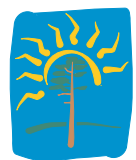




Too Big, Too Costly & Too Polluting

The Proposed Power Plant
for Northern York Region



Ontario Clean Air Alliance

APRIL 1, 2008

Introduction

On January 31, 2008 Ontario's Minister of Energy, Gerry Phillips, directed the Ontario Power Authority (OPA) to enter into a contract with a power company for the construction and operation of a 350 to 400 megawatt (MW) simple-cycle natural gas-fired electric power plant in Northern York Region.

This report outlines why the proposed power plant is too big, too costly and too polluting for Northern York Region (NYR) and a better alternative to meet the region's electricity needs.

Background

In 2004, Hydro One was proposing to build a new high-voltage transmission line from Markham to Newmarket to meet the electricity needs of NYR. As a result of strong public opposition to this proposal, Ontario's then Minister of Energy, Dwight Duncan, asked the OPA to establish a NYR Working Group to explore alternative options to meet the region's electricity needs.

The NYR Working Group (OPA, municipal officials, local electric utility representatives, and concerned citizens) commenced work during the summer of 2005. On September 9, 2005 the OPA released the Working Group's three-pronged strategy to avoid the need for a new high-voltage transmission line.

1. The aggressive promotion of energy conservation and demand management.

According to Amir Shalaby, Vice President of the OPA: "During the community deliberations, people wanted a heavy emphasis on conservation and demand management to help solve the problem. We took that to heart. In fact, we see the York Region as a leader – a proving ground, if you like – for our colleagues at the OPA in the Conservation Bureau. It's an opportunity to use a cross-section of approaches – everything from 'turning-the-air-conditioner-up', to changes in building practices, higher appliance efficiency and the latest demand response technologies – to prove the effectiveness of conservation."

2. The installation of a new transformer station in the vicinity of Holland Junction in King Township; plus an additional transformer station preferably in northern Aurora.
3. A natural gas-fired generating facility in the northern part of the region.¹

While the Working Group produced excellent recommendations, it is important to note that it did not address two key issues:

1. How large should the new natural gas-fired power plant be?
2. What type of natural gas-fired generation technology is appropriate for NYR?

There are three types of natural gas-fired power plants: a) simple-cycle; b) combined-cycle; and c) combined heat and power.

Simple-cycle gas turbines are the least efficient gas technology for electricity generation. According to the OPA, simple-cycle turbines have an energy efficiency of only 36%.²

Natural gas combined-cycle and combined heat and power plants are much more energy efficient than simple-cycle turbines. Specifically, combined-cycle power plants can have an energy efficiency of 55 to 60%; and combined heat and power (cogeneration) systems can have energy efficiencies of 80 to 90%.³

While simple-cycle turbines have lower capital costs than combined-cycle and combined heat and power plants, their fuel costs and greenhouse gas emission rates are much higher.⁴

In its September 30, 2005 report to the Ontario Energy Board, the OPA noted that either a simple-cycle or a combined-cycle power plant could meet the needs of NYR:

"Generally speaking, combined cycle gas generation is suited to intermediate duty while simple cycle is more suited to peaking. Combined cycle generation typically has a higher capital cost but a lower operating cost than simple cycle on a \$/MWh basis. As a result, it is designed to run more often than simple cycle, and is more efficient when running. Additionally, a combined cycle generator produces lower emissions per megawatt-hour than simple cycle.

Either generator can alleviate the Northern York Region bulk supply bottleneck..."⁵

Minister's Directive

On January 31, 2008 Ontario's Energy Minister, Gerry Phillips, sent a letter to the OPA directing it to procure a 350 to 400 MW simple-cycle natural gas-fired power plant to meet NYR electricity needs.⁶ As a consequence, the OPA is in the process of seeking bids from private sector developers to build such a power plant in one of the following seven municipalities: Aurora, East Gwillimbury, Georgina, King, Newmarket, Whitchurch-Stouffville, Bradford West Gwillimbury.

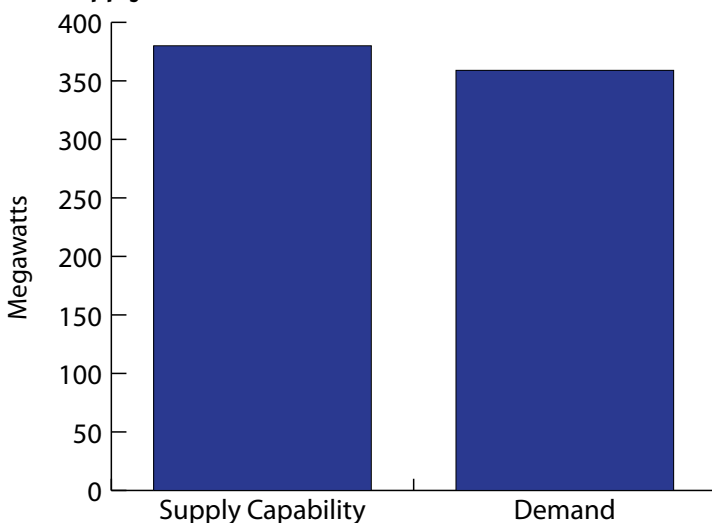
A 350 to 400 MW simple-cycle power plant does not make sense for NYR for three reasons:

1. It is too big;
2. It is too costly; and
3. It is too polluting.

Too Big

Figure 1 shows NYR's electricity supply capability and demand in 2007. In 2007 NYR's electricity supply capability was approximately 380 MW and its annual peak demand was 359 MW.⁷

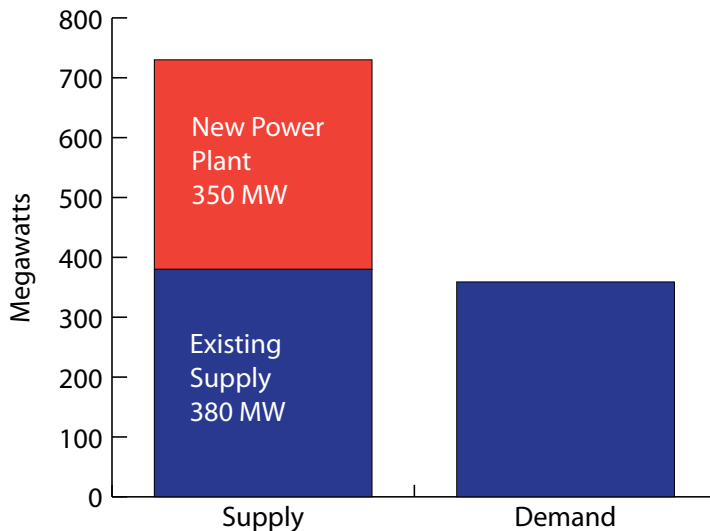
Figure 1: Northern York Region's Electricity Demand and Supply in 2007



While NYR supply slightly exceeds current peak demand, there is a need to increase the margin between NYR's electricity supply capability and its peak day demand. This can be achieved by reducing demand, by increasing supply or by a combination of increased supply and reduced demand.

Figure 2 shows NYR's electricity supply capability and demand if a 350 MW power plant is built in the region. If this occurs, NYR's supply capability (730 MW) will be *double* its peak electricity demand in 2007 (359 MW).

Figure 2: Northern York Region's Electricity Supply and Demand with Addition of 350 MW Power Plant



According to Energy Minister Phillips, the proposed power plant is needed because the "load in NYR is forecast to grow at above 3 per cent per annum".⁸ However, even if electricity demand does grow by 3% per year, it will not equal 730 MW until 2031.

In this context, it is important to note two facts. First, the demand for electricity in NYR *fell* in 2007, declining from 365 MW in 2006 to 359 MW in 2007.¹⁸

Second, according to the OPA, Ontario's province-wide electricity demand is forecast to grow by only 4/10ths of 1% per year between 2007 and 2025.⁹ This means that Energy Minister Phillips is forecasting that the rate of electricity growth in NYR will be 7.5 times *greater* than the provincial average.

Too Costly

According to the OPA, the capital cost of a 350 MW simple-cycle power plant is approximately \$230 million.¹⁰

Table 1 provides the OPA's forecast of the annual capacity utilization rates of the NYR power plant for each year from 2012 to 2015. On average, between 2012 and 2015, its annual capacity utilization rate is 1.45%.¹¹

Table 1: Annual Capacity Utilization Rates of NYR Simple-Cycle Power Plant

2012	2013	2014	2015	Average 2012 to 2015
3.3%	0%	0%	2.5%	1.45%

It does not make sense to spend \$230 million to build a power plant to simply meet the spike in electricity demand that occurs between 2 and 6 p.m. on a handful of very hot summer days when our air-conditioners are running full out.

A much more cost-effective option to meet our electricity needs is to invest in conservation and demand management to reduce the spike in electricity demand that occurs on hot summer days. For example, Hydro One’s and PowerStream’s *peaksaver* programs reduce peak demand by cycling residential air-conditioners, water heaters and pool pumps on and off on peak-demand days. In addition, large commercial, institutional and industrial customers can be paid to shift some of their electricity consumption from peak to off-peak hours on high demand days.

Too Polluting

As shown in Table 2, a simple-cycle gas turbine’s greenhouse gas emission rate per kWh of electricity produced is more than *double* that of a combined heat and power plant.

Table 2: Greenhouse Gas Emission Rates per kWh of Electricity Produced

Simple-Cycle Gas Turbine	Combined-Cycle Power Plant	Combined Heat and Power Plant
506 grams per kWh	303 to 331 grams per kWh	202 to 227 grams per kWh

But What About the Needs of the Rest of Ontario?

According to the OPA, the proposed 350 to 400 MW power plant is also needed to supply the rest of Ontario:

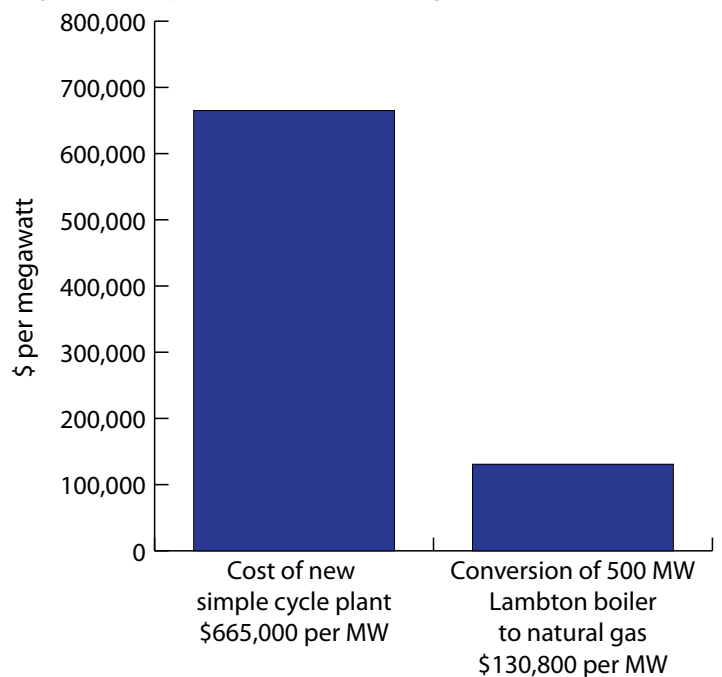
“This new capacity will address not just local peak electricity requirements, but will also make a positive contribution to the provincial supply picture as well. As a result, the cost of the new plant will be supported by electricity consumers across the province.”¹²

However, if Ontario needs additional peaking generation, it can be supplied at a much lower cost by converting one or more of the four 500 MW boilers at the Lambton Generating Station to burn natural gas instead of coal. (According to a legally binding Government of Ontario regulation, the Lambton Generating Station cannot burn coal after December 31, 2014.)

Figure 3 provides the OPA’s estimates of the capital cost per MW of:

- a) a new simple-cycle power plant; and
- b) converting a 500 MW coal boiler to burn natural gas.

Figure 3: Capital Costs of Peaking Generation¹³



As Figure 3 reveals, the capital cost of converting an existing coal boiler to burn natural gas is 80% lower than the cost of building a new power plant.

A Better Alternative

The best options to meet NYR's electricity needs, in order of preference, are:

1. Energy conservation and demand management;
2. Renewable energy;
3. Natural gas-fired combined heat and power;
4. Natural gas-fired combined-cycle generation; and
5. A 30 MW natural gas-fired simple-cycle power plant.

Energy Conservation and Demand Management

As a result of the collective actions of the OPA, Hydro One, Newmarket Hydro and PowerStream, the demand for electricity in NYR fell last year. Additional demand reductions can be achieved by aggressively promoting the *peaksaver* and Rodan Energy demand management programs.

Peaksaver

The *peaksaver* programs of Hydro One and PowerStream reduce peak demand by cycling residential central air-conditioners, electric water heaters and pool pumps on and off on peak demand days. Since the air conditioners are cycled off for only short periods of time, and since their fans continue to operate, customers do not notice a difference in terms of comfort. For more information go to www.powerstream.ca and click on "*peaksaver* Program".

Recommendation #1: The NYR municipalities should ask their local electric utilities to aggressively promote their *peaksaver* programs in 2008 and 2009. In particular, they should ask their utilities to provide them with the following information:

- a) how many residential and small business central air-conditioners are located in each of their municipalities;
- b) how many of these air-conditioners have enrolled in the *peaksaver* program to date;

- c) their *peaksaver* program participation targets, by municipality, for 2008 and 2009.

Rodan Energy

The OPA has established an excellent program to pay large commercial, institutional and industrial customers in NYR (e.g. Magna, Royal Group Technologies, Teknion Form, Protemp Glass, Ontario Sawdust, Vins Plastics, Towns of Aurora, Newmarket and Markham, Region of York, York Catholic District School Board) to reduce some of their electricity consumption during peak demand hours on hot summer days. This program is administered by Rodan Energy. In response to a request from the Independent Electricity System Operator (IESO), on August 2, 2007 between 1 p.m. and 7 p.m. Rodan's customers reduced their demands by 16.6 MW.¹⁴ If the IESO had asked the Rodan customers to reduce their demand on NYR's peak demand day (August 1st), NYR's peak day demand in 2007 would have fallen by 6.2% relative to 2006.¹⁵

To date, the OPA has capped the amount of demand reductions it is willing to purchase in NYR via the Rodan Energy program at 30 MW.¹⁶ In addition, the OPA's payments to customers for demand reductions in NYR are *substantially lower* than its payments for similar demand reductions in downtown Toronto. These arbitrary limitations on the Rodan Energy demand management program are unfair and economically irrational.

Recommendation #2: Ontario Energy Minister, Gerry Phillips should direct the OPA to:

- a) remove its cap on the quantity of demand reductions it will purchase in NYR; and
- b) pay the same price for demand reductions in NYR as it is paying for demand reductions in downtown Toronto.

Combined Heat and Power

Virtually every building in NYR uses natural gas to provide just one service, namely, heating. It is much more efficient to use these same quantities of natural gas to simultaneously produce two services, namely, heat and power. A natural gas-fired combined heat and power plant can have an overall energy efficiency of 80 to 90% versus the 36% energy efficiency of a simple-cycle power plant.

We need to convert dozens of buildings (e.g., apartments, condominiums, recreation centres, municipal buildings, shopping malls, hospitals and factories) in NYR into small-scale natural gas-fired combined heat and power plants. In addition to helping to meet NYR's electricity needs, combined heat and power plants can reduce the need for new, high-cost nuclear power plants.

Table 3 compares the fuel costs per kWh of electricity produced from natural gas-fired simple-cycle and combined heat and power plants. As Table 3 reveals the fuel costs per kWh of a combined heat and power plant are more than 50% *lower* than those of a simple-cycle power plant.

Table 3: Fuel Cost per kWh of Electricity¹⁷

Simple-Cycle Power Plant	Combined Heat and Power Plant
7.6 cents per kWh	3.0 to 3.4 cents per kWh

In the second quarter of 2008, the OPA will be launching a standard offer program to encourage the development of small-scale (10 MW or less) combined heat and power plants. The OPA's program will establish a fixed price that it will pay for electricity production from small-scale combined heat and power plants, making it cost-effective for many building owners and managers to adopt this technology.

Recommendation #3: Each of the NYR municipalities and the Region of York should create a list of their municipal buildings that could be cost-effective hosts for combined heat and power plants.

Northern York Region Working Group

The OPA should re-constitute the Northern York Region Working Group (municipal officials, local utility representatives and concerned citizens) to develop a balanced, clean and cost-effective strategy to meet NYR's electricity needs. As part of its deliberations, the Working Group should review whether there is a need for a small-scale (30 MW) simple-cycle power plant as an insurance policy while NYR develops its energy conservation, demand management, renewable and combined heat and power resources.

Recommendation #4: Ontario Energy Minister, Gerry Phillips should direct the OPA to re-constitute the Northern York Region Working Group.

A 30 MW Simple-Cycle Power Plant

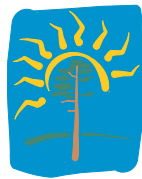
Ontario Energy Minister, Gerry Phillips has directed the OPA to procure a 350 to 400 MW simple-cycle power plant in NYR. As this report has shown, a 350 to 400 MW simple-cycle power plant is too big, too costly and too polluting for NYR. In addition, it is not a cost-effective peaking generation option for the rest of Ontario.

A small-scale simple-cycle power plant may be an appropriate "insurance policy" for NYR as it develops its energy conservation, demand management, renewable and combined heat and power resources. Furthermore, a 30 MW simple-cycle plant could be connected directly to the existing local distribution network, unlike a 350 MW power plant which would require the construction of a new high-voltage transmission line to connect it to Hydro One's transmission network.

Recommendation #5: Ontario Energy Minister Gerry Phillips should amend his January 31, 2008 directive to the OPA to permit it to procure a 30 MW simple-cycle power plant, instead of a 350 to 400 MW power plant, if such a power plant is in the best interests of NYR.

Endnotes

- 1 Ontario Power Authority, *News Release*, “Northern York Region Needs Balanced Electricity Supply Solution”, (September 9, 2005).
- 2 Ontario Power Authority, *Integrated Power System Plan*, (August 2007), Exhibit G, Tab 2, Schedule 1, p. 7.
- 3 Danny Harvey, “Clean building: contribution from co-generation, trigeneration and district energy”, *Cogeneration and On Site Power Production*, (September-October 2006), pp. 108, 110; and Ontario Power Authority, *Supply Mix Analysis Report*, Volume 2, (December 2005), p. 210 & 212.
- 4 Ontario Clean Air Alliance, *The Ontario Power Authority’s Coal Phase-Out Strategy: A Critical Review*, (September 24, 2007), p. 2.
- 5 Ontario Power Authority, *Northern York Region Electricity Supply Study: Submission to the Ontario Energy Board*, (September 30, 2005), p. 42.
- 6 Letter from the Honourable Gerry Phillips, Minister of Energy to Dr. Jan Carr, CEO, OPA re: Procuring Approximately 350 MW of New Gas-Fired Electricity Generation for Northern York Region, January 31, 2008.
- 7 Michael Lyle, General Counsel, Ontario Power Authority, *Northern York Region CDM: Ontario Power Authority Report*, (May 31, 2007), p. 10, Table 4; and letter to Phyllis Morris, Mayor of Aurora from Jason Chee-Aloy, Director, Procurement, Electricity Resources, Ontario Power Authority, (February 1, 2008).
- 8 Letter from Gerry Phillips, Ontario Minister of Energy to Dr. Jan Carr, CEO, OPA, Re: Procuring Approximately 350 MW of New Gas-Fired Electricity Generation for Northern York Region, January 31, 2008.
- 9 In 2007 Ontario’s peak electricity demand was 25,737 MW. The OPA is forecasting that our peak day demand in 2025 will be 27,563 MW. Independent Electricity System Operator, *News Release*, IESO Releases 2007 Generation and Consumption Figures”, (January 10, 2008); and OPA, *Integrated Power System Plan*, Exhibit D, Tab 1, Schedule 1, Attachment 2, page 1 and Exhibit D, Tab 4, Schedule 1, page 16.
- 10 According to the OPA, the capital cost of simple-cycle gas turbines is \$665,000 per MW. See, OPA, *Integrated Power System Plan*, Exhibit G, Tab 2, Schedule 1, page 7.
- 11 OPA, *Integrated Power System Plan*, Exhibit D, Tab 8, Schedule 1, pages 16 & 21.
- 12 Jan Carr, CEO, OPA, “Planning for Reliable Supplies of Electricity in Northern York Region”, Presentation to Joint Chambers of Commerce – Northern York Region, February 26, 2008. Available at www.powerauthority.on.ca
- 13 OPA, *Integrated Power System Plan*, Exhibit E, Tab 5, Schedule 1, page 16; and Exhibit G, Tab 2, Schedule 1, page 7.
- 14 Letter to Phyllis Morris, Mayor of Aurora from Jason Chee-Aloy, Director, Procurement, Electricity Resources, Ontario Power Authority, (February 1, 2008).
- 15 In 2006 and 2007 the peak electricity demands in NYR were 365 and 359 MW respectively. If the IESO had called on Rodan’s 16.6 MW of demand response resources on the 2007 peak demand day, NYR’s 2007 peak day demand would have been 342.4 MW (359 – 16.6). Letter to Phyllis Morris, Mayor of Aurora from Jason Chee-Aloy, Director, Procurement, Electricity Resources, Ontario Power Authority, (February 1, 2008); and Michael Lyle, General Counsel, Ontario Power Authority, *Northern York Region CDM: Ontario Power Authority Report*, (May 31, 2007), page 9, Table 3.
- 16 Jan Carr, CEO, OPA, “Planning for Reliable Supplies of Electricity in Northern York Region”, Presentation to Joint Chambers of Commerce – Northern York Region, February 26, 2008. Available at www.powerauthority.on.ca
- 17 We have used the OPA’s natural gas commodity cost assumption of \$8 per million BTUs to calculate the fuel costs of electricity generation. OPA, *Integrated Power System Plan*, Exhibit D, Tab 3, Schedule 1, Attachment 1, page 11.
- 18 Letter to Phyllis Morris, Mayor of Aurora from Jason Chee-Aloy, Director, Procurement, Electricity Resources, Ontario Power Authority (February 1, 2008); and Michael Lyle, General Counsel, Ontario Power Authority, *Northern York Region CDM: Ontario Power Authority Report*, (May 31, 2007), page 9, Table 3.



Ontario Clean Air Alliance Research Inc.

625 Church Street, Suite 402

Toronto M4Y 2G1

Tel: (416) 926-1907 ext. 245

Fax: (416) 926-1601