly, it is acknowledged on all sides, that there must be substantial investment in urban transit from some source over the next few years in Canada.⁹⁶

The Committee recognizes that it is not only urban transportation issues that must be addressed when mitigating climate change effects, but the national public transportation system and infrastructure.

⁹² *Minutes of Proceedings and Evidence of the Standing Committee on Environment*, Issue No. 48, 30 November 1992, p. 50.

⁹³ *Ibid.*, p. 51.

⁹⁴ *Ibid.*, Issue No. 46, 17 November 1992, p. 18.

⁹⁵ *Ibid.*, Issue No. 48, 30 November 1992, p. 21.

⁹⁶ John Christopher, *Transportation in Canada: Current Issues*, Background Paper BP-324E, Research Branch, Library of Parliament, Ottawa, December 1992.

The Committee supports the Royal Commission on National Passenger Transportation in its recommendations designed to persuade users to reduce the amount of environmental damage they cause by ensuring that those who travel less will not pay the environmental remediation costs imposed by those who travel more. All of the modes should be subject to the same regulatory standards and changes.⁹⁷

Recommendation No. 23

The Committee recommends that the Government of Canada consider the advisability of using economic instruments, such as tolls and incentives, to encourage the use of public transportation systems and more environmentally-friendly modes of travel.

Darrell Richards suggested that free parking at work be considered a taxable benefit, while tax deductions should be extended for transit passes. The Committee agrees that the modal shift of people from cars to walking, bicycling and transit would indeed award Canada a tremendous reduction in greenhouse gas emissions. However, the Committee sees an equitable transportation tax system as a quagmire of largely unenforceable regulations. Using the examples offered by Darrell Richards, would a motorist living in an area not served by public transit have the same taxable benefit as a motorist living on a bus route? Would a tax deduction for transit passes not discriminate against more environmentally-friendly citizens who walk and cycle to work?

The problems facing the shift to more energy-efficient modes of transport are indeed largely ones of attitude; so pervasive are these attitudes that it is unlikely they could be quickly solved by any recommendations this Committee might suggest. Rather, the challenge can only be addressed by reforming our attitudes, and altering our thinking and traditional ways of doing things. The Committee feels that the long-term solutions to the problems addressed at Rio will only occur by the full integration of sustainable development objectives into all decision-making, in every sector of Canadian society.

⁹⁷ Royal Commission on National Passenger Transportation, *Directions, The Final Report of the Royal Commission on National Passenger Transportation Summary*, 1992.

A copy of the relevant Minutes of Proceedings and Evidence of the Standing Committee on Environment (*Issues 65, 67, 69 and 71*) which include this report is tabled.

Respectfully submitted,

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A: *Deadly Releases CFCs*B: *No Time To Lose: The Challenge of Global Warming*

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E: *Ozone Depletion: Acting Responsibly*F: *From Words to Action*G: *A Global Partnership*

