SUBMISSIONS
OF LAKE ONTARIO WATERKEEPER
TO THE ONTARIO POWER AUTHORITY

RE: **INTEGRATED POWER SUPPLY PLAN**
SUBMISSION RE DISCUSSION PAPER #7

SUBMISSION DATE: **DECEMBER 15, 2006**

IPSP Submissions,
Ontario Power Authority,
120 Adelaide Street West, Suite 1600,
Toronto ON M5H 1T1

What follows is a paper by Lake Ontario Waterkeeper responding to the Ontario Power Authority's Discussion Paper #7, *Integrating The Elements – A Preliminary Plan*.

This paper is the result of the coordinated efforts of a three-person team, led by myself. I am an environmental lawyer with extensive relevant expertise, including numerous OEB hearings and CNSC interventions, participation in government advisory groups, and working on the Demand-Supply Plan hearing and constitutional challenge to the *Nuclear Liability Act*. I am also co-author of *The Citizens Guide To Environmental Investigations and Private Prosecutions* (2000) and a forthcoming citizen's guide to the Canadian Nuclear Safety Commission.

Peter Faye is a retired executive from the electricity distribution business. During his career as an engineer with Ontario Hydro he worked on generating stations, high voltage transmission lines and distribution systems. He subsequently worked for Markham Hydro and rose to the position of President from which he retired in 2001. Mr. Faye attended law school at the University of Toronto and was called to the Ontario Bar in 2005. He consults to the electricity industry on regulatory matters and assists Lake Ontario Waterkeeper with energy related projects.

Krystyn Tully is Vice President of Lake Ontario Waterkeeper, editor of Waterkeeper.ca Weekly, and administrator of LOW's Clean Water Workshop, a mentoring program that serves 25 law students each year. She has worked alongside Mark Mattson on interventions and environmental assessments since 2001. Krystyn is also the Lake Ontario Advisor to Great Lakes Aquatic Habitat Network & Fund.

Thank you for the opportunity to comment on such an important process. We hope you will consider our analysis.

Yours truly,

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Mark Mattson, President & Waterkeeper
December 15, 2006

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"Starting With Sustainability"
A response to the OPA's preliminary integration plan
Published by Lake Ontario Waterkeeper
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Introduction

Lake Ontario Waterkeeper is a registered charity, pursuing environmental justice in the Great Lakes Basin and protecting people's rights to safely swim, drink, and fish in public waterways. Since our launch in 2001, Lake Ontario Waterkeeper has investigated, documented, and monitored the impacts of power generation sources on our watershed. We have been active in the Integrated Power Supply Plan process from the outset, submitting comments in February of this year on the Supply Mix proposals made by the Ontario Power Authority ("OPA") to the Minister of Energy. Since then, we have participated as a funded agency in the stakeholder consultation process.

This submission summarizes our comments on the IPSP stakeholder consultation process and in particular on the OPA's Discussion Paper #7, "*Integrating the Elements – A Preliminary Plan*".

The Plan's Fundamental Flaw

Lake Ontario Waterkeeper sees the creation of an IPSP as an opportunity to show world-class leadership. The province is no longer walking in the shadows of other jurisdictions, mimicking foreign practices or echoing others' rhetoric. It has an opportunity to take a new direction in energy conservation and sustainability by adopting a fresh approach to the challenge of electricity demand and supply.

We agree with the statement that the Preliminary Plan is, "a significant new opportunity for Ontario." At the same time, Waterkeeper respectfully submits that the Preliminary Plan utterly fails to successfully integrate sustainability-based principles. **The OPA uses rhetoric to create the impression of a sustainable Plan, but the actual assumptions, methodologies, and information it relies upon on are fundamentally flawed.**

To address these flaws, the next Plan should do the following:

1. Start with sustainability
2. Do not ignore risks, consequences
3. Embrace flexibility, innovation

Start With Sustainability

"Countries such as Canada are very good at creating growth. We are not very good at creating 'green growth'. We still think of growth first, then tack on green as an afterthought." – Jeffrey Simpson, Globe and Mail, December 12, 2006.

Mr. Simpson's comment perfectly captures the OPA's failure to create a Plan that successfully integrates sustainability-based principles such as feasibility, reliability, cost, flexibility, environmental performance, and social acceptance. The OPA has used traditional analysis to create a traditional energy generation and distribution system and then made a few attempts to integrate "sustainable" technology and language after the fact.

A truly effective Plan would start with sustainability. It would gather, present, and analyze facts about the feasibility, reliability, flexibility, etc. of each and every possible technology. The Plan does not do this.

A truly effective Plan would mandate that every element of the plan – forecast, conservation, supply, and transmission – be designed to enhance sustainability. The Plan does not do this.

As a result, Ontarians were presented with a Preliminary Plan that reflects an antiquated approach to energy planning. Where is the frank, groundbreaking discussion about the feasibility of a decentralized system? The true costs of nuclear power? The flexibility of a system that requires forecasting decades in advance? The impacts of different energy supplies on air, water, and land?

For the most part, this failure can be remedied by integrating risk, uncertainty, and innovation analysis into the Plan. These substantive changes will go a long way to improving the Plan.

Do not ignore risks, consequences

The Plan is loaded with risk. Yet, the analysis presented by the OPA ignores entirely what could or will be lost: land uses, water quantity, water quality, security, money, and local authority.

Generally, the risks and consequences of the Plan fall into two categories: environmental impacts and opportunity costs. There are, of course, a variety of other risks (e.g., financial investment) that are outside our organization's focus.

Environmental Impacts

An accurate representation of the environmental impacts of various energy generation methods is still missing in the Plan. For the most part, environmental impact analysis is based on best-case theoretical examples and in no way reflects real-world risks. These are a few examples of information that is either misleading or missing, to help illustrate Waterkeeper's concerns:

- It is frequently suggested that nuclear power plants lack air emissions during operation. This assertion is false; reactors in use in Ontario release tritium into the air. Tritium is a radioactive isotope of hydrogen and is a carcinogen, a mutagen, and a teratogen.
- The impacts of water consumption and waste creation are typically minimized in a way that appears to bias the supply recommendations towards nuclear power.
- Environmental impacts tend to be drawn from best-case scenarios that completely eliminate consideration of major and minor malfunctions, including spills.
- Many key environmental impacts are dismissed as "site specific" and are not being considered in the Plan at all (e.g., wastewater emissions, drinking water supplies, and fisheries impacts).

Similarly, the Plan contains little discussion of the Ontario's regulatory environment. **The failure to integrate a frank consideration of the nature of energy regulation in Ontario is perhaps one of the greatest, most potentially devastating, flaws in the Preliminary Plan.**

We have layers of municipal, provincial, and federal environmental rules. We also have different provincial and federal regulators, including the Ontario Energy Board and the Canadian Nuclear Safety Commission. At all times, the OPA assumes that every facility integrated into its Plan will adhere to the strictest environmental standards. It is incredibly important to acknowledge that such strict adherence to environmental guidelines, regulations, and laws has **never** been the norm in Ontario.

The underlying assumption that energy regulation will occur in a best-case scenario is at best an ignorant and at worst a reckless over sight. Rather than offload responsibility for environmental protection, the OPA should ensure that every risk is acknowledged and mitigated against in its Plan.

Opportunity Costs

The centrally-planned large-scale system described in the Plan carries with it large inherent risks. Many decisions are irrevocable. Many investments are irreversible. The OPA itself uses the phrase "a road map for the longer term" suggesting that, once the course is charted, the direction cannot be easily changed. Successful integration should include an analysis that accurately summarizes and analyses tradeoffs and other opportunity costs. The Plan does not do this.

Embrace flexibility, innovation

Of great concern is the OPA's confidence in reliance on load forecasts that are, at best, guesses. The last time detailed forecasts were prepared like the ones the OPA has presented,

was in the early 1990s when Ontario Hydro issued its "Balance of Power" plan. The estimates of load growth in that document proved to be wildly inaccurate. For example, had the province followed the recommendations of the median load growth scenario, installed generating capacity would have been 32,000 MW by this time fully 5,000 MW more than the all time peak demand experienced in August of this year[1]. Electricity consumers and taxpayers would have been on the hook for another nuclear station the size of Darlington by now.

Clearly forecasting electricity demand accurately is problematic. If this art cannot be improved, it is not sensible to invest billions in generating stations that might never be needed. This is particularly important when considering making investments in nuclear power plants that require such huge economies of scale for justification that a single plant far exceeds the forecasted annual demand increase of the province. These plants also commit Ontarians to long term costs and environmental problems associated with radioactive waste that cannot be avoided once the decision to build has been made.

Waterkeeper believes that flexible generating strategies need to be used that can be more closely matched to the incremental load increase and that can be brought into and taken out of service more quickly than mega projects. It is time to stop "betting the farm" on demand forecasts that are routinely overstated.

In order to address the uncertainties associated with forecasting demand, the OPA should embrace flexibility and innovation. Simply forecasting demand and then listing traditional supply options that meet that demand, inevitably results in traditional "solutions" (e.g., building more power plants).

Waterkeeper believes that there are numerous opportunities to mitigate increases in electricity demand if our energy Plan embraces flexibility and innovation. If we study demand more closely, if we learn more about the underlying reasons for demand increases, we will be able to develop innovative responses – approaches that don't always result in a call for more power generating plants.

To be of assistance to the OPA, Waterkeeper has listed a few examples that could be considered:

Residential Sector

- The OPA's research into peak load drivers has determined that "the system load shape is highly correlated to residential air conditioning load"[2]. Instead of accepting that increasing residential air conditioning load is irreversible, can we reverse it? If most of this load increase is due to penetration of central air conditioning in homes, opportunities exist to educate homeowners about the wastefulness and ineffectiveness

[1] *Providing the Balance of Power* – p.xiv Jan 2004 Basic Load Forecast 34.5 GW
[2] OPA Conservation Bureau *Energy Use in Ontario Households* available on Conservation Bureau website

of this method of home air conditioning, to decentralize home air-conditioning systems, and/or to introduce financial disincentives for luxuries that contribute to load-increases[3].

- With the advent of smart meters and the possibility of remote control of electrical loads, it is possible to discourage or physically limit central air use at peak times of the day. Time of use rates can be a powerful incentive to consumers to conserve during power shortages. The on-peak rates, though, have to be high enough and the off-peak rates low enough to make it worth the trouble of changing when and how we use electricity. Designing proper time of use rates takes political. But the opportunity to create "a conservation culture" which will lead us away from dependence on an ever-expanding power supply system is too important to be wasted. Time of use rates can only discourage use if the consumer is aware of what systems in his home use the most power. Many, however, are not aware of how much energy is consumed by appliances like central air conditioners. Introducing "*type of use rates*" that specifically target use of wasteful appliances like central air systems is a possibility with the smart meter technology that can focus consumer attention on the loads that have the most impact on system peak. Another possibility is to introduce the idea of "*controlled loads*" that could be disconnected remotely by distributors at peak times. Radio frequency control of electric hot water heaters has been around for many decades and the same concept can be applied to central air plants quite easily.

Commercial and Industrial Sectors

- Could deep lake cooling eliminate large amounts of air conditioning load on the electrical system? This technology has been implemented in Toronto to cool office and condominium towers, by Cornell University in Ithaca New York to cool campus buildings and by the city of Stockholm for cooling many of the buildings in its downtown area. Deep water cooling draws cold water from the depths of a lake or sea and passes it through heat exchangers to transfer its cooling capacity to a district energy system supplying buildings with chilled water for air conditioning. In the Toronto application, the water from the lake is then sent on into the drinking water system. The net effect on temperature of the lake is negligible and there are no other harmful emissions to consider like there are with electricity generating stations. Every community along the lakeshore has the opportunity to extract this "cold energy bonanza" from Lake Ontario's waters without causing it any harm. Even communities more remote from the lake can benefit. Much of the greater Toronto area draws its drinking water from

[3] Central air plants attempt to cool an entire home when only one or two rooms are typically occupied at any given time. Many homes, in fact are not occupied at all during the hottest time of the day because the owners are at work. Central plants use large amounts of energy because much of the cool air they produce sinks into the basement while the upper story rooms where the control thermostats are remain warm. The result is the air conditioner running continuously during the hottest parts of the day but doing a very ineffective job of cooling the rooms that the occupant use. When consumers are urged to adjust the set point of their central air conditioning plant higher on peak load days, the central system becomes even more ineffective at cooling the rooms that are being used. Consumers are understandably resistant to the appeal. Could a more economical and efficient way of providing a comfortable environment be the use window air conditioning units? These draw much less power than central plants, cool only the room they are intended to and can be turned off when the room is not being used.

the lake. About 236 million litres of cold water are already being pumped up to York Region communities every day[4]. Heat exchangers and a district energy distribution system is all that is needed to take advantage of the chilling capacity of this drinking water for air conditioning thereby relieving the electricity system of having supply the load. Currently, the IPSP does not mention deep lake cooling as a potential offset to new generating capacity.

- What role could chilled water storage play? Chilled water storage takes advantage of off-peak electrical supplies to make cold water overnight and distribute it during the hot hours of the following day when air conditioning demand is high. The concept is similar to pumped storage hydraulic generation. It only requires storage tanks and a district energy system for distribution. Communities like Markham, Sudbury, Cornwall and Hamilton have all embarked on community district energy projects. Other would follow if the proper support and incentives were put in place. The OPA should make recommendations to the Minister to encourage deep lake cooling and chilled water storage systems for offsetting electricity demand from air conditioning.

At the same time that a number of innovations have been overlooked, a number of problems with the centralized-system are becoming more apparent. Generating plants the size of Bruce or Darlington, for example, can only be located in areas that are remote from the loads they are intended to serve. They require storage space for vast quantities of fuel and waste and (typically) substantial supplies of freshwater. Getting the power to load centers then requires an extensive network of high voltage transmission lines.

Another problem with this model of generation/transmission is the requirement for very large switching and transformation stations. These facilities are expensive to build, difficult to acquire land for siting, and makes systems more vulnerable to adverse weather and man-made interference.

Further, large remote plants also suffer from an inherent limitation on efficiency brought about by their inability to take advantage of heat recovery technology. Because these plants are never close to population centers, waste heat recovered from combustion or nuclear fission cannot be redeployed for steam or hot water heating needs of local industry. It is just wasted. The efficiency is restricted to about 40% as a result compared to efficiencies of about 80% for combined heat and power applications where steam or hot water hosts are available.

In light of these limitations, the Plan should at the very least consider alternatives that install generating capacity close to the loads it is intended to serve. This avoids transmission problems because new transmission lines are not required. Generation is input into the local distribution system at distribution voltage. Line losses from transmission are eliminated boosting the overall efficiency of the power supply system.

[4] Toronto Water 2004 Annual Report p.43

People living in the community are also much more aware of how their electricity is generated and are likely to be more responsive to conservation appeals. They are also likely to support recycling of waste heat by subscribing to district energy systems linked to CHP plants.

Conclusion

Ontario Hydro's legacy has been an approach to electricity system planning that matches supply to demand as its first priority. This model accepts long-term financial and environmental costs without questioning if alternatives are available. The consequences of this approach are apparent in the more than $20 billion of stranded debt that Ontario Hydro ran up, our dependence on a inflexible technology like nuclear power, and contaminated air, land and water.

The fundamental reason for breaking Ontario Hydro up was to get away from the "bigger is better" approach to planning and to introduce some market discipline to the electricity supply system. Ontario now has the opportunity now to develop a sustainable approach to electric power planning that can avoid many of the mistakes of the past forty years. But it will require more than just repackaging the power planning studies of that era. Real analysis of load trends with an emphasis on how those trends can be shaped to fit with a sustainable energy culture is the priority in electricity system planning. Matching supply and demand is a simple enough task for the marketplace to manage. Ensuring the Plan is sustainable and reflects long-term foresight is the value the OPA must add.