Countdown Coal

How Ontario can improve air quality by phasing out coal-fired electricity generation

Ontario Clean Air Alliance

FEBRUARY 2003

Acknowledgements

The Ontario Clean Air Alliance gratefully acknowledges the generous financial support of the Joyce Foundation and the Laidlaw Foundation, which made the research, writing and production of this report possible.

This report was written by Jack Gibbons and Ravi Mark Singh.

About the Ontario Clean Air Alliance

The Ontario Clean Air Alliance (OCAA) is a coalition of health, environmental and consumer organizations, municipalities, utilities and individuals working for cleaner air through strict emission limits and the phase-out of coal in the electricity sector. Our partner organizations represent over six million Ontarians.

The OCAA can be contacted at:

Ontario Clean Air Alliance
625 Church Street, Suite 402
Toronto M4Y 2G1

Tel: (416) 926-1907 ext. 245
Fax: (416) 926-1601

E-mail: info@cleanairalliance.org
Web Site: www.cleanairalliance.org

Table of Contents

Introduction

On September 18, 2002, the Government of Ontario promised to completely phase-out Ontario Power Generation's five coal-fired power plants by 2015. This is the most significant commitment ever made by a Government of Ontario to reduce air pollution. However, the people of Ontario cannot afford to endure another twelve summers of smog alerts before the coal plants are eliminated. This report will outline:

a) the public health and environmental benefits of phasing-out Ontario's dirty coal-fired power plants before 2015; and

b) a strategy to phase-out our coal-fired power plants by 2010 or sooner.

Air Pollution and Ontario Power Generation's Coal-Fired Power Plants

In 1998 the Ontario Medical Association (OMA) announced that air pollution is "a public health crisis" in Ontario.[1]

According to the OMA's report, The Illness Costs of Air Pollution in Ontario, air pollution costs Ontario more than $9.9 billion per year in health care costs, lost work time and other quantifiable expenses, as well as killing an estimated 1,900 Ontarians each year.[2]

In 2001, the OMA released a report that indicated that ozone levels are continuing to rise in Ontario. According to the OMA, the "overall increasing trend in the annual average ozone levels in Ontario will continue to cause serious health damage for the people of Ontario."[3]

The five coal-fired power plants run by Ontario Power Generation (OPG, formerly Ontario Hydro) are major contributors to the public-health crisis caused by air pollution in Ontario:

1. OPG's coal plants produce as much air pollution as 6.2 million cars.[4]
2. OPG's coal plants are responsible for 67% of Ontario's chromium emissions (a carcinogen)[5]; 34% of Ontario's airborne mercury emissions (a neurotoxin)[6]; 27% of Ontario's sulphur dioxide emissions (smog and acid rain)[7]; 27% of Ontario's arsenic emissions (a carcinogen)[8]; approximately 20% of Ontario's greenhouse gas emissions (global warming and climate change)[9]; and 14% of Ontario's nitrogen oxides emissions (smog and acid rain)[10].
3. OPG's Nanticoke coal-fired power plant on Lake Erie is Canada's #1 air polluter. Nanticoke produces more air pollution than is reported by all the polluters in Saskatchewan, Manitoba, New Brunswick or Nova Scotia.[11]
4. OPG's Lambton coal-fired power plant near Sarnia is Ontario's #2 air polluter.[12]
5. OPG's coal plants also emit dioxins and furans (endocrine disruptors) and lead (a neurotoxin).[13]
6. The output and greenhouse gas emissions of OPG's coal-fired power plants increased by approximately 125% between 1995 and 2001.[14]

For more on the health impacts of air pollution, see Appendix A.

Regulatory Requirements for an Early Coal Phase-Out

Smog

In 2001, OPG's five coal-fired power plants emitted 42,170 tonnes of nitrogen oxides (measured as NO) and 147,090 tonnes of sulphur dioxide.[15] They are responsible for 14% and 27% of Ontario's total nitrogen oxides and sulphur dioxide emissions respectively.[16]

The *Ozone Annex to the 1991 Canada-United States Air Quality Agreement* requires the total nitrogen oxides emissions (measured as NO) of fossil (coal, oil and natural gas) power plants in southern Ontario to be capped at 25,490 tonnes per year (measured as NO) commencing in 2007.[17]

In Halifax in October 1998, Canada's federal, provincial and territorial ministers of energy and environment endorsed the Canada-Wide Acid Rain Strategy for Post-2000 which calls for a 75% reduction in sulphur dioxide emissions (which are also major contributors to smog) in Ontario and Quebec.[18] The Government of Ontario is proposing to reduce Ontario's nitrogen oxides and sulphur dioxide emissions by 45% and 50% respectively by 2010.[19]

Acid Rain

Acid rain is an environmental pollutant formed when sulphur dioxide and nitrogen oxides combine with moist air and fall to the earth as precipitation.

The Government of Canada has signed the United Nations Economic Commission For Europe's Second Sulphur Protocol which requires the country to work toward achieving "critical loads" — that is, levels of acid rain that do not harm our lakes and forests.[20] According to the Acidifying Emissions Task Group, sulphur dioxide emissions in eastern Canada and the United States must be reduced by a further 75%, relative to the existing legally binding caps, to achieve these levels.[21]

Mercury

Mercury is a neurotoxin and a fetotoxin.[22] Infants and children are most at risk from mercury contamination.

OPG's coal plants are responsible for 34% of Ontario's airborne mercury emissions.[23] Between 1988 and 2000, OPG's mercury emissions increased by 18%. Over the same time period, all other mercury emitters in Ontario reduced their combined emissions by 82%.[24]

The *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem* requires Ontario to reduce its mercury emissions by 90%, relative to its 1988 level, by 2010.[25]

Climate Change

Greenhouse gases trap heat in the earth's atmosphere causing global warming and, as a result, climate change. Ontario Power Generation's five coal plants are responsible for approximately 20% of Ontario's greenhouse gas emissions.[26]

In light of the potentially devastating effects of climate change, Canada has signed several international agreements to reduce greenhouse gas emissions. First, in 1992, at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, Canada signed the United Nations Framework Convention On Climate Change. The goal of this international agreement is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system.[27]

As a first step toward meeting the convention's goal, developed nations (including Canada) made a commitment to stabilize their greenhouse gas emissions at 1990 levels by the year 2000.[28] This was a modest commitment given that climate scientists from around the world maintain that a reduction in greenhouse gas emissions of at least 50% from 1990 levels is required to stabilize the concentrations of greenhouse gases in the atmosphere at their current levels.[29] Canada, including Ontario, has failed to reach this target reduction.

In December 1997, in Kyoto, Japan, more than 150 countries met to take stock of their progress in reducing greenhouse gas emissions and to re-affirm their commitment to achieving the Framework Convention On Climate Change objective. In Kyoto, the Canadian government promised to improve its greenhouse gas control record by committing to reduce its emissions by 6% relative to its 1990 levels between 2008 and 2012.[30] The Government of Canada ratified the Kyoto Protocol in December 2002.

Advancing the Coal Phase-Out Date

Ontario has significant greenhouse gas, nitrogen oxides, sulphur dioxide and mercury emission reduction goals for 2010. A coal phase-out by 2010 could make a very large contribution to the achievement of these goals while also significantly improving the quality of life of all of Ontario's citizens. A coal phase-out will also be central to achieving current emission reduction goals at the lowest possible cost.

By advancing its coal phase-out date, Ontario can ensure compliance with emission limits for the following pollutants:

Greenhouse Gases

The Kyoto Protocol requires Canada to reduce its greenhouse gas emissions by 6% between 2008 and 2012 relative to its 1990 level. A coal phase-out by 2010 would provide Ontario with 50% to 80% of the total greenhouse gas emission reductions the entire province needs to achieve compliance with its Kyoto Protocol target in 2010.

- Replacing OPG's coal-fired power plants with high-efficiency natural gas combined-cycle turbines would provide Ontario with 50% of the greenhouse gas emission reductions the entire province needs to achieve its Kyoto target in 2010.[31] According to Canadian Manufacturers and Exporters: "One of the least expensive ways of reducing GHG [greenhouse gas] emissions is by switching from coal to natural gas, especially in the generation of electricity."[32]

- Replacing the power from OPG's coal plants with a combination of energy efficiency and new renewable power sources could provide 80% of the total greenhouse gas emission reductions the entire province needs to achieve compliance with its Kyoto target in 2010.[33]

Nitrogen Oxides

Ontario is proposing to reduce its smog and acid rain-causing nitrogen oxides emissions by 45% by 2010.[34] A coal phase-out by 2010 would provide Ontario with 42% to 91% of the total nitrogen oxides emission reductions the province needs to achieve this goal.[35]

Sulphur Dioxide

Ontario is proposing to reduce its smog and acid rain-causing sulphur dioxide emissions by 50% by 2010.[36] A coal phase-out by 2010 would provide Ontario with 117% to 125% of the total sulphur dioxide emission reductions the province needs to achieve this goal.[37]

Mercury

The *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem* (March 2002) requires Ontario to reduce its mercury emissions by 90% by 2010.[38] A coal phase-out by 2010 would provide Ontario with approximately 50% of the total mercury emission reductions the province needs to achieve this goal.[39]

The Government of Ontario's Coal Phase-Out Policies

- In 2001, the Government of Ontario established a regulation that requires OPG's Lakeview Generating Station in Mississauga to cease burning coal as of April 30, 2005.[40]

- In the summer of 2002, the Government of Ontario vetoed the proposed sale of OPG's Atikokan and Thunder Bay Generating Stations to Sherritt International Inc. because Sherritt would not agree to convert the plants from coal to natural gas.[41] (Sherritt is a western Canadian coal producer that sells coal to OPG for its Atikokan and Thunder Bay power plants.[42])

- On September 18, 2002, the Government of Ontario promised to phase-out coal burning at all of OPG's coal plants by 2015.[43]

The Government of Ontario's Strategy to Phase-Out Coal

The Government of Ontario has implemented a multi-pronged strategy to promote the phase-out of OPG's coal plants.

- As part of the move to a competitive electricity market, OPG has put three of its five coal-fired power plants up for sale. In response to requests from the Ontario Clean Air Alliance, Mayor Hazel McCallion of Mississauga and others, the Government has made the sales of these plants conditional on their conversion to natural gas.

- In July 2002, the Government of Ontario endorsed the promotion of energy conservation by Hydro One and Ontario's municipal utilities (e.g., Toronto Hydro).[44] In December 2002, the Government amended the *Ontario Energy Board Act* to make the promotion of energy conservation and efficiency one of the objectives of the Ontario Energy Board. (Hydro One and Ontario's municipal utilities are regulated by the Ontario Energy Board.) In addition, the Government gave itself the authority to issue directives to the Ontario Energy Board to require the Board to promote energy conservation and efficiency.[45]

- On November 12, 2002, the Government of Ontario directed OPG to expand the output of the Sir Adam Beck Generating Station by building another tunnel under the City of Niagara Falls.[46] The Sir Adam Beck Generating Station is a 100% pollution-free source of clean, renewable power. The increased output of Sir Adam Beck could displace approximately 50% of the output of the Lakeview coal-fired power plant.[47]

- On November 12, 2002, the Government of Ontario also directed OPG to accelerate its assessment of building a new, high-efficiency natural gas power plant in downtown Toronto on the site of its old Hearn coal-fired power plant (no longer in service).[48] As a result, on December 19, 2002, OPG and TransCanada PipeLines announced the formation of a 50/50 limited partnership, Portlands Energy Centre L.P., to assess the viability of developing a 550 megawatt natural gas-fired power plant on the Hearn site.[49] The proposed power plant could displace 100% of the output of the Lakeview coal-fired power plant in addition to 6% of the output of the Nanticoke coal-fired power plant.[50] The Portlands Energy Centre has also signed a Letter of Intent with Enwave District Energy Limited to supply it with steam to heat office buildings in downtown Toronto.[51]

- OPG and Atco Power are building a new, high-efficiency 580-megawatt natural gas-fired power plant (the Brighton Beach power plant) on the site of OPG's old J. Clark Keith coal-fired power plant in Windsor. This power plant will be able to displace 22% of the output of the Nanticoke coal-fired power plant.[52] According to OPG, the Brighton Beach power plant is "a significant, cost-effective new supply of electricity generation for Ontario."[53]

- On November 12, 2002 the Government of Ontario also announced numerous tax incentives to "support the creation of additional electricity from cleaner, alternative and renewable energy sources including natural gas, hydro-electric, solar and wind power."[54]

Since the summer of 2002, the Government of Ontario has announced a number of important initiatives to help phase-out OPG's coal-fired power plans. However, these initiatives are not sufficient to phase-out all of OPG's coal plants by 2015 while still meeting Ontario's complete power needs, let alone allow it to meet the highly preferable phase-out date of 2010.

The Ontario Clean Air Alliance's Phase-Out Targets

The Ontario Clean Air Alliance recommends a three-stage phase-out of OPG's coal fired power plants, with the phase-out of all facilities completed no later than 2010.

1. a phase-out of coal-burning at the Nanticoke Generating Station by 2005;
2. a phase-out of coal-burning at the Lambton Generating Station by 2007;
3. a phase-out of coal-burning at the Atikokan and Thunder Bay Generating Stations in 2010 or when they are sold, whichever comes first.

The Ontario Clean Air Alliance's Strategy to Phase-Out OPG's Coal Plants by 2010 or Sooner

The Ontario Clean Air Alliance has developed a four-pronged strategy to phase-out OPG's coal plants by 2010 or sooner:

1. ban non-emergency coal-fired electricity exports;
2. increase energy conservation;
3. increase the use of renewable power sources;
4. use high-efficiency natural gas power plants as a bridge to a green power sector and a green economy.

Ban Non-Emergency Coal-Fired Electricity Exports

In 2001, 10% of OPG's coal-fired electricity production was exported.[55] Given the Government of Ontario's recognition of the need to phase-out coal to protect public health and the environment, it is not consistent for it to continue to allow coal-fired electricity exports that play no role in meeting Ontario's power needs. Such a ban would in no way interfere with requirements to import or export emergency power from any source.

Energy Conservation

Energy conservation can simultaneously reduce pollution, reduce customers' bills, make Ontario's economy more competitive and reduce taxes.

Promoting Conservation Through Utilities

Ontario's electric distribution companies (e.g., Hydro One, Hamilton Hydro, Toronto Hydro) are ideal organizations to help residential, commercial and industrial consumers conserve energy for the following reasons:

i) they serve all the electric customers in their franchise areas;

ii) they are trusted sources for energy information and services; and

iii) they are regulated by the Ontario Energy Board (OEB).

In 1998, the OEB linked Enbridge Gas Distribution's profits to its success in reducing its customers' bills by increasing their energy efficiency. As a result of this profit incentive, Enbridge has developed the best utility-sponsored energy conservation programs in Canada. Specifically in 1999 Enbridge's energy conservation programs reduced its residential, commercial and industrial customers' bills by $57 million. As a consequence Enbridge's shareholders earned an energy conservation bonus of $4.8 million.[56] According to an independent U.S. report, Enbridge's 1995 to 2003 energy conservation programmes will reduce its customers' bills by $537 million.[57] The Industrial Gas Users Association, the Consumers Association of Canada, Pollution Probe and others are recommending that the OEB award Enbridge conservation bonuses of $3.5 million and $4.6 million as a reward for the achievements of its 2000 and 2001 energy conservation programs respectively.[58]

Aggressive promotion of energy conservation by Ontario's electricity distribution companies (e.g., promotion of super-efficient air-conditioners to reduce the peak day demand for power) could also result in very large bill savings for Ontario's electricity consumers and help pave the way for a phase-out of OPG's coal-fired power plants.

Energy Conservation's Impact on Ontario's Budget

The aggressive promotion of energy conservation could also help Ontario avoid significant budget impacts and potential taxation increases.

In November 2002, the Government of Ontario froze the retail price of electricity in Ontario at 4.3 cents per kilowatt-hour for small-volume customers. Wholesale prices, however, are not covered by the freeze. As a consequence, if the average wholesale price of electricity exceeds 4.3 cents per kilowatt-hour, the deficit (the difference between the retail and the average wholesale price times the total quantity of electricity consumed by the province's small-volume consumers) will have to be financed by Ontario taxpayers. Aegent Energy Advisors has estimated the net cost to tax payers of the rate freeze in year one to be $300 million.[59] Energy conservation can reduce the magnitude of this deficit in two ways:

- First, by reducing the demand for electricity, energy conservation programs will reduce the wholesale price of electricity. If energy conservation programs reduce the average wholesale price to 4.3 cents per kilowatt-hour, the projected deficit will be eliminated. If energy conservation programs drive the average wholesale price of electricity below 4.3 cents per kilowatt-hour, the deficit will be transformed into a surplus.

- Second, by reducing electricity consumption, energy conservation programs will reduce the magnitude of the deficit that must be financed by taxpayers if the wholesale price remains higher than the retail price.

Driving Energy Conservation

Pursuant to Section 27.1 of the *Ontario Energy Board Act*, the Minister of Energy should direct the OEB to:

1. permit electric utilities to recover from their ratepayers:
    a. their reasonably incurred 2003 and 2004 costs and lost revenues from the development and implementation of pilot energy conservation programs; and
    b. reasonable shareholder incentive payments for their energy conservation programs that reduce their customers' bills; and
2. issue, by December 2003, guidelines with respect to the scope, cost-effectiveness tests, cost recovery mechanisms, monitoring and evaluation procedures and shareholder incentive mechanisms for electric utility energy conservation programs.

Obtaining Additional Electricity Supplies

Switching from dirty coal to cleaner-burning natural gas for electricity generation can reduce greenhouse gas emissions by 61%, nitrogen oxides emissions by more than 90%, and sulphur dioxide emissions by 99.5%. Furthermore emissions of arsenic, chromium, dioxins, lead and mercury are eliminated.[60]

Switching from coal to renewable sources (water, wind, solar) for electricity generation can reduce air pollution emissions by 100%. However, some renewable options can have negative impacts on river flows, water quality, fish passage and protection and First Nations communities. To encourage supply and demand for renewable power sources that will impose less stress on the environment, Environment Canada has developed interim EcoLogo criteria for environmentally preferable, low impact renewable power sources. Power projects that have been certified under Environment Canada's Environmental Choice Program are awarded an EcoLogo certification mark.[61]

In order to phase-out OPG's coal plants by 2010 or sooner and keep the lights on in Ontario, new renewable and natural gas-fired power plants must be built in the province. However, according to the Government of Ontario, investor-owned power companies will not build new power plants in the absence of long-term contracts for their electricity production:

> "The wholesale market is designed to give price incentives to new supply to come on stream. Even though prices have been high, potential investors have been deterred by a number of other factors; for example, the expected return of the low cost nuclear base load plant at Pickering A and Bruce A and its implication of low future market prices for several years. Investors have also been deterred by the destruction of the balance sheets of many major North American and European power generators in the past 18 months. Many companies have had low earnings as a result of over-expansion and depressed demand in the United States. Accounting and regulatory scandals have also rocked investor confidence.
>
> Consequently, the shares of stand-alone merchant energy companies are trading at all time lows, and these energy companies have limited access to new debt and equity capital. *Under these circumstances, generators can only get financing for new generating capacity if they have sold a substantial portion of their output in advance*." [62] [emphasis added]

Therefore the Government of Ontario must pursue one of the following three options:

1. Direct OPG to build sufficient new renewable and natural gas-fired power generation to permit the phase-out of its coal plants;

2. Direct the Ontario Electricity Financial Corporation (OEFC) to enter into long-term contracts with investor-owned power companies, industrial companies (e.g., Dofasco), municipal electric utilities, co-operatives and/or OPG for sufficient new supplies of renewable and natural gas-fired generation to permit a coal phase-out. (The OEFC is one of the Ontario Hydro successor companies and is 100% owned by the Government of Ontario. Currently, the OEFC has 88 contracts with investor-owned companies for the supply of electricity from renewable and natural gas-fired power facilities.[63] These contracts provide Ontario with approximately 7% of its total supply of electricity.[64])

3. Direct Hydro One and all municipal utilities (e.g., Toronto Hydro), all electricity retailers (e.g., Direct Energy) and all large commercial, institutional and industrial power consumers (e.g., Inco, General Motors) to enter into capacity contracts with electricity supply companies (e.g., OPG, Great Lakes Power) to meet their peak day power requirements from coal-free electricity generating stations.

EcoLogo-certified renewable power sources are the environmentally preferable supply options to phase-out coal-fired electricity generation. However, current renewable supply options typically have a higher financial cost than high-efficiency natural gas-fired combined-cycle power plants. Therefore, to ensure that a coal phase-out is combined with the socially optimal level of new renewable power supplies, the Government must also establish a renewable supply objective (RSO) that states the proportion of Ontario's total electricity demand that must be met by EcoLogo-certified renewable power sources.

What Will It Cost?

Replacing OPG's coal plants with new, high-efficiency natural gas-fired power plants alone could raise Ontario's average price of electricity by approximately 6% relative to pre-market opening (May, 2002) rates.[65]

However, this potential price impact is likely to be significantly reduced by a number of factors. The first is that power needs can be met through many energy conservation options at a lower cost than the cost of switching from coal to natural gas. This will make energy conservation programs a preferred market option for meeting consumer power needs while reducing the use of coal power.

Second, some renewable power options can provide electricity at a lower cost than natural gas. For example, the output of the Sir Adam Beck Generating Station at Niagara Falls can be increased for a cost of approximately 2.7 cents per kilowatt-hour, a cost that is substantially less than the average wholesale cost of power in Ontario.[66] Therefore, the expansion of the Sir Adam Beck Generating Station will put downward pressure on electricity rates.

Third, OPG may be able to reduce the net financial cost of phasing-out its coal plants by selling its resulting excess greenhouse gas emission permits.

The Impact of Greenhouse Gas Credits

The Government of Canada is proposing to reduce the greenhouse gas emissions of large industrial emitters, including coal-fired power plants, by 55 megatonnes per year.[67] Furthermore, the federal government's *Climate Change Plan for Canada* suggests that each large industrial emitter be given greenhouse gas emission permits equal to 85% of their forecast business-as-usual emissions.[68] Under this scenario, OPG would receive approximately 26.6 million tonnes of greenhouse gas emission permits per year for its coal-fired power plants.[69] This means that if OPG replaced its coal-fired power plants with high-efficiency natural gas combined-cycle power plants, it would have approximately 14.4 million tonnes of unneeded greenhouse gas emission permits in hand.[70] Assuming a market price of $10 per tonne for greenhouse gas emission permits, OPG could sell its excess permits for $144 million per year.[71]

Under this scenario, a coal phase-out achieved exclusively by switching fuel sources to natural gas would raise average electricity rates by 5% by 2010 or 0.7% per year relative to pre-market opening (May 2002) prices.[72] As noted-above, a coordinated program of increasing energy efficiency, expansion of hydro power from Niagara and replacement of coal-fired generators with high-efficiency natural gas units can allow for a coal phase-out at a significantly lower cost than a pure gas option. Furthermore, such a multi-sectoral program could also generate more excess greenhouse gas emission permits for OPG, which could in turn be used to further dampen the price impact of a coal phase-out.

Is There Enough Natural Gas?

Converting all of OPG's coal-fired power plants to natural gas would increase North American gas demand by 1%.[73] According to the National Energy Board, the total remaining natural gas supplies in Canada and the United States. (excluding Alaska) are 1,637 to 2,178 trillion cubic feet.[74] That is, Canadian and American gas supplies are at least 63 to 83 times greater than the annual current gas consumption of Canada and the U.S.[75]

Will a Coal Phase-Out Raise the Price of Natural Gas for Home Heating in Ontario?

The price of natural gas for home heating in Ontario is determined by the total demand for and supply of natural gas within North America. In other words, we do not have a Made-in-Ontario price for natural gas. Converting all of OPG's coal-fired power plants to natural gas would raise North American gas demand by only 1%. As a result, such a conversion would have an imperceptible impact on the price of natural gas for home heating in Ontario. Moreover, despite the fact that North American gas demand is forecast to grow significantly, the New York Mercantile Exchange's futures contract price for natural gas in February 2009 is 30% lower than its March 2003 price.[76]

Will a Coal Phase-Out Require a New Pipeline to Western Canada?

Ontario obtains natural gas from western Canada and other sources via the TransCanada PipeLines and the Alliance/Vector pipeline systems. Currently, both of these systems are operating at less than full capacity and the capacities of these systems can be increased by installing more compressors and/or by looping limited sections (e.g., 40 km). Therefore a coal phase-out will not require a new pipeline to western Canada.

What About Coal-Fired Electricity Imports?

Ontario's electricity imports and exports are controlled by Ontario's Independent Electricity Market Operator, which is an agency of the Government of Ontario.

The North American Free Trade Agreement permits Ontario to establish equivalent environmental emission standards for Ontario's domestic and imported electricity supplies. As a consequence, a phase-out of OPG's coal plants can and should be accompanied by a phase-out of our imports of coal-fired electricity from the United States.

What Can Governments, Industry and Citizens Do to Facilitate an Early Coal Phase-Out?

Government of Canada

Greenhouse Gas Emissions

The Government of Canada's Climate Change Plan for Canada proposes to establish a greenhouse gas emissions trading system to reduce the emissions of large industrial emitters, including OPG, by 55 megatonnes per year.[77] The Government of Canada should establish a greenhouse gas emissions trading system that will give OPG a financial incentive to phase-out its coal plants by 2010 or sooner.

The Ozone Annex

Approximately 50% of the Ontario's smog comes from the United States. According to OPG, 33% of the U.S. emissions that arrive in Ontario are produced by power plants.[78]

On December 7, 2000 the Governments of Canada and the United States signed the *Ozone Annex to the 1991 Canada-United States Air Quality Agreement*.[79] The Ozone Annex requires fossil power plants in southern Ontario to reduce their smog-causing nitrogen oxides emissions by approximately 50% by 2007. Specifically, the nitrogen oxides emissions (measured as NO) of southern Ontario's fossil power plants are capped at 25,490 tonnes commencing in 2007.[80]

Unfortunately, Ontario's new nitrogen oxides emissions limits for Ontario's fossil power plants are not consistent with the *Ozone Annex*'s requirements. Specifically, the Government of Ontario's nitrogen oxides emissions regulations cap the NO emission *allowances* of southern Ontario power plants at 25,600 tonnes, not 25,490 tonnes as required by the *Ozone Annex*.[81] More seriously, Ontario's emissions trading rules permit fossil plants' NOx emissions to exceed 25,600 tonnes if they buy *emission reduction credits*. These *emission reduction credits* would permit the fossil power plants to increase their emissions by a further 33%.[82] Under the Ontario rules, these credits can be bought from companies that have not reduced their total emissions.[83]

Canada's Federal Minister of the Environment has repeatedly asked the Government of Ontario to bring its nitrogen oxides emission regulations for southern Ontario's fossil power plants into compliance with the Ozone Annex.[84] Unfortunately, the Government of Ontario has repeatedly ignored his requests.

The Government of Canada should use its authority under the *Canadian Environmental Protection Act* to cap the NO emissions of southern Ontario's fossil power plants at 25,490 tonnes commencing in 2007.

Toxic Emissions

According to section 93 of the Canadian Environmental Protection Act, 1999 (CEPA), the Government of Canada can regulate the emissions of substances that are included on CEPA's List of Toxic Substances. Currently, the list includes the following pollutants that are emitted by OPG's coal power plants: ammonia, arsenic, cadmium, chromium, dioxin, lead, mercury, nickel and respirable particulate matter less than or equal to 10 microns (PM-2.5 and PM-10).[85] Furthermore, according to Section 330 of CEPA, the Government of Canada can establish toxic regulations that apply only to OPG's coal plants.

The Government of Canada should use its authority under CEPA to require OPG's coal plants to virtually eliminate their toxic emissions by 2010 or sooner.

Government of Ontario

Commit to a 2010 Phase-Out

The government should immediately ban non-emergency exports of coal power and should create a firm timeline for phasing out Ontario's coal plants by or before 2010. Such a plan should target the largest emitters for early phase-out (e.g. Nanticoke and Lambton).

Increase Energy Conservation

Pursuant to Section 27.1 of the *Ontario Energy Board Act*, the Minister of Energy should direct the OEB to:

1. permit electric utilities to recover from their ratepayers:
    a. their reasonably incurred 2003 and 2004 costs and lost revenues from the development and implementation of pilot energy conservation programs; and
    b. reasonable shareholder incentive payments for their energy conservation programs that reduce their customers' bills; and
2. issue, by December 2003, guidelines with respect to the scope, cost-effectiveness tests, cost recovery mechanisms, monitoring and evaluation procedures and shareholder incentive mechanisms for electric utility energy conservation programs.

Encourage the Development of New Coal-Free Electricity Supplies

The government should also facilitate the development of new supply options by either:

- directing the Ontario Electricity Financial Corporation to enter into long-term contracts with coal-free electricity suppliers; or by
- directing utilities and large consumers to enter long-term contracts for peak power from coal-free sources; or by
- directing OPG to develop new renewable or high-efficiency gas power sources sufficient to displace current coal-fired capacity.

Ensure a Strong Percentage of Clean Renewable Power in New Supplies

To ensure that a coal phase-out is combined with the socially optimal level of new renewable power supplies, the Government must also establish a renewable supply objective (RSO) that states the proportion of Ontario's total electricity demand that must be met by EcoLogo-certified renewable power sources. The RSO should rise on an annual basis.

Municipalities

Ontario's municipalities should phase-out their purchases of coal-fired electricity for their municipal buildings by:

i) making cost-effective energy efficiency and conservation investments to reduce their demand for electricity; and

ii) purchasing coal-free electricity.

OPG is willing to enter into contracts with Ontario municipalities to supply them with power generated exclusively by its existing water power facilities (e.g., the Sir Adam Beck Generating Station at Niagara Falls). For a list of companies that are willing to sell Ontario's municipalities coal-free electricity, please visit: www.electricitychoices.org/coalfree.

Corporations

Ontario's corporations should phase-out their purchases of coal-fired electricity by:

i) making cost-effective energy efficiency and conservation investments to reduce their demand for electricity; and

ii) purchasing coal-free electricity.

To date, the following companies are purchasing some of their electricity supplies from coal-free electricity generating facilities that have received Environment Canada's EcoLogo certification or the equivalent: FAG Bearings Limited, Husky Fuel Injection Molding Systems and RBC Financial Group.[87]

For a list of electricity suppliers that are willing to sell Ontario's corporations coal-free electricity please visit: www.electricitychoices.org/coalfree.

Citizens

Ontario's citizens should ask Premier Eves to implement the OCAA's strategy to phase-out OPG's coal plants by 2010 or sooner. Premier Eves can be contacted by mail at Queen's Park, Toronto M7A 1A1; by email at webprem@gov.on.ca or by phone at 416-325-1941.

Ontario citizens should ask Canada's Environment Minister David Anderson to:

a) establish a greenhouse gas emissions trading system that will motivate OPG to phase-out its coal plants by 2010 or sooner;

b) establish regulations that will bring Ontario's fossil power plants into compliance with the *Ozone Annex to the 1991 Canada-United States Air Quality Agreement*; and

c) establish regulations that will require OPG to virtually eliminate its coal plants' toxic emissions by 2010 or sooner.

Minister Anderson can be contacted by mail at 28th Floor, 10 Wellington Street, Hull, Quebec K1A 0H3; by email at David.Anderson@ec.gc.ca or by phone at 819-997-1441.

Ontario's citizens should phase-out their own purchases of coal-fired electricity by:

i) making cost-effective energy efficiency and conservation investments to reduce their demand for electricity; and

ii) purchasing coal-free electricity. For information about energy conservation and coal-free electricity supply options, residential consumers can visit our web site: www.electricitychoices.org.

Conclusion

Ontario simply cannot afford to wait another 12 years to end the use of coal to produce electricity. The health impacts of burning coal are well documented (see Appendix A) and are only growing. Phasing out coal is a practical – and indeed critical – step for clearing our air. A coal phase out will improve quality of life, economic competitiveness and energy security in Ontario. We need to get on with the job.

Appendix A

Health Impacts of Air Pollution

Smog

Two of the most significant components of smog are ground-level ozone and airborne particulates.[88] Ground-level ozone is formed when nitrogen oxides and volatile organic compounds react in the atmosphere in the presence of sunlight. The principal substances that create airborne particulates are sulphur dioxide, nitrogen oxides, ammonia and volatile organic compounds.[89]

In June 2000, the Ontario Medical Association (OMA) released a report, *The Illness Costs of Air Pollution In Ontario*, which analyzed the health-related costs of smog (ground-level ozone and airborne particulates).[90] According to the OMA's report, Ontario's health-related costs due to smog are approximately $9.9 billion per year. The major components of the $9.9 billion annual cost are: heath care costs ($601 million); lost productivity ($561 million); increased pain and suffering ($4.758 billion); and loss of life ($4.058 billion).

According to the OMA report, air pollution causes approximately 1,900 premature deaths, 9,800 hospital admissions, 13,000 emergency room visits and 46 million minor illnesses per year in the province.

According to the OMA, every Ontarian is affected by air pollution. However, the more sensitive subgroups include the elderly and those with heart and lung diseases such as asthma, emphysema and chronic bronchitis. Children's exposure and risk of harm due to air pollution can be greater than adults because they breathe faster and, in summer, spend more time being active outdoors.[91] Approximately 10% of Canadian children have asthma.[92]

Acid Rain

Acid rain is responsible for major damage to our aquatic ecosystems. In fact, at least 150,000 of the 700,000 lakes in eastern Canada have been damaged by acid rain, resulting in significant losses in aquatic life, such as ducks, loons and fish.[93]

Forest ecosystems are also harmed by acid rain. Acid rain can increase defoliation and the death rate of trees and can deplete important nutrients from forest soils. Preliminary analyses indicate that the impact of acid rain on the most acid-sensitive soils in eastern Canada leads to an annual tree-growth productivity loss of 10%.[94]

Canada has made good progress in reducing the emissions of sulphur dioxide. In eastern Canada, sulphur dioxide emissions have been cut in half from 1980 levels. Nevertheless, even with full implementation in 2010 of the current program, sensitive ecosystems in almost 800,000 square kilometres of south-eastern Canada - an area the size of the United Kingdom and France combined - will still receive harmful levels of acid rain. As a result, an estimated 95,000 lakes in south-eastern Canada will remain acidified.[95]

Mercury

Airborne mercury emissions from coal-fired power plants and other sources are converted into methyl mercury when deposited in lakes and rivers.[96] Nearly all the mercury that accumulates in fish tissue, for example, is methyl mercury. Methyl mercury that is taken in as part of a regular diet is almost completely absorbed into the blood and distributed to all tissues including the brain. It is also readily passed through the placenta to the fetus and fetal brain. This means it can cause serious neurological and developmental damage, including subtle losses of sensory or cognitive ability, delays in developmental milestones such as walking and talking, and birth defects.[97]

According to a U.S. National Academy of Sciences report, the bioaccumulation of methyl mercury can lead to high concentrations in many species of fish and "result in unacceptable levels of exposure and risk to highly exposed or susceptible subpopulations." According to the report, the "population at highest risk is the offspring of women . . . who consume large amounts of fish and seafood."[98] According to the U.S. Environmental Protection Agency, mercury exposure may be responsible for neurological problems in 52,000 to 277,000 children born each year in the United States.[99]

Wildlife such as loons, eagles, otters, mink and ospreys that consume large quantities of fish are also exposed to methyl mercury poisoning. The resulting neurological impairment is especially damaging for these predators, which rely on speed and coordination to obtain their food.

Mercury contamination is responsible for 20% to 48% of the consumption restrictions placed on fish in Ontario's Great Lakes. Moreover, mercury contamination is responsible for more than 99% of all consumption restrictions placed on fish in Ontario's inland lakes.[100]

Climate Change

According the United Nation's Intergovernmental Panel on Climate Change, the earth's surface temperature is forecast to rise by 1.4 to 5.8 degrees Celsius between 1990 and 2100.

> "This is about two to ten times larger than the central value of observed warming over the 20th century and the projected rate of warming is very likely to be without precedent during at least the last 10,000 years…"[101]

The David Suzuki Foundation describes climate change as "the most urgent slow-motion catastrophe facing humankind."[102] This statement is appropriate given the predicted health and environmental impacts of climate change. Climate change is expected to undermine economies and communities by causing more frequent and severe climate extremes such as heat waves, floods, droughts and storms; disrupting agriculture, forests and ecosystems; increasing the spread of infectious diseases (e.g., West Nile virus); and raising sea-levels.[103]

Appendix B

Ontario Power Generation's Five Coal-Fired Power Plants: Electricity Generation and Emissions, 2001

	Atikokan *West of Thunder Bay*	**Lakeview** *Mississauga*	**Lambton** *St. Clair River South of Sarnia*	**Nanticoke** *Lake Erie*	**Thunder Bay** *Thunder Bay*
Electricity Generation (Gwh)	838	3,081	10,472	21,124	1,670
Greenhouse Gases (tonnes)	850,000	2,760,000	9,420,000	20,260,000	1,800,000
Sulphur Dioxide (tonnes)	4,480	19,000	28,300	86,500	8,810
Nitrogen Oxides (NO) (tonnes)	950	5,050	11,800	22,400	1,970

1 Gwh = 1,000,000 kilowatt-hours
Source: Ontario Power Generation, *Towards Sustainable Development: 2001 Progress Report*, Appendix A.

Appendix C

Ontario Power Generation's Coal Plants: Electricity Generation and Emissions, 1995 to 2001

	1995	1996	1997	1998	1999	2000	2001
Electricity Generation (Gwh)	16,699	18,915	24,523	33,275	34,068	41,446	37, 185
Greenhouse Gases (tonnes)	15,400,000	17,900,000	22,430,000	29,800,000	30,530,000	37,640,000	35,090,000
Sulphur Dioxide (tonnes)	74,100	84,500	123,150	140,810	140,580	163,510	147,090
Nitrogen Oxides (NO) (tonnes)	28,200	35,100	42,770	54,320	49,240	49,450	42,170

1 Gwh = 1,000,000 kilowatt-hours
Sources: Ontario Power Generation, *Towards Sustainable Development: 2001 Progress Report*, Appendix A; *Towards Sustainable Development: 1999 Progress Report*, Appendix A; Email from Bob Kozopas, Ontario Power Generation, August 22, 2000.

Endnotes

[1] Ontario Medical Association, News Release, "Beware The Air You Breathe: Ontario's Doctors Call For Cleaner Air", May 12, 1998.

[2] URL: http://www.oma.org.

[3] Ontario Medical Association, Ontario's Air: Years of Stagnation, (June 2001), p. 2

[4] In 2000 OPG's coal plants emitted 37,640,000 tonnes of carbon dioxide. The average car emits 6.1 tonnes of carbon dioxide per year. Ontario Power Generation, Towards Sustainable Development: 2000 Progress Report, pp. 55 – 57; and U.S. PIRG Education Fund, Up In Smoke: Congress' failure to control emissions from coal power plants, (Washington, D.C., 1999), p. 27.

[5] Sarah Rang, Up The Stack: Coal-Fired Electricity's Toxic Impact, An OCAA Air Quality Report, (July, 2002), p. 10.

[6] Up The Stack, (July 2002), p. 9

[7] Ontario Ministry of the Environment, Discussion Paper on Ontario's Clean Air Plan For Industry: Developing NOx and SO2 Emission Limits, (December, 2002), p. 2.

[8] Up The Stack, p. 12.

[9] In 2000 OPG's coal-fired power plants emitted 37,640,000 tonnes of greenhouse gases. Ontario's total forecast greenhouse gas emissions for 2000 were 193,000,000 tonnes. Towards Sustainable Development: 2000 Progress Report, pp. 55 – 57; and National Climate Change Process, Analysis and Modelling Group, Canada's Emissions Outlook: An Update, (December 1999), p. C – 30.

[10] Ontario Ministry of the Environment, Coal-Fired Electricity Generation In Ontario, (March, 2001), p. 8.

[11] Up The Stack, p. 2.

[12] The Lambton Generating Station is Ontario's #2 source of greenhouse gas and nitrogen oxides emissions. Email from Simon Wong, Ontario Ministry of the Environment to Jack Gibbons, February 4, 2003.

[13] Up The Stack, pp. 6 & 7; and Government of Canada, Canadian Environmental Protection Act: Strategic Options for the Management of Toxic Substances: Electric Power Generation (Fossil Fuel) Sector: Report of Stakeholder Consultations, (April 14, 1997), pp. 11, 16.

[14] Email from Bob Kozopas, Ontario Power Generation to Jack Gibbons, Ontario Clean Air Alliance, August 22, 2000; and Ontario Power Generation, Towards Sustainable Development: 2001 Progress Report, p. 52.

[15] Ontario Power Generation, Towards Sustainable Development: 2001 Progress Report, pp. 52

[16] Coal-Fired Electricity Generation In Ontario, p. 8; Discussion Paper on Ontario's Clean Air Plan For Industry, p. 2.

[17] The *Ozone Annex*'s NOx cap of 39,000 tonnes measured as NO2 is equivalent to a cap of 25,490 tonnes measured as NO. Environment Canada, News Release, "Canada and the United States Reach a Draft Agreement to Reduce Transboundary Smog: Statement of the Hon. David Anderson, Minister of the Environment", October 13, 2000; Government of Canada, News Release, "Canada and the United States Embark on New Era of Cleaner Air", December 7, 2000.

[18] Federal/Provincial/Territorial Ministers of Energy and Environment, The Canada-Wide Acid Rain Strategy for Post-2000, (October 19, 1998) and Supporting Document For The Canada-Wide Acid Rain Strategy For Post-2000.

[19] Ontario Environmental Bill of Rights Registry, EBR Registry Number: PA01E0026, *Emission Reductions From Ontario's Industrial Sources*, (October 24, 2001).

[20] United Nations Economic Commission For Europe, Protocol To The 1979 Convention On Long-Range Transboundary Air Pollution On Further Reduction Of Sulphur Emissions, Article 2; and Federal/Provincial/Territorial Ministers of Environment and Energy, Supporting Document For The Canada-Wide Acid Rain Strategy For Post-2000, (October, 1998), p. 4.

[21] The Acidifying Emissions Task Group, Towards a National Acid Rain Strategy, (October, 1997), pp. v, 41 and 52.

[22] Up The Stack, p. 8.

[23] Up The Stack, p. 9

[24] Bob Krauel, Environment Canada, "Summary – progress report", December 4, 2000.

[25] Harmful Pollutants Annex to the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem.

[26] In 2000 OPG's coal-fired power plants emitted 37,640,000 tonnes of greenhouse gases. Ontario's total forecast greenhouse gas emissions for 2000 were 193,000,000 tonnes. Towards Sustainable Development: 2000 Progress Report, pp. 55 – 57; and National Climate Change Process, Analysis and Modelling Group, Canada's Emissions Outlook: An Update, (December 1999), p. C – 30.

[27] United Nations, United Nations Framework Convention On Climate Change, Article 2.

[28] United Nations, United Nations Framework Convention On Climate Change, Article 4.

[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] United Nations Framework Convention on Climate Change, Conference Of The Parties, Third Session, Kyoto, 1 –-10 December, 1997, Agenda item 5, Kyoto Protocol To The United Nations Framework Convention On Climate Change.

[31] Ontario's forecast greenhouse gas emissions gap in 2010 is 43.92 megatonnes. The greenhouse gas emissions of OPG's five coal plants were 37.6 and 35.1 megatonnes respectively in 2000 and 2001. Converting the coal plants to high-efficiency natural gas combined-cycle turbines will reduce their greenhouse gas emissions by 61%. Analysis and Modelling Group, National Climate Change Process, Canada's Emissions Outlook: An Update, (December, 1999), p. C-30 and "The Magnitude of the Challenge: Revising the Gap", (February, 2002); Ontario Power Generation, Towards Sustainable Development: 2001 Progress Report, p. 52; and Ontario Clean Air Alliance, The Nanticoke Conversion Study, (April, 2001), p. 21.

[32] Canadian Manufacturers and Exporters, Pain Without Gain: Canada and the Kyoto Protocol, pp. 7, 8.

[33] OPG's coal plants emitted 35.1 megatonnes of greenhouse gases in 2001. Ontario's forecast greenhouse gas emissions gap in 2010 is 43.92 megatonnes. See endnote # 31.

[34] Ontario Ministry of the Environment, News Release, "Ontario Announces Bold Actions On Industry Emissions", October 24, 2001; and Environmental Bill of Rights Registry Number: PA01E0026, "Emission Reductions From Ontario's Industrial Sources", October 24, 2001.

[35] In 2001 OPG's Atikokan, Lambton, Nanticoke and Thunder Bay coal plants generated 34,104 Gwh of electricity and emitted 37,120 tonnes of NO. OPG is installing SCRs which will reduce Lambton's and Nanticoke's annual NO emissions by 12,000 tonnes. Therefore, assuming that these plants' power production levels remain constant, their NO emission rate will be 0.737 tonnes per Gwh (25,120 tonnes/34,104 Gwh). The NO emission rate of a combined-cycle natural gas-fired power plant is 0.163 tonnes per Gwh. Therefore, assuming 34,104 Gwh of electricity production, replacing these coal plants with high-efficiency natural gas-fired power plants will reduce NO emissions by 19,576 tonnes [(0.737 – 0.163) x 34,104]. 19,576 tonnes of NO is equivalent to 29,951 tonnes of NO2. According to the Ontario Ministry of the Environment, the gap in 2010 between Ontario's NOx emissions target and forecast NOx emissions is 33,000 to 71,000 tonnes measured as NO2. Ontario Power Generation, News Release, "Ontario Power Generation Announces Major Environmental Initiative", September 14, 2000; Towards Sustainable Development: 2001 Progress Report, p. 52; The Nanticoke Conversion Study, p. 19; and Ontario Ministry of the Environment, Discussion Paper on Ontario's Clean Air Plan For Industry: Developing NOx and SO2 Emissions Limits, (December, 2002), p. 4.

[36] Ontario Ministry of the Environment, News Release, "Ontario Announces Bold Actions On Industry Emissions", October 24, 2001; and Environmental Bill of Rights Registry Number: PA01E0026, "Emission Reductions From Ontario's Industrial Sources", October 24, 2001.

[37] OPG's Atikokan, Lambton, Nanticoke and Thunder Bay coal plants emitted 128,090 tonnes of sulphur dioxide in 2001. Replacing the coal plants with high-efficiency natural gas combined-cycle turbines would reduce these emissions by 99.5% or 127,450 tonnes. According to the Ontario Ministry of the Environment, the gap in 2010 between Ontario's sulphur dioxide emissions target and forecast sulphur dioxide emissions is 102,000 to 109,000 tonnes. Towards Sustainable Development: 2001 Progress Report, p. 52; The Nanticoke Conversion Study, p. 19; and Discussion Paper on Ontario's Clean Air Plan For Industry: Developing NOx and SO2 Emission Limits, p. 4.

[38] Harmful Pollutants Annex to the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem, (March, 2002).

[39] According to Environment Canada, Ontario's mercury emissions in 1988 and 2000 were 14,199 and 3,028 kg respectively. Therefore Ontario's mercury emissions must be reduced by an additional 1,608 kg (3,028 – 1,420) to reach the 2010 goal. In 2000 Ontario's mercury emissions from incineration were 790 kg. The new Canada Wide Standards are expected to reduce these emissions by at least 50% or 395 kg by 2006. The reduced emissions from incinerators entail that the province-wide mercury emissions gap will be no greater than 1,213 kg. According to Environment Canada, OPG's mercury emissions in 2000 were 590 kg. Replacing the coal plants with natural gas power plants would reduce

Ontario's electricity-related mercury emissions by 100%. Bob Krauel, Environment Canada, "Summary – progress report", December 4, 2000.

[40] Environmental Bill of Rights Registry Number: RA01E0014, "Lakeview Thermal Generating Station Emission Limits", (2001).

[41] Paul Vieira, "Ontario blocked sale of coal-fired plants: Industry questions commitment to creating market", National Post, November 4, 2002; and Legislative Assembly of Ontario, Hansard, Sept 23, 2002, Oral Questions (URL: http://www.ontla.on.ca/hansard/house_debates/37_parl/Session3/L030.htm#P89_6419)

[42] Sherritt International Corporation Annual Information Form, (March 15, 2002), p. 7; URL: http:www.sedar.com.

[43] Richard Brennan, "Tories vow to close five coal plants by 2015", Toronto Star, September 19, 2002.

[44] Letter from the Honourable Chris Stockwell, Minister of Environment and Energy to Floyd Laughren, Chair, Ontario Energy Board, July 22, 2002

[45] Legislative Assembly of Ontario, Bill 210: Electricity Pricing, Conservation and Supply Act, 2002, (URL: http://www.ontla.on.ca/library/bills/210373.htm)

[46] Ontario Ministry of Energy, Backgrounder, "Increasing The Supply of Electricity", November 12, 2002.

[47] According to OPG, the output of the Sir Adam Beck Generating Station could be increased by 1,500 to 1,800 million kilowatt-hours per year by building another tunnel under the City of Niagara Falls. In 2001 the Lakeview Generating Station produced 3,081 million kilowatt-hours of electricity. Telephone conversation with R.W. Osborne, Public Affairs Officer, Niagara Plant Group, OPG, February 2001; and Towards Sustainable Development: 2001 Progress Report, p. 52.

[48] Ministry of Energy, Backgrounder, "Increasing The Supply Of Electricity", November 12, 2002.

[49] Ontario Power Generation and TransCanada, Media Release, "Ontario Power Generation and TransCanada Energy Establish Partnership for Energy Centre", December 19, 2002.

[50] Assuming a 90% average capacity factor, a 550 MW power plant will produce 4,336,000 megawatt-hours of electricity per year. In 2001 the Lakeview and Nanticoke power plants produced 3,081,000 and 21,124,000 megawatt-hours of electricity. Towards Sustainable Development: 2001 Progress Report, p. 52.

[51] "Ontario Power Generation and TransCanada Establish Partnership for Energy Centre"

[52] Assuming a 90% average capacity factor, a 580 MW power plant will produce 4,572,720 megawatt-hours of electricity per year. In 2001 Nanticoke produced 21,124,000 megawatt-hours of electricity. Towards Sustainable Development: 2001 Progress Report, pp. 48 & 52.

[53] Towards Sustainable Development: 2001 Progress Report, p. 48.

[54] "Increasing The Supply Of Electricity".

[55] OPG, Annual Information Form For The Year Ended December 31, 2001, (April 30, 2002), pp. 19, 30; URL: http://www.sedar.com.

[56] Ontario Energy Board Docket No. RP-2000-0040, Ex. A, Tab 16, Sch. 1, Table 8; and Ontario Energy Board, RP-2000-0040 Reasons For Decision, (August 17, 2001)

[57] Ontario Energy Board Docket No. RP-2002-0133, Exhibit L, Tab 10, p. 1: Chris Neme, Vermont Energy Investment Corporation, A Review of Enbridge Gas Distribution F2003 DSM Plan Proposals, (January 21, 2003).

[58] Ontario Energy Board Docket No. RP-2001-0032, Letter to Mr. P.B. Pudge, Board Secretary, Ontario Energy Board from H.T. Newland, Fraser Milner Casgrain, December 23, 2002.

[59] Aegent Energy Advisors Inc., Updated Analysis of Ontario's New Electricity Rebate Plan, (January, 2003).

[60] The Nanticoke Conversion Study, p. 19; and Coal-Fired Electricity Generation In Ontario, p. 44.

[61] URL: http://www.environmentalchoice.com.

[62] Ontario Ministry of Energy, Action Plan to Lower Hydro Bills: Enhancing Supply and Competition in the Ontario Electricity Marketplace: A Consultation Paper, (December 23, 2002), p. 7.

[63] Email from Tyler Elyea, Ontario Financing Authority to Jack Gibbons, January 20, 2003.

[64] Action Plan to Lower Hydro Bills: Enhancing Supply and Competition in the Ontario Electricity Markeplace, p. 4.

[65] In April 2001 the Ontario Clean Air Alliance's The Nanticoke Conversion Study estimated the cost of converting OPG's Nanticoke coal-fired power plant to natural gas. Since April 2001 the New York Mercantile Exchange's average futures contract price for natural gas in 2005 has fallen to $6.24 per mcf (Canadian $ as of February 8, 2003) and the capital cost of combined-cycle natural gas turbines has fallen to $700,000 megawatt. Using these revised cost estimates and

assuming a uniform percentage rate increase for all customer classes, The Nanticoke Conversion Study's excel spreadsheet model estimates that replacing Nanticoke with natural gas-fired power would raise rates by 3.89% relative to Ontario's pre-market opening (May 1, 2002) electricity prices. The Study's base case analysis assumes that 22,776 GWh per year are replaced by natural gas. In 2001 OPG's Atikokan, Lambton and Thunder Bay coal plants produced 12,980 GWh of electricity. Therefore replacing these plants with natural gas would raise rates by an additional 2.22% (3.89 x 0.57). (The Government of Ontario has already directed OPG to phase-out coal-burning at Lakeview by 2005.) The Nanticoke Conversion Study's excel spreadsheet model can be downloaded from the Ontario Clean Air Alliance's web site: www.cleanairalliance.org/resources. Ontario Power Generation, Towards Sustainable Development: 2001 Progress Report, p. 52; Speech by Ron Osborne, President, OPG to the Empire Club, Toronto, April 26, 2001; URL: http://www.opg.com/info/repSpeeches/empire2001.asp; and http://www.nymex.com.

[66] According to OPG, the output of the Sir Adam Beck Generating Station could be increased by 1,500 to 1,800 million kilowatt-hours per year by building another tunnel under the City of Niagara Falls at a cost of approximately $500 million. Assuming a 50 year amortization period and an 8% cost of capital, the cost of this project would be approximately 2.7 cents per kilowatt-hour. Telephone conversation with R.W. Osborne, Public Affairs Officer, Niagara Plant Group, OPG, February 2001.

[67] Government of Canada, Climate Change Plan for Canada, (2002), ISBN: En56-183/2002E, p. 30; URL: http://www.climatechange.gc.ca.

[68] Climate Change Plan for Canada, p. 31.

[69] The Ontario Ministry of the Environment's nitrogen oxides (NO) emission limit for OPG in 2007 is 23,940 tonnes. OPG has announced plans to install pollution control measures which will reduce Nanticoke's and Lambton's NOx emissions by 12,000 tonnes per year. Therefore, OPG's maximum coal-fired electricity generation in 2007, assuming no additional pollution control measures, can be determined by dividing the sum of OPG's legal NOx emission limit and the emission reductions which will be provided by the above-noted measures by OPG's year 2001 NO emission rate for its Atikokan, Nanticoke, Lambton and Thunder Bay coal-fired power plants, i.e., 1.088 tonnes of NO per GWh. Therefore the business-as-usual maximum output of OPG's coal plants in 2007 is 33,033 Gwh. The average greenhouse gas emission rate of OPG's Atikokan, Nanticoke, Lambton and Thunder Bay coal-fired power plants is 948 tonnes per GWh. Therefore, its maximum business-as-usual greenhouse gas emissions from its coal-fired power plants in 2007 is 31,315,284 tonnes. 85% of 31,315,284 = 26,617,991. Ontario Ministry of the Environment, Emissions Trading and NOx and SO2 Emission Limits for Ontario's Electricity Sector: A Technical Description Of The Regulation, (2001); OPG, News Release, "Ontario Power Generation Announces Major Environmental Initiative", September 14, 2000; and OPG, News Release, "Ontario Power Generation and Babcock & Wilcox Canada Team Up for $200 Million Environmental Project", November 26, 2001; and OPG, Towards Sustainable Development: 2001 Progress Report, pp. 52 – 54.

[70] Replacing OPG's coal plants with combined-cycle gas turbines could reduce its greenhouse gas emissions by 61% or 19.1 million tonnes (31.3 million x 0.61 = 19.1 million). Therefore, its greenhouse gas emissions would be 12,212,961 tonnes per year. As a consequence, it would have 14,405,030 tonnes of surplus greenhouse gas emission permits. Ontario Clean Air Alliance, The Nanticoke Conversion Study, (2001), p. 21.

[71] The Government of Canada's analysis of Canada's cost of achieving compliance with the Kyoto Protocol assumes greenhouse gas emission permit prices of $10 and $50 per tonne. Government of Canada, Climate Change Plan for Canada, (2002), p. 58.

[72] Using the revised cost estimates noted in endnote # 65, The Nanticoke Conversion Study's excel spreadsheet model estimates that a coal to gas conversion would raise average electricity rates by $0.00473 per kilowatt-hour. According to the Study, Ontario's total electricity consumption in 2010 is forecast to be 173,860 GWh. Therefore the sale of the excess greenhouse gas emission permits could lower rates by $.00083 per kilowatt-hour [$144 million/173,860 GWh]. Since $00083 is 18% of $0.00473, a 6.11% rate increase becomes a 5.01% rate increase.

[73] According to The Nanticoke Conversion Study, Nanticoke would consume 162 petajoules (PJs) of natural gas to produce 22,776 GWh of electricity. In 2001 OPG's coal plants produced 37,185 GWh of electricity. Therefore if all of the coal plants are converted to natural gas, gas demand would increase by 266 PJs. Total North American (Canada and U.S.) natural gas consumption in 2000 was approximately 27,300 PJ. The Nanticoke Conversion Study, pp. 3, 16; Towards Sustainable Development: 2001 Progress Report, p. 52.

[74] National Energy Board, Canadian Energy Supply and Demand to 2025, (1999), pp. 43, 44.

[75] Total Canadian and U.S natural gas consumption in 2000 was approximately 27,300 PJ or 25.935 trillion cubic feet. The Nanticoke Conversion Study, p. 16.

[76] Natural gas prices as of February 8, 2003. URL: http://www.nymex.com.

[77] Government of Canada, Climate Change Plan for Canada, (2002), p. 28.

[78] Ontario Power Generation, Towards Sustainable Development: Ontario Power Generation Inc. 1999 Progress Report, p. 15.

[79] Government of Canada, News Release, "Canada and the United States Embark on New Era of Cleaner Air", December 7, 2000.

[80] Environment Canada, News Release, "Canada and the United States Reach a Draft Agreement to Reduce Transboundary Smog: Statement by the Hon. David Anderson, Minister of the Environment", October 13, 2000; and International Joint Commission, Air Quality Agreement: 2002 Progress Report, Appendix B.

[81] Ontario Ministry of the Environment, *Emissions Trading and NOx and SO2 Emissions Limits for Ontario's Electricity Sector: A Technical Description Of The Regulations*, (2001), p. 3.

[82] *Emissions Trading*, p. 5

[83] Ontario Clean Air Alliance, Weak Emission Limits, (May, 2001), p. 5

[84] John Spears, "Smog plan not enough, Ottawa says", Toronto Star, October 26, 2001; Dennis Bueckert, "Clean-up deadline for coal-fired plants", Toronto Star, November 28, 2001; and letter from the Honourable David Anderson to the Honourable Chris Stockwell, Ontario Minister of Environment and Energy, July 18, 2002.

[85] Environment Canada, "Toxic Substances List – Updated Schedule 1 as of January 1, 2003"; URL: http://www.ec.gc.ca/CEPARegistry/subs_list/Toxicupdate.cfm

[86] Letter to Jack Gibbons, Ontario Clean Air Alliance from Graham A. Brown, Chief Operating Officer, OPG, September 6, 2002.

[87] URL: http://www.opg.com/info/press.asp.

[88] Ontario Ministry of the Environment, Ontario's Smog Plan: Steering Committee Report, (January, 1998), p. 2.

[89] Government of Canada, News Release, "Government of Canada Announces Next Steps in Program to Reduce Particulate Matter, A Primary Component of Smog", (July 17, 2000, URL: http://www.ec.gc.ca/Press/000717_n_e.htm

[90] Ontario Medical Association, The Illness Costs of Air Pollution in Ontario: A Summary of Findings, (June, 2000), URL: http://www.oma.org.

[91] Ontario Medical Association, Health Effects of Ground-Level Ozone, Acid Aerosols & Particulate Matter, (May, 1998), pp. iv & v, URL: http://www.oma.org.

[92] Region of Peel Health Department, State of the Region's Health 2002 – Focus on Asthma, (2002), p. 2.

[93] Michael Keating, Canada and the State of the Planet, (1997) Oxford University Press, Toronto, as cited in the University of Toronto Institute for Environmental Studies/Pollution Probe study, Emissions from Coal-Fired Electric Stations: Environmental Health Effects and Reduction Options, (January 19, 1998), p. 11.

[94] The Acidifying Emissions Task Group, Towards a National Acid Rain Strategy, (October, 1997), p. iv.

[95] Federal/Provincial/Territorial Ministers of Energy and Environment, The Canada-Wide Acid Rain Strategy for Post-2000, (October 19, 1998), pp. 1 & 4.

[96] U.S. National Academy of Sciences, Toxicological Effects of Methylmerecury, (2000), p. 1. URL: http://www.nap.edu/openbook/0309071402/html/l.html.

[97] Clear the Air – The National Campaign Against Dirty Power, "Mercury and Your Health", (1200 18th Street, NW, Washington, D.C. 20036).

[98] US National Academy of Sciences, Toxicological Effects of Methylmercury, (2000), pp. 275, 276; URL: http://www.nap.edu/openbook/0309071402/html/275.html.

[99] United States Environmental Protection Agency, Mercury Study Report to Congress: Volume VII: Characterization of Human Health and Wildlife Risks from Mercury Exposure in the United States, EPA-452/R-97-009, (December 1997), p. 6-24.

[100] Government of Ontario, Guide to Eating Ontario Sport Fish: 1999-2000, Twentieth Edition, Revised, (Queen's Printer for Ontario, 1999), pp. 11, 12 & 13.

[101] Intergovernmental Panel on Climate Change, Climate Change 2001: Synthesis Report: Summary for Policymakers, p. 8.

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

[103] 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.

ONTARIO CLEAN AIR ALLIANCE MEMBER LIST

***The following cities, utilities, organizations and associations have endorsed the need for emission caps to reduce Ontario's total (domestic and imported) electricity-related greenhouse gas, sulphur dioxide, nitrogen oxides and air toxics emissions and joined the Alliance*:**

Municipalities

City of Guelph
City of Hamilton
City of Kitchener
Town of Markham
City of Peterborough
City of Stratford
City of Toronto
City of Windsor
Regional Municipality of Durham
Regional Municipality of Peel
Regional Municipality of Waterloo

Citizen Organizations and Associations

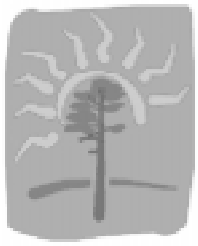
Algoma Manitoulin Environmental Awareness
Algoma Manitoulin Nuclear Awareness
Allergy/Asthma Information Association
Association of Local Public Health Agencies
Canadian Association of Physicians for the Environment
Canadian Institute of Child Health
Canadian Institute for Environmental Law and Policy
Canadian Unitarians for Social Justice, South Peel Chapter
CAW CANADA*
CAW Durham Regional Environment Council
Citizens' Advisory Committee on Air Quality - Waterloo
Citizens Advocating Renewable Energy
Citizens Environment Alliance of Southwestern Ontario* **
Citizens' Network on Waste Management
Clear The Air
Community Action Parkdale East
Conservation Council of Ontario
Conserver Society of Hamilton and District, Hamilton Chapter
Consumers Association of Canada (Ontario)
Earth Day Canada
Earthworks
Echo Lake Association
Energy Action Council of Toronto**
Energy Probe
Environment North
Environmental Defence Canada
The Evergreen Foundation
Federation of Ontario Cottagers' Associations
For a Safe Environment
GASP (Good Air, Safe Power)
Grassroots Woodstock
The Green Channel
Greenest City
Hearthmakers Energy Cooperative
Kingston Environmental Action Project
Lakeshore Area Multi Services Project
Learning Disabilities Association of Ontario
Metro Toronto Pesticide Action League
North Toronto Green Community
Ontario College of Family Physicians
Ontario English Catholic Teachers' Association
Ontario Forestry Association
Ontario Lung Association
Ontario Public Health Association
Ontario Public Interest Research Group - University of Guelph
Ontario Public Interest Research Group - McMaster University
Ontario Public Interest Research Group - Queens University
Ontario Public Interest Research Group - University of Toronto
Ontario Society for Environmental Education
Pesticide Action Group/Waterloo
Pollution Probe
South Riverdale Community Health Centre
Thames Region Ecological Association
Torrie Smith Associates
The United Church of Canada
Wastewise
Wildlands League
Youth Challenge International

Utilities

Enwave District Energy Limited
Hydro 2000
Mississippi River Power Corporation
Oshawa Power and Utilities Corporation
Peterborough Utilities Services
Sudbury Hydro
Toronto Hydro
Veridian Corporation
Wellington Electric Distribution Company

*CAW-Canada and Citizens Environment Alliance of Southwestern Ontario are opposed to the privatization of Ontario Power Generation and Hydro One.

**The Energy Action Council of Toronto and Citizens Environment Alliance of Southwestern Ontario support a full phase-out of nuclear energy.



Ontario Clean Air Alliance
625 Church Street, Suite 402
Toronto M4Y 2G1

Tel: (416) 926-1907 ext. 245
Fax: (416) 926-1601

E-mail: info@cleanairalliance.org
Web Site: www.cleanairalliance.org