



March 10, 2006

The Hon. Donna Cansfield
Minister of Energy
Ontario Ministry of Energy
900 Bay Street, 4th Floor
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Toronto, Ontario M7A 2E1

Submitted via email: write2us@energy.gov.on.ca

RE: Ontario Power Authority Supply Mix Advice Report - EBR Registry No: PO05E0001

Dear Minister:

Thank you for the opportunity to respond to the *Ontario Power Authority's Supply Mix Advice Report*. We appreciate the challenges faced by the Ontario Government to ensure that there is sufficient electricity supply to meet demand to 2025 at the same time as it is promoting a conservation culture in Ontario and the use of renewable energy. We share these interests and assessed the OPA report within this context.

Pollution Probe has been active over the past four years in assessing the potential for Green Power (low-impact renewable energy) to meet Canada's electricity needs. We began with research on the development of renewables in Europe (Germany, Denmark, the Netherlands, United Kingdom), Australia and the United States to determine the most effective policies used and we produced a 200-page report on the topic. From September 2003 to April 2004, working in partnership with Summerhill Group, we conducted a cross-Canada workshop series that engaged more than 300 experts in Green Power, electricity generation and policy development to build consensus towards a vision and strategy for achieving the maximum potential for Green Power development in Canada.

Following the workshop series, we produced *A Green Power Vision and Strategy for Canada (copy attached)*, based on the presentations and discussions. This document includes a list of priorities for a sustainable electricity future. The intention was to ensure that long-term strategies include targets for the maximum feasible development of each priority before considering the next on the list. The priorities were established as follows:

1. Energy efficiency and conservation;
2. Green Power that meets the criteria for EcoLogo certification;
3. Ecologically sustainable larger-scale hydro and other renewables;
4. Combined heat and power using natural gas;
5. The cleanest and safest technologies among the remaining options.

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Pollution Probe’s main recommendation is that decisions regarding new supply from nuclear power be delayed until a more comprehensive assessment is made of the technical and economically achievable potential for conservation and energy management and renewable energy and until a strategy is developed to achieve this potential. The province should immediately implement Conservation and Demand Management programs that Pollution Probe believes can be implemented to delay the supply/demand gap until 2020.

MAXIMIZING THE POTENTIAL FOR CONSERVATION AND DEMAND MANAGEMENT

To assist us in responding to the *Ontario Power Authority’s Supply Mix Advice Report*, Pollution Probe commissioned a report by ICF Consulting, *The Electricity Supply/Demand Gap and the Role of Efficiency and Renewables in Ontario*. A copy of the report is attached as part of this submission.

The ICF report made the following observations:

- The use of “Gapology”, (projecting the impending “gap” between future supply and demand) as a basis for electric power planning has had a poor record in Ontario.
 - In 1976, Ontario Hydro argued that there would be a 38,000 MW gap by 1997 – with the potential low and high peak scenarios being 36,000 MW and 67,000 MW respectively. The actual peak demand in 1997 was 22,200 MW. The gap never materialized.
 - In the late 1980s, the supply/demand gap presented in *Providing the Balance of Power*¹ was projected to reach 9,700 MW by 2005, based on peak demand reaching 34,900 MW. Actual demand peaked at 25,000 in 2004. The gap never materialized.
- The main reasons the planning and analysis efforts of the 1970s and 1980s failed were because they underestimated the potential for more efficient use of electricity, as well as failed to take into account the underlying changes that were occurring in the level and pattern of demand for electricity services.
- The ICF report estimates that electricity productivity improvements in Ontario since 1990 have delivered more than 5,000 MW of effective peak capacity. This demand side resource is currently the fastest growing “supply” of electricity services in Ontario.
- The forecast for future electricity demand made in the *Supply Mix Advice Report* is inadequate as it is based on a single-line aggregate forecast. It is the reliance on this type of single-line aggregate forecast that has led to predictions of supply/demand gaps in the past that have never materialized.

¹ *Providing the Balance of Power: Ontario Hydro’s Plan to Serve Customers Electricity Needs*, Ontario Hydro, Toronto, 1989.

- To avoid the pitfalls of the past, Ontario electricity planners need much better information. It is absolutely essential that we establish the databases and analytical capacity needed to understand electricity use patterns in Ontario. This means assembling databases that identify how electricity is used by sector and end use. It means having tools that allow the exploration of how the level and pattern of electricity use would vary given different assumptions about future Ontario population, housing preferences, industrial structure, technological efficiency and so forth.

In spite of concerns about the validity of the supply/demand gap projected in the OPA report, the ICF report indicates that, in any event, sufficient “demand side” resources are available to close the gap, or at least to delay its appearance until at least 2020. This can be done if only about 50% of the achievable economic potential for fuel substitution, demand management and energy efficiency were realized, along with a modest growth in cogeneration. Table 1 summarizes this scenario, with the contributions column representing about half of the achievable economic potential in each case.

Table 1: Closing the “Gap”

Demand Side Resource	Contribution by 2020 (MW)	Percentage of Achievable Economic Potential
Fuel Substitution	400	50%
Demand Reduction*	1,500	50%
Cogeneration	8,250	50%
Energy Efficiency	2,150	50%
Total	12,300	50%

* Demand reduction potential could be increased if Smart Meters provide enabling technology.

The following Demand Side Resources offer 12,300 MW of reductions that could be used to fill the projected gap for 2020 (the OPA projects a gap of about 10,200 MW by 2020):

- **Fuel Substitution:** Space and Water Heating Load – Electric space and water heating account for about 37% of total residential electricity use. This represents a potential of about 800 MW in demand side electricity savings, of which 400 MW are included in Table 1.
 - For water heating, options include peak demand reduction, hot water conservation, switching to natural gas, and system efficiency improvements. The water-heating load is particularly important as it contributes an estimated 800 MW to the summer peak. Another contender is solar water heating where commoditization and improved production design and management have reduced unit costs to competitive levels.
 - More than half of the electric space heating is provided by baseboard heaters, usually in dwellings that are not equipped with the hot air ducts required for forced air heating systems. Advances in small diameter, flexible piping, and hydronic heat distribution systems allow conversions from electric baseboard heating with relatively little disruption to households and at much lower capital costs compared to retrofitting dwellings with forced hot air distribution and return systems.

- **Demand Reduction** – In 2003, Navigant Consulting prepared a review of Demand Response in Ontario for the Independent Electricity Operator (later re-named the Independent Electricity System Operator). In outlining its vision for 2010, Navigant stated that Demand Response should be able to provide a 10% reduction in overall electricity demand during high priced periods². This represented a 3,000 MW potential by 2010, given the IESO forecast for peak demand at 30,000 MW by 2010. Table 1 only includes 1,500 MW of this potential.
- **Cogeneration** – A study conducted for the Ontario Ministry of Energy, Science and Technology³ in the year 2000 indicated that the technical potential for co-generation in Ontario by 2020 could be more than 16,500 MW. The report comments that all of the technical potential would be economic if prices rose to \$78/MWh delivered. Delivered power costs for businesses now average around \$85-\$90/MWh. Only half of this potential is included in Table 1.
- **Energy Efficiency** – An ICF Consulting report⁴ found that the technical potential to improve energy efficiency could reduce current electricity use in Ontario by 36.6 TWh and cut peak demand by 8.2 GW. This is equivalent to 26% of Ontario's current electricity use and 33% of the system peak. When the economic potential was considered, the numbers were slightly lower, representing 21% of total energy sales and peak demand. Similar studies in other jurisdictions have reported economic potential ranging from 6% to 35% across different sectors.

Achievability

There are examples of successful initiatives that specifically set out to maximize the amount of CDM economic potential. These include:

- In Espanola, using comprehensive energy audits and inspections, combined with incentives, Ontario Hydro captured the majority of available savings. Residential customers implemented 82% of identified savings, while Commercial customers achieved 50% of recommended demand and energy savings.
- In Hood River, Oregon, 85% of homes were audited and, with a range of financial support, 81% of the more than 14,000 measures recommended were implemented.

These examples, and others, show what can be done when the will and the effort are in place.

² *Blueprint for Demand Response in Ontario*, Navigant Consulting. 2003 for the Independent Electricity Market Operator. page 67.

³ *Potential for Cogeneration in Ontario*. Hagler Bailly Canada. 2000. For the Ontario Ministry of Energy, Mines and Technology.

⁴ *Electricity Demand in Ontario – Assessing the Conservation and Demand Management (CDM) Potential*, prepared by ICF Consulting for the Ontario Power Authority

In summary:

- Ontario needs much improved databases and analytical capacity to be able to understand electricity use patterns and make more reliable forecasts.
- If only half of the economically achievable CDM potential for fuel substitution (800 MW), demand reductions (3,000 MW), co-generation (16,500 MW), and efficiency improvements (4,300 MW) were implemented, it would be possible to fill the gap projected in the OPA *Supply Mix Advice Report*. Table 1 shows that implementing half of these measures over the next 14 years, for a total of 12,300 MW, could delay the projected gap beyond 2020 (the OPA report projects a gap of about 10,200 MW in 2020).
- A delay in the date of the projected gap would give Ontario the opportunity to develop the databases and analytical tools needed to do a more reliable assessment of projected demand based on a better assessment the underlying drivers and of the full range of options for CDM. The Ontario Government should put in place a plan to accelerate CDM before considering major investments in conventional electricity sources.

MAXIMIZING THE POTENTIAL FOR GREEN POWER

When considering electricity supply, first priority should be given to maximizing the use of Green Power, defined as low-impact renewable energy meeting the criteria for EcoLogo Certification. This offers the most environmentally benign sources, increased job creation, rural development, price hedging and greater energy security as it represents indigenous supply. A poll conducted by Pollution Probe indicated that it is the first choice of the public when they were offered a choice among different electricity options.⁵

Wind – The OPA Recommendation is up to 5,000 MW by 2025

Wind power offers many advantages beyond its environmental benefits. Wind energy can be deployed quickly and can be coupled with hydropower and biomass to address intermittency issues. The OPA report recommends the development of 5,000 MW of wind generation capacity by 2025, representing about 15% of the electricity supply mix. The study prepared by Helimax for the OPA identified more than 13,000 MW of wind generation potential within 20 kilometers of the existing electricity grid in Ontario south of the 50th parallel⁶. The Canadian Wind Energy Association (CanWEA) recommends that a minimum of 500 MW of new wind energy be procured each year, from 2006 to 2013, giving Ontario 4,300 MW of installed wind energy capacity, or about 15% of expected capacity needs by 2013. Looking at the longer term, CanWEA estimates that it may be possible to have penetration levels for wind power of 25% by 2020, or even 30% (10,000 MW) by 2025 as new technology developments are considered.

⁵ National Survey Report. Oraclepoll Research for Pollution Probe. October 2004

⁶ *Analysis of Wind Power in Ontario*. Helimax Energy Inc. November 2005

Hydropower – OPA Recommendation is up to 1,500 MW by 2025

The OPA *Supply Mix Advice Report* found that Ontario has 180 potential waterpower sites capable of 7,585 MW, but that only 1,447 MW could be developed within existing public policy guidelines. The sites located in Parks and Conservation Reserves represent 1,501 MW and the sites subject to agreements with First Nations and the Federal Government represent 4,637 MW of potential power. While it may not be practical or desirable to develop all potential sites, more research is needed to determine a realistic estimate of what is possible with further consultation and analysis.

Biomass – OPA Recommendation is up to 500 MW by 2025

The OPA *Supply Mix Advice Report* recognizes that the ranges of estimates for biomass potential vary from a few hundred to several thousand megawatts. A comprehensive assessment being conducted by BIOCAP on Biomass Energy in Ontario⁷ suggests that existing sources of biomass alone could provide 94% of the energy currently derived from coal. There is also potential to develop additional sources. Since biomass can be used as base load electricity generation, it offers very interesting prospects as a future electricity source with great potential. Ontario should immediately begin to further assess this potential and consider enhanced targets for electricity generation from this source.

Solar Photovoltaic – OPA Recommendation is up to 40 MW by 2025

The OPA *Supply Mix Advice Report* recognizes the Canadian Solar Industries Association (CanSIA) target of up to 40 MW of photovoltaic electricity supply by 2010 and recognizes that European countries have accelerated the use of Solar PV by offering a high purchase price for solar-generated electricity. However, CanSIA estimates that much higher projections are possible for 2025 given the evidence of international experience. While the OPA target is 40 MW over the next 19 years, Germany installed the equivalent amount of solar PV within 6 weeks in 2004. Given the right policy conditions, the technical potential for PV on all buildings in Ontario is more than 14,000 MW by 2025. CanSIA is recommending a target for Ontario of 3,400 MW by 2025.

As targets are being set for the year 2025, serious consideration should be given today, to what this future will be. The impacts of climate change are expected to become increasingly severe leading to environmental impacts related to water quality and supply, food production, extreme weather events, forestry and human health. Adaptation strategies will need to be put into play. One adaptation measure that needs to be seriously considered is the use of renewable energy as a distributed source of electric power for a more secure electricity supply. Also, air quality targets will need to be considered when evaluating various sources, including biomass.

⁷ Biomass Energy in Ontario: Exploring the Potential for Heat and power Generation.
BIOCAP Canada Foundation (Draft for Discussion – February 2006)

As targets for Green Power are being developed, consideration should be given to a strategy that will lead to domestic manufacturing of renewable energy technologies, including the need for a trained labour force and the development of new standards and procedures to support this new industrial base. With expanding international markets for renewable energy sources, there are tremendous opportunities for jurisdictions that have invested in renewable energy.

ASSESSING CONVENTIONAL SOURCES

Hydro Imports

The OPA *Supply Mix Advice Report* recommended up to 1,500 MW of additional waterpower through imports. According to a recent news release the Ontario and Manitoba governments are in discussions regarding 1,500 to 3,000 MW.⁸ If the east-west electricity grid were to bring in additional generation from Manitoba it could also carry wind generation from the Hudson's Bay lowlands. There is also the potential for 941 MW from the Lower Churchill River development in Labrador. There are many considerations to be taken into account. But, if sustainably developed, these could represent a viable renewable option for Ontario that should be given priority consideration.

Nuclear

We believe that there has not been a critical assessment of nuclear power done in Ontario in terms of the full cost, liability, life-cycle impact including final waste disposal and reliability. There needs to be an objective expert review that includes broad public debate if nuclear is to be considered as an option for future electricity generation in Ontario.

We make note that a major study has just been released by the Sustainable Development Commission (SDC) in the UK titled, *Nuclear Power in a Low Carbon Economy*. The SDC report attempts to give a balanced examination of the pros and cons of nuclear power. Its research recognizes that nuclear is a low carbon technology with an impressive safety record in the UK. It recognizes that nuclear could generate large quantities of electricity, contribute to stabilizing carbon dioxide emissions and add to the diversity of the UK's energy supply.

However, the research establishes that even if the UK's existing nuclear capacity were doubled, it would only give an 8% cut on CO₂ emissions by 2035 (and nothing before 2010). This must be set against the risks.

⁸ Manitoba, Ontario Sign Power Sale Agreement. Ontario Ministry of Energy news release. October 27, 2005.

The SDC report identified the following five major disadvantages to nuclear power. These need to be part of the public discussion about nuclear power in Ontario.

1. **Long-term waste** – no long term solutions are yet available, let alone acceptable to the general public; it is impossible to guarantee safety over the long- term disposal of waste.
2. **Cost** – the economics of nuclear new-build are highly uncertain. There is little, if any, justification for public subsidy, but if estimated costs escalate, there's a clear risk that the taxpayer will be have to pick up the tab.
3. **Inflexibility** – nuclear would lock the UK into a centralised distribution system for the next 50 years, at exactly the time when opportunities for microgeneration and local distribution network are stronger than ever.
4. **Undermining energy efficiency** – a new nuclear programme would give out the wrong signal to consumers and businesses, implying that a major technological fix is all that's required, weakening the urgent action needed on energy efficiency.
5. **International security** – if the UK brings forward a new nuclear power programme, we cannot deny other countries the same technology*. With lower safety standards, they run higher risks of accidents, radiation exposure, proliferation and terrorist attacks.

CONCLUSION

This submission has not recommended specific targets for conservation and demand management or for Green Power sources. Rather, it argues that there needs to be a more thorough assessment of the full potential for Conservation and Demand Management to determine what will be needed by 2025 and to maximize implementation of CDM measures. Also, we are still gathering information, as a province, on the potential for renewable energy to meet our needs – further evaluation is required to ensure that the maximum potential can be achieved before considering other options.

By aggressively implementing realistic, but achievable, policies supporting Conservation and Demand Management, the province has the opportunity to extend the need to address the supply/demand gap to 2020 and hence to allow time for further assessment of the implementation of measures to achieve the full potential of CDM and Green Power to address electricity demand.

Pollution Probe's main recommendation is that decisions regarding new supply from nuclear power be delayed until a more comprehensive assessment is made of the technical and economically achievable potential for conservation and energy management and renewable energy and until a strategy is developed to achieve this potential. The province should immediately implement Conservation and Demand Management programs that Pollution Probe believes can be implemented to delay the supply/demand gap until 2020.

Pollution Probe respectfully submits the following additional recommendations:

- The province should make its first priority a firm commitment to maximize the potential for conservation and demand management for addressing electricity supply/demand issues
- The province should make its second priority a firm commitment to maximize the potential for Green Power to address electricity supply/demand issues
- A multi-stakeholder expert committee should be established to help assess the potential for CDM and Green Power, set targets to develop the maximum feasible potential, and develop a strategic plan to address barriers, take advantage of opportunities and monitor progress on implementation of the strategic plan.
- The province should develop the necessary databases and analytical tools for more detailed scenario analysis in order to better understand the drivers of market growth and the potential for Demand-Side Management.
- The province should consider the more conventional energy sources, such as fossil fuels (with natural gas being considered a valuable interim measure) and nuclear after all other priority considerations have been thoroughly assessed (including ecologically sustainable larger-scale hydro (including imported), larger-scale biomass, and combined heat and power using natural gas).
- Pollution Probe urges the province to adopt the following policy hierarchy for determining Ontario's future electricity demand/supply mix:
 1. Energy efficiency and conservation;
 2. Green Power that meets the criteria for EcoLogo certification;
 3. Ecologically sustainable larger-scale hydro and other renewables;
 4. Combined heat and power using natural gas;
 5. The cleanest and safest technologies among the remaining options.

We would be pleased to answer questions regarding this submission.

Sincerely,



Ken Ogilvie
Executive Director
Pollution Probe

Attachments: A Green Power Vision and Strategy for Canada
The Electricity Supply/Demand Gap and the Role of Efficiency
and Renewables in Ontario