ELECTRICITY COMPETITION AND CLEAN AIR

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For

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INTRODUCTION

Ontario Hydro, which has generated virtually all of the province's electricity for most of this century, is on the brink of losing its monopoly. In the near future, the provincial government is planning to establish a competitive market for the generation and sale of electricity in Ontario.[1]

A competitive electricity market will increase customer choice and, according to many industry participants, lower electricity prices. However, in the absence of effective new environmental policies, the economic benefits of competition will be achieved at the expense of human health, clean air and future generations.

The following paper will discuss the rationale for moving to a competitive electricity market and suggest the adverse consequences that this move may have on human health and the environment. It will also outline a strategy which would enable Ontario to simultaneously achieve the economic benefits of competition *and* reduce air pollution.

THE RATIONALE FOR COMPETITION

Presently, Ontario Hydro has a virtual monopoly on the generation of electricity in Ontario. The company produces approximately 94% of the electricity consumed in this province.

The original rationale for Ontario Hydro's monopoly was technological. For most of this century, electricity could be produced at a lower average cost from a small number of large electricity generating stations than from a large number of small electricity generating stations. Therefore, a monopoly utility could provide consumers with lower electricity prices than an industry consisting of many small-scale, competing electricity suppliers.

In recent years, however, there has been a revolution in electricity generation technologies. Small-scale natural gas-fired electricity generating technologies can now produce electricity at the same, or a lower, cost than large-scale electricity generating stations. In effect, the original rationale for Ontario Hydro's monopoly no longer exists.[2]

Consequently, in May 1996, the Advisory Committee On Competition in Ontario's Electricity System (the Macdonald Committee) proposed that Ontario Hydro's monopoly on electricity generation should be eliminated. In addition, the Committee recommended that any electricity generator, including those located in the United States, should be allowed to sell electricity in Ontario.

According to the Macdonald Committee, a competitive electricity market would cause wholesale electricity prices to fall by 11% to 27% relative to a continuation of Ontario Hydro's monopoly.[3]

The Macdonald Committee also recommended that the benefits of a competitive electricity market should not be achieved at the expense of the environment, but should be combined with stricter environmental controls:

> We believe that the move to a competitive market for electricity in Ontario should not require the sacrifice of environmental goals. If anything, we believe that it will create a situation in which environmental objectives can and should be more, not less, demanding.[4]

ENVIRONMENTAL CONSEQUENCES OF ELECTRICITY GENERATION

The primary sources of electricity-related air pollution are fossil-fired generating stations. In 1990, Ontario Hydro's fossil generating stations were responsible for 22% of its output.[5] Virtually all of Ontario Hydro's fossil-generation is coal-fired.[6]

Ontario Hydro's coal-fired generating stations produce the following pollutants: carbon dioxide, sulphur dioxide, nitric oxide and numerous toxic air pollutants.

Carbon Dioxide

Carbon dioxide (CO_2) is the major greenhouse gas that is responsible for climate change. According to the David Suzuki Foundation, climate change is "the most urgent slow-motion catastrophe facing humankind."[7]

If the world's greenhouse gas emissions continue to rise, the resulting global warming and climate change will increase the frequency and severity of heat waves, floods, droughts and storms. Climate change will also disrupt crops, forests and ecosystems, spread disease, raise sea-levels and undermine economies and communities.[8]

In 1990 Ontario Hydro's coal-fired generating stations produced approximately 18% of Ontario's total fossil-fuel-related CO_2 emissions.[9]

Sulphur Dioxide

Sulphur dioxide (SO_2) is a precursor of acid rain, which is killing aquatic ecosystems in the Canadian Shield and is severely damaging forest ecosystems.

Pursuant to the 1991 Canada-U.S. Air Quality Agreement, sulphur dioxide emissions in Canada and the U.S. have been reduced significantly.[10] However, the SO_2 reduction goals outlined in the Air Quality Agreement were only designed to protect moderately sensitive aquatic systems.[11] As a consequence, the problem has not been completely rectified. Recent studies, in fact, show a number of alarming trends:

> ...that most lakes in Eastern Canada are not recovering at all or only at one-third the rate expected; that fish populations are not rebounding; that trees located on acid-sensitive soils in Ontario's cottage country are dying; that forest growth in southern Quebec has declined by 30 per cent in the last decade; and that current emission targets are inadequate to protect many lakes and forests.[12]

According to scientists, SO_2 emissions in eastern North America must be reduced

by a further 50% to protect our lakes and forests.[13]

In 1990 Ontario Hydro's coal-fired generating stations were responsible for 16% of Ontario's SO_2 emissions.[14]

Nitric Oxide

Nitric oxide (NO_x) is a precursor of acid rain and low level ozone or urban smog.

According to the Ontario Ministry of Environment and Energy, smog is a very serious health and environmental hazard:

- Smog aggravates a wide range of serious health ailments, especially respiratory illnesses such as asthma and bronchitis.
- Smog causes about 1,800 premature deaths each year in Ontario.
- Smog also exacts a severe toll on the environment by harming vegetation, materials and crops.[15]

Ontario's low level ozone target is an hourly objective of no more than 80 parts per billion (ppb). However, during the summer of 1995, the target was exceeded 600 times at 10 monitoring stations in southwestern Ontario.[16] According to the Ontario Ministry of Environment and Energy, during hot summer days, U.S. emissions are responsible for more than 50% of the ozone affecting Ontario.[17]

In 1990 Ontario Hydro's coal-fired electricity generating stations were responsible for approximately 12% of Ontario's NO_x emissions.[18]

Toxic Air Pollutants

Ontario Hydro's coal-fired electricity generating stations also emit the following air toxics: mercury, cadmium, arsenic, hexavelant chromium, nickel, lead, fluorides and particulates.[19]

Air toxics are hazardous to human, plant and animal life. According to the International Joint Commission, toxic substances can "bioaccumulate in living organisms and have been associated with immune system dysfunction, reproductive deficits, developmental and neurobehavioral abnormalities, and cancer."[20]

Air toxics can travel for thousands of miles. As a result, most of the air toxics that are deposited in Ontario are emitted in the U.S. or other countries.[21] The health and environmental effects of two particular air toxics, mercury and particulates, are discussed below.

Mercury is one of the most harmful air toxics associated with coal-fired electricity generation. Mercury damages the nervous systems of humans and animals.[22] Recent studies have shown that mercury concentrations in loons is impairing their vision, muscle co-ordination and ability to reproduce.[23]

In 1990 Ontario Hydro's coal-fired electricity generating stations were responsible for 7% of Ontario's mercury emissions.[24]

According to the U.S. Environmental Protection Agency (EPA), particulate emissions are also very damaging to human health and the environment. For example, particulates

may cause premature deaths, aggravation of respiratory and cardiovascular diseases and more frequent attacks of asthma in children. As the U.S. EPA explains:

> For the particulate matter standard review, EPA assessed hundreds of peer reviewed scientific research studies, including numerous community-based epidemiological studies. Many of these community-based health studies show associations between particulate matter (known as PM) and serious health effects. These include premature death of tens of thousands of elderly people or others with heart and/or respiratory problems each year. Other health effects associated with exposure to particles include aggravation of respiratory and cardiovascular disease, including more frequent attacks of asthma in children. The results of these health effects have been signficantly increased numbers of missed work and school days, as well as increased hospital visits, illnesses, and other respiratory problems.[25]

Particulate emissions have also caused a significant decline in visibility:

> These fine particles are not only associated with serious health effects, but they also are a major reason for visibility impairment in the United States in places such as national parks that are valued for their scenic views and recreational opportunities. For example, visibility in the eastern United States should naturally be about 90 miles, but has been reduced to under 25 miles.[26]

In 1990, Ontario Hydro was responsible for 2.4% of Ontario's particulate emissions.[27]

ONTARIO HYDRO'S ENVIRONMENTAL GOALS

Carbon Dioxide/Greenhouse Gas Emissions

In 1992, at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, over 150 countries signed the United Nations Framework Convention On Climate Change. The ultimate objective of the Framework Convention is to achieve:

> ...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.[28]

To stabilize the *concentrations* of greenhouse gases in the atmosphere, the world's greenhouse gas *emissions* must be substantially reduced. According to the best scientific evidence, the Intergovernmental Panel on Climate Change, global CO_2 emissions must be reduced by more than 50% in order to stabilize the concentrations of greenhouse gases in the atmosphere at their present levels.[29]

As a first step towards the achievement of the Convention's ultimate objective developed nations, including Canada and the United States, made a commitment to stabilize their greenhouse gas emissions at their 1990 levels by 2000.[30]

In January 1995, Ontario Hydro announced that it will work towards this goal by:

1. stabilizing its greenhouse gas emissions at its 1990 level by the year 2000; and

2. reducing its greenhouse gas emissions by 10%, relative to its 1990 level, by the year 2005.[31]

In effect, Ontario Hydro's maximum greenhouse gas emissions in 2000 and 2005 will be 26,000 and 23,400 kilotonnes respectively.[32]

In 1996, Ontario Hydro's actual greenhouse gas emissions were 18,117 kilotonnes.[33]

Sulphur Dioxide Emissions

As mentioned, sulphur dioxide is a precursor of acid rain. In the 1980's, concern over the environmental damage caused by acid rain prompted the provincial government to regulate SO_2 emissions. Ontario Hydro's maximum legally permissible SO_2 emissions are currently 175 kilotonnes per year.[34]

In 1996 Ontario Hydro's actual SO_2 emissions were 85 kilotonnes.[35]

Nitric Oxide Emissions

Ontario Hydro's combined maximum legally permissible emissions of SO_2 and NO_x are 215 kilotonnes per year.[36] In other words, Ontario Hydro's maximum NO_x emissions cannot exceed 40 kilotonnes per year unless its SO_2 emissions are less than 175 kilotonnes per year. Moreover, Ontario Hydro has made a voluntary commitment to cap its NO_x emissions at 38 kilotonnes per year commencing in the year 2000.[37]

In 1996 Ontario Hydro's actual NO_x emissions were 35 kilotonnes.[38]

Air Toxic Emissions

There are no legal or voluntary caps on Ontario Hydro's total emissions of toxic air pollutants.

A COMPETITIVE ELECTRICITY MARKET

Because Ontario Hydro has a virtual monopoly on electricity generation in the province, the utility is responsible for producing almost all of Ontario's electricity-related emissions. Therefore, as long as Ontario Hydro retains its virtual monopoly, a 10% reduction in the utility's greenhouse gas emissions will result in an almost 10% reduction

in Ontario's total electricity-related greenhouse gas emissions.

However, if electricity competition is permitted, Ontario's electricity-related emissions may rise even if Ontario Hydro's emissions fall. Inevitably, new natural gas-fired generating stations will be built in Ontario by companies other than Ontario Hydro (e.g., Toronto Hydro, investor-owned generating companies). The output of these new, generating stations will raise Ontario's electricity-related greenhouse gas and NO_x emissions. In fact, according to Natural Resources Canada (NRCan), if a competitive electricity market is not combined with new government policies to control emissions, the greenhouse gas emissions of electricity generating stations located in Ontario will rise inexorably after the year 2000.[39]

Furthermore, in a competitive market, some of Ontario's electricity needs will be met by importing coal-fired electricity from the Ohio Valley. For example, American Electric Power (AEP) has recently opened an office in Toronto so that it can sell electricity in Ontario when competition is permitted. According to Daniele Seitz, a U.S. energy analyst, AEP's coal-fired electricity stations will be able to offer Ontario consumers very competitive prices. Seitz explains, "AEP starts with a tremendous advantage...It's a company that has power costs that are very low."[40]

AEP's costs are so low because more than 85 per cent of its power is generated from coal, an inexpensive power source.[41] The company also has long-term contracts at preferred rates with its coal suppliers and its plants are located near coal mines in the Ohio Valley, which drastically reduces transportation costs.[42] These factors place AEP "among the lowest cost-based generating operations in the United States".[43]

While there is a cap on the SO_2 emissions of U.S. electricity generating stations, there are no caps on the CO_2, NO_x or air toxic emissions of coal-fired generating stations located in Midwestern U.S.A.[44] As a consequence, increased electricity imports from the United States will cause Ontario's electricity-related CO_2, NO_x and air toxic emissions to rise.[45]

Furthermore, increased demand for Ohio Valley coal-fired electricity would make it more costly for Midwestern utilities to achieve additional SO_2 emission reductions. As a consequence, increased electricity imports from the Ohio Valley would probably make it more difficult for the Governments of Canada and the United States to negotiate a bilateral treaty to reduce SO_2 emissions in Eastern North America.

AN EFFECTIVE SOLUTION

With appropriate environmental regulations we can achieve the economic benefits of competition without sacrificing our human health and environmental objectives. For example, the introduction of competition could be combined with a regulation that establishes legally binding greenhouse gas, SO_2, NO_x and air toxics emissions caps for *all* Ontario electricity generating stations. These caps could be set to ensure that the sum of emissions from all Ontario electricity generating stations would not exceed Ontario Hydro's existing legal and voluntary caps. With such a regulation, we could create a competitive electricity market without increasing the air emissions of Ontario's electricity generating stations.

Furthermore, if the Government of the United States also establishes policies to stabilize the greenhouse gas emissions of U.S. electricity generators (or total U.S. greenhouse gas emissions), electricity imports from the U.S. will not lead to a rise in Ontario's electricity-related greenhouse gas emissions.

Moreover, to achieve compliance with a cap which stabilizes U.S. electricity-related greenhouse gas emissions, U.S. electricity generators and marketers would be required to promote energy efficiency and fuel switching from coal to natural gas and renewable energy for electricity generation. Energy efficiency and renewable energy are 100% pollution-free. Also, the NO_X and air toxic emissions of natural gas are substantially lower than those of coal. In effect, a greenhouse gas emissions stabilization cap would also cause the NO_X and air toxic emissions of U.S. electricity generators to decline.

Unfortunately, the U.S. Government has not yet established policies to stabilize the greenhouse gas emissions of U.S. electricity generators or the U.S. economy as a whole. As a consequence, U.S. electricity-related and total CO_2 emissions are forecast to exceed their 1990 levels by 13% and 15% respectively in the year 2000.[46]

Therefore, to ensure that the creation of a competitive electricity market will not lead to an increase in Ontario's electricity-related greenhouse gas, sulphur dioxide and nitric oxide emissions, the Government of Ontario must:

1. establish legally binding greenhouse gas, sulphur dioxide, and nitric oxide emission caps for all Ontario electricity generating stations that are, in aggregate, at least as strict as Ontario Hydro's existing legal and voluntary caps; and

2. ban (non-emergency) electricity imports from the U.S. until the U.S. Government establishes policies to stabilize the greenhouse gas emissions of U.S. electricity generating stations or total U.S. greenhouse gas emissions, pursuant to its commitments under the United Nations Framework Convention On Climate Change.

APPROPRIATE ELECTRICITY-RELATED EMISSION REDUCTION TARGETS FOR ONTARIO

Greenhouse Gas Emissions

As mentioned, Ontario Hydro has committed to reduce its greenhouse gas emissions by 10%, relative to its 1990 level, by 2005. As a consequence, if the benefits of competition are not to be achieved at the expense of future generations, a competitive electricity market must also reduce Ontario's electricity-related greenhouse gas emissions by at least 10% by 2005.

Moreover, according to the Macdonald Committee Report, in a competitive electricity market "our environmental objectives can and should be more, not less, demanding."[47]

Therefore, a competitive electricity market should be combined with a system of greenhouse gas emission caps which will require Ontario's electricity generating stations

to reduce their greenhouse gas emissions by more than 10% by 2005.

If the Government of Ontario establishes legally binding greenhouse gas emission caps for Ontario's electricity generators, the emission reductions will be delivered by the following market mechanisms:

1. the aggressive promotion of "energy efficiency" energy services by Ontario Hydro, Ontario's large municipal electric utilities (e.g., Toronto Hydro, Windsor Public Utilities Commission) and other energy services companies (e.g., Consumersfirst, Enron, Honeywell);

2. new investments in renewable energy technologies (e.g., wind-turbines, solar photovoltaic systems) by energy utilities, non-utility investor-owned corporations and consumer co-ops;

3. incremental investments in high efficiency, low carbon intensity technologies, e.g., fuel cells and natural gas-fired cogeneration (the CO_2 emissions per kilowatt-hour of gas-fired cogeneration are 66 to 70% less than those of Ontario Hydro's coal-fired generating stations) by electric utilities and non-utility investor-owned corporations;[48] and

4. the aggressive promotion of end-use fuel-switching from electricity to natural gas (e.g., converting electrically-heated homes and electric water heaters to natural gas) by Centra Gas, Consumers Gas and Union Gas.

All of the above actions will simultaneously reduce the total SO_2, NO_X and air toxic emissions of Ontario's electricity generating stations.

Sulphur Dioxide and Nitric Oxide Emissions

As previously noted, eastern North American SO_2 emissions must be reduced by a further 50% to protect our lakes and forests. Moreover, additional reductions in NO_X emissions are a pre-requesite for achieving Ontario's existing low level ozone (smog) target.

Therefore, the establishment of a competitive electricity market should be combined with SO_2 and NO_X emission caps which will reduce the total SO_2 and NO_X emissions of Ontario's electricity generating stations.

Air Toxic Emissions

As discussed, Ontario's electricity generating stations are not subject to air toxic emission caps even though air toxics are a serious threat to human health and the environment.

Strict air toxic emission caps for Ontario's electricity generating stations should thus be established as soon as possible.

IS A BAN ON ELECTRICITY IMPORTS COMPATIBLE WITH OUR INTERNATIONAL TRADE OBLIGATIONS?

If the United States fails to adopt policies to achieve compliance with its obligations pursuant to the Framework Convention On Climate Change, (i.e., U.S. greenhouse gas emission stabilization at its 1990 level by the year 2000), a ban on U.S. electricity imports would be compatible with our international trade obligations under the General Agreement on Tariffs and Trade (GATT) and the North American Free Trade Agreement (NAFTA). Furthermore, it would be consistent with recent actions by the U.S. Federal Energy Regulatory Commission (FERC).

The GATT

The GATT is the world's principal multilateral treaty with respect to international trade. It has been signed by over 90 countries which together account for more than four-fifths of world trade.

Article XX of the GATT states that member countries can adopt measures to conserve natural resources:

> Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures...relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption.[49]

According to the findings of a GATT disputes settlement panel that was adopted by the GATT Council, a conservation measure which restricts trade is permissible if it is: a) primarily aimed at the conservation of natural resources; and b) it's primary purpose is to make domestic conservation measures effective.[50]

If the U.S. does not adopt measures to stabilize its greenhouse gas emissions by the year 2000, a ban on U.S. electricity imports in conjunction with mandatory greenhouse gas emission quotas for Ontario electricity generators would be consistent with GATT for the following reasons:

1. the primary objective of the ban is to conserve natural resources (fossil fuels; the global climate system and the ecosystems that it supports);

2. the ban on U.S. electricity imports is made in conjunction with restrictions on domestic greenhouse gas emissions; and

3. the primary purpose of the ban is to reduce greenhouse gas emissions associated with electricity consumption in Ontario.

NAFTA

Article 2101 of NAFTA incorporates GATT Article XX and its interpretive notes into the NAFTA. Therefore NAFTA does not limit our GATT rights to control Ontario's electricity-related greenhouse gas emissions.

FERC

The U.S. Federal Energy Regulatory Commission has established open access rules for the transmission systems of U.S. electric utilities. For example, assume Utility A wishes to sell electricity to Utility B and that Utility C is located between Utilities A and B. As a result of FERC's open access rules, Utility C must transmit Utility A's electricity to Utility B at a FERC-approved transmission tariff.

The purpose of FERC's open access rules is to foster the development of a competitive electricity market in the U.S.

In December 1996, Ontario Hydro applied for the same open access rights on U.S. transmission systems that are enjoyed by U.S. utilities. In March 1997 the FERC denied Ontario Hydro's application because U.S. utilities do not have open access rights on Ontario Hydro's transmission system. For example, American Electric Power does not have the right to use Ontario Hydro's transmission system to sell electricity to Ottawa Hydro or Toronto Hydro.

The FERC stated that, "we will deny Ontario [Hydro Interconnected] Markets' market-based rate application without prejudice. We emphasize that, in doing so, we seek to assure reciprocal service into and out of Canada when Canadian entities seek access to United States markets.[51] In other words, according to FERC, Ontario Hydro can only have open access rights on U.S. transmission systems if the Government of Ontario establishes a competitive electricity market in Ontario.

If the FERC can deny Ontario Hydro open access rights on U.S. transmission systems until we establish a competitive electricity market, the Government of Ontario can deny U.S. electricity exporters access to Ontario Hydro's transmission system until the U.S. Government establishes greenhouse gas emission quotas for its electricity generating stations or adopts other policies to fulfill its international commitments pursuant to the Framework Convention On Climate Change.

RECOMMENDATIONS

As discussed, the Macdonald Committee has recommended that the electricity market in Ontario should be opened for competition. The Committee also recommended that a competitive electricity market should be combined with stricter environmental controls. Therefore, the Ontario Clean Air Alliance recommends that the introduction of competition should be combined with:

1. greenhouse gas emission caps which require Ontario's electricity generating stations to stabilize their aggregate greenhouse gas emissions by the year 2000 and to reduce their aggregate greenhouse gas emissions by more than 10% by 2005;

2. a ban on (non-emergency) electricity imports from the U.S. until the United States Government establishes policies to stabilize the greenhouse gas emissions of its electricity generating stations or total U.S. greenhouse gas emissions, pursuant to its commitments under the United Nations Framework Convention On Climate Change.

3. sulphur dioxide emission caps which require Ontario's electricity generating stations to reduce their aggregate sulphur dioxide emissions below 175 kilotonnes per year;

4. nitric oxide emission caps which require Ontario's electricity generating stations to reduce their aggregate nitric oxide emissions below 38 kilotonnes per year by the year 2000; and

5. air toxics emission caps for Ontario's electricity generating stations.

Endnotes

1. James Rusk, "Province planning to divide Hydro", Globe and Mail, (May 15, 1997), p. A1.

2. Albert Nichols, John Farr and David Harrison, Jr., The Timing Of Plant Replacement And The Cost-Effectiveness of CO_2 Reductions From Two Canadian Utilities, Prepared for Ontario Hydro and TransAlta Corporation, (National Economic Research Associates, 1996), pp. 19 - 21; and Advisory Committee On Competition in Ontario's Electricity System To The Ontario Minister of Environment and Energy, A Framework For Competition, (1996), pp. 23 & 24.

3. A Framework For Competition, p. 112.

4. ibid., p. 92

5. Ontario Hydro, Ontario Hydro Statistical Yearbook 1991, p. 5.

6. Ontario Hydro's nuclear and hydraulic generation stations, which were responsible for 48% and 30% of its output respectively in 1990, have low operating costs. As a result, they are run at their maximum possible output levels throughout the year. The coal-fired generating stations are used to meet the demand that cannot be met by the nuclear and hydraulic stations. As a consequence, the output of the coal-fired generating stations varies significantly on a daily, seasonal and annual basis in response to changes in electricity demand and the performance of the nuclear stations.

7. The David Suzuki Foundation, "It's time Canadian voters turn up the heat", URL: http://www.vkool.com/suzuki/climatead4.html

8. Intergovernmental Panel on Climate Change, IPCC Second Assessment Synthesis of Scientific-Technical Information relevant to interpreting Article 2 of the UN Framework Convention on Climate Change, URL: http://www.unep.ch/iucc.html

9. Ontario CO_2 Collaborative, A CO_2 Strategy For Ontario: A Discussion Paper, (Toronto: Canadian Institute for Environmental Law and Policy; 1996), p. 40.

10. International Joint Commission, United States-Canada Air Quality Agreement Progress Report 1996, pp. 9 - 16.

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12. Andrew Nikiforuk, "An environmental success story that isn't", Globe and Mail, (May 24, 1997).

13. ibid. According to Professor David Schindler of the University of Alberta, emissions must be reduced by 50% to prevent detectable chemical or biological changes to our lakes and forests.

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17. ibid., p. 1.

18.Ontario Ministry of Environment and Energy, Towards a smog plan for Ontario: A Discussion Paper, (June 1996), p. 15.

19. Memo from Ann Douglas, Fossil Business Unit, Ontario Hydro to Jack Gibbons, May 9, 1997.

20. United States-Canada Air Quality Agreement Progress Report 1996, p. 56.

21. ibid., p. 56; and Martin Mittelstaedt, "Reducing mercury levels no easy task", Globe and Mail, (April 28, 1997), p. A8.

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24. Susan Sang and Bruce Lourie, Mercury In Ontario: An Inventory of Sources, Uses and Releases: Executive Summary, (Toronto: Pollution Probe; 1996), p. 18.

25. Testimony of Mary D. Nichols, Assistant Administrator for Air and Radiation, U.S. Environmental Protection Agency, Before the Subcommittees on Health and the Environment and Oversight and Investigations Committee on Commerce, United States House of Representatives, (April 17, 1997), p. 4. URL: http://www.epa.gov/oar/aqstd/testimon.html

26. ibid.

27. Memo from Patrick McInnis, Ministry of the Environment and Energy, Environmental Monitoring and Reporting Branch, to Jack Gibbons, June 10, 1996.

28. United Nations Framework Convention On Climate Change, Article 2.

29. World Meteorological Organization/United Nations Environment Programme, Scientific Assessment of Climate Change: The Policymakers' Summary of the Report of Working Group I to the Intergovernmental Panel on Climate Change, (1990), pp. 9 - 12.

30. Framework Convention On Climate Change, Article 4.

31. Ontario Hydro, A Strategy To Manage Greenhouse Gas Emissions, (1995), pp. 1,2.

32. ibid., p. 7.

33. Ontario Hydro, 1996 Progress Report: Towards Sustainable Development, p. 21.

34. R.R.O. 1990, *Regulation 355*, Ontario Hydro.

35. Ontario Hydro, 1996 Progress Report: Towards Sustainable Development, p. 22.

36. R.R.O. 1990, *Regulation 355*, Ontario Hydro.

37. Ontario Hydro, 1996 Progress Report, p. 7.

38. ibid., p. 22.

39. Natural Resources Canada, The Greenhouse Gas Emissions Outlook 1996-2020, Prepared for Joint Federal, Provincial, Territorial Energy and Environment Ministers Meeting, Toronto, December 12, 1996 (Updated: March 19, 1997), pp. 5 & 6; and Memo from Wally Geekie, Energy Sector, Natural Resources Canada to Jack Gibbons, May 2, 1997.

40. Dawn Walton, "Is AEP's power worth waiting for?", Globe and Mail, (May 27, 1997).

41. ibid.

42. ibid.

43. ibid.

44. International Joint Commission, United States-Canada Air Quality Assessment Progress Report 1996, pp. 13, 14; and Center for Clean Air Policy, Air Quality and Electricity Restructuring, (March 1997), pp. 24, 165.

45. Even if Ontario nominally imported electricity from a U.S. hydraulic or nuclear generating station, our electricity imports would cause U.S. CO_2, NO_X and air toxics emissions to rise. For if the U.S. hydraulic or nuclear generating station is no longer providing electricity for U.S. consumers, the output of one or more U.S. coal-fired generating stations will have to be increased to meet their needs.

46. Annual Energy Outlook 1997, p. 73; and The Greenhouse Gas Emissions Outlook 1996-2020, p. 23.

47. A Framework For Competition, p. 92.

48. A CO_2 Strategy For Ontario, pp. 40, 62 - 66.

49. General Agreement on Tariffs and Trade, Article XX.

50. Panel report on "Canada - Measures Affecting Exports of Unprocessed Herring and Salmon", paragraph 4.6 (BISD, 35S/114).

51. FERC, Docket No. ER97-852-000, Order Denying Market-Based Rates Without Prejudice (March 31, 1997).