

Ontario's Electricity Future



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The Ontario government is taking several actions to ensure our electricity system meets the electricity needs of more than four million consumers every day. Ontario has a diverse supply mix, and is renewing, replacing and adding to this supply steadily. The province is replacing coal-fired generation with cleaner energy for a cleaner environment and healthier Ontarians. Together with our electricity sector partners, we are working to provide ample, reliable, competitively priced electricity to meet the full range of business and consumer needs.

This document is prepared in response to a request from the Energy Working Group of the Ontario Economic Summit. The ministry was requested to provide information on the changing structure of Ontario's electricity sector, plans to retire, replace and add to Ontario's generation mix, related policy changes and their impact on the sector, and the roles and responsibilities of key actors in our electricity system.

I hope the information provided in this report is useful in the further discussions taking place within the Ontario Economic Summit. The ministry is pleased to assist in the Summit's important contribution to determining Ontario's economic future.

Hon. Dwight Duncan
Minister of Energy

Ontario's Electricity Future

It is difficult to overstate the importance of electric power to Ontario's economy, businesses and society. It is one of the most critical components of our province's infrastructure.

Yet, for more than a decade, Ontario's electricity sector experienced considerable neglect and upheaval. Skyrocketing debt at Ontario Hydro and declining operational efficiency at the province's nuclear plants undermined the long-term outlook for the system. These "lost years" have left the province in circumstances where significant attention, decisiveness and action are required to ensure our electricity infrastructure for the future.

Since Fall 2003, the Ontario government has worked aggressively to strengthen Ontario's electricity system – and bring long-term stability, reliability and sustainability to the sector to propel Ontario's future growth and prosperity.

The Electricity Restructuring Act, 2004

The Ontario Legislature passed the *Electricity Restructuring Act* (the "Act") in December 2004. This Act establishes the foundation of Ontario's electricity sector, and reshapes its institutional arrangements.

The Act includes provisions that the Ontario government will continue to set targets for conservation, renewable energy and the overall mix of supply sources in the electricity sector.

The Act provides for regulated prices in parts of the electricity sector to ensure price stability for certain customers.

It also established the Ontario Power Authority, and redefined the roles of the Ontario Energy Board and the Independent Electricity System Operator to support the restructured sector.

Partners in Ontario's Electricity Sector

Government of Ontario

The Government of Ontario has overall responsibility for setting direction for the development of the province's electricity sector. Acting through its Minister of Energy, the government establishes broad energy policy, sets appropriate targets for conservation, and provides direction for the right mix of supply sources.

To ensure consistency with provincial energy policies, the government is able to issue directives to the Ontario Power Authority with respect to fuel mix.

In addition, the Minister of Energy, on behalf of the Government, is the sole shareholder of Ontario Power Generation and Hydro One.

Ontario Power Authority

The Ontario Power Authority (OPA) is responsible for the long-term adequacy of electricity supply in Ontario. To support this mandate the OPA focuses on four principal areas:

- medium and long-term electricity demand and supply planning;
- conservation and load management;
- procurement of electricity capacity or supply, as necessary; and
- stable prices for designated retail customers.

The OPA will fulfill these key responsibilities by working collaboratively with others on sectoral developments. It will generate the Integrated Power System Plan, which will consist of public documents, thoroughly examined and subject to review and updating. These will include plans for conservation, demand management, transmission and generation measures.

The OPA also has the responsibility for providing smooth pricing to designated electricity consumers, based on the real cost of supply. Initially the function will be met through a variance account, but ultimately it may also be managed through a combination of short, medium and long-term wholesale supply contracts.

Conservation Bureau

The Conservation Bureau is housed in the OPA and is led by a Chief Energy Conservation Officer. This Bureau will determine the potential for energy conservation in the province, based

on available technology and economic conditions. It will work with other institutions and stakeholders in the energy sector to promote the adoption of energy-saving technologies, and to educate the public on the importance of conservation. It will also implement demand management and demand response programs across the province.

Independent Electricity System Operator

(formerly the Independent Electricity Market Operator)

The Independent Electricity System Operator (IESO) manages the province's wholesale electricity market. Electricity has unique characteristics that make this a challenging role. Electricity cannot be stored economically on a large scale. Supply must be matched moment-by-moment to demand.

Generators offer power to the wholesale market. The IESO matches offers to supply against forecasted demand. It first accepts the lowest priced offers and then "stacks" up the higher priced offers until demand is met. The last offer accepted sets the market price. Prices are set every five minutes with the average over the hour used for most settlements.

The IESO signals to large electricity generators across the province when to increase or decrease their electricity production in order to balance supply and demand. Then it directs the electricity flow across the province, ensuring transmission lines are operating within their appropriate limits.

The IESO is also responsible for short-term assessment of Ontario's electricity supply.

Ontario Energy Board

The Ontario Energy Board (OEB) is an independent, quasi-judicial tribunal. It regulates the province's electricity and natural gas utilities. It also licences all participants in the electricity sector, including retailers and generators, as well as natural gas marketers that sell to low volume customers.

The OEB has a strong role in consumer protection in the energy market, and has an established public hearings process to ensure fairness for consumers.

Within the electricity sector, the OEB has several key responsibilities. These include:

- Setting transmission and distribution rates and approving the OPA and IESO budget and fees.

- Approving a Regulated Price Plan for residential and low volume consumers based on regulated, contract and forecasted prices. Ontario consumers must pay the true cost of electricity over time, but are not subject to day-to-day market volatility.
- Approving the OPA's Integrated Power System Plan, making sure the Plan meets government directives and provides for adequate long-term supply; and reviewing contracts for new supply, ensuring value for money.

Through its Market Surveillance Panel, the OEB monitors markets in the electricity sector and reports to the Minister of Energy on the efficiency, fairness, transparency and competitiveness of the markets. It reports any abuse or potential abuse of market power.

The Board also reviews and approves the market rules and considers appeals of IESO orders.

Ontario Power Generation

Ontario Power Generation (OPG) is fully owned by the Province of Ontario. Its principal business is the generation and sale of electricity to customers in Ontario and to interconnected markets.

OPG's mandate, recently confirmed by the government, is to maximize Ontario's hydroelectric opportunities. This includes upgrading existing facilities and exploring new sites, particularly in northern parts of the province that hold substantial untapped hydroelectric potential.

OPG owns and operates the province's coal-fired generation facilities, most of the province's hydroelectric facilities, and the Pickering and Darlington nuclear generating stations. It also owns the Bruce nuclear generating station, which is operated by Bruce Power under a long-term lease. As instructed by the Minister of Energy, OPG is currently focused on improving operations at the Pickering and Darlington nuclear stations and is considering all courses of action to achieve this objective.

OPG accounts for about 70 per cent of generation output in Ontario. The output of OPG's nuclear and large baseload hydro plants is regulated in price and accounts for 40 per cent of Ontario generation. OPG's remaining output is not price regulated and will be subject to a revenue limit until May 2006.

Hydro One and the Transmission System

Ontario's transmission network, owned and operated by Hydro One, which is fully owned by the Province of Ontario, plays a critical role in meeting Ontario's electricity requirements. This

network transmits electricity across the province and to interconnected markets via more than 29,000 kilometres of transmission lines. It allows the integrated operation of generating stations, which minimizes electricity production costs while maintaining reliable supply.

There are five other private and First Nation-owned transmitters in the province. Collectively, these smaller companies own and operate less than five per cent of the overall high-voltage transmission network.

Local Distribution Companies

In addition to Hydro One, the largest electricity delivery company in Ontario, there are more than 90 municipally and privately owned Local Distribution Companies (LDCs) in Ontario.

LDCs own the distribution systems that provide local delivery of electricity to consumers. They are also important conduits for the delivery of conservation programs.

In December 2004, the Ontario government issued a consultation paper to help address key transmission and distribution issues.

Private Sector

Ontario's restructured electricity sector balances public leadership with private investment.

Recently, a competitive procurement process resulted in the province giving the green light to several new power projects to be built by the private sector. These include new combined cycle natural gas-fired generating plants in south-western Ontario and in the Greater Toronto Area.

When approved, the OPA's Integrated Power System Plan will identify how much generation is needed in different parts of Ontario as well as the type, i.e. base load, intermittent or peaking. If new facilities are required to meet these needs, the Plan will provide clear signals to potential investors and developers.

Ontario's Plan for a Stable, Balanced Electricity Sector

Today, Ontario's electricity generation includes a mix of nuclear energy, fossil fuel and hydroelectric power.

Ontario's Electricity System Supply Mix, 2005

All Plants	Capacity (MW)
Nuclear	10,882
Hydro	7,756
Coal	6,434
Oil/Gas	4,976
Other	68
Total	30,116

However, the replacement of coal-fired generation in Ontario, the aging of Ontario's nuclear fleet, and increases in electricity demand as the province and our economy grows suggests enormous investments in generation will be required to the year 2020:

- The replacement of coal plants (7,500 MW)
- Potential retirement of nuclear plants (up to 10,000 MW)
- load growth (6,500 MW)

Taken together, Ontario faces the challenge of developing 25,000 MW of new/refurbished generation, or equivalent demand management, by 2020, a possible investment of \$25 to \$40 billion.

Replacement of Coal-fired Generation

As part of its plan for a cleaner environment and healthier Ontarians, the government is eliminating Ontario's reliance on coal-fired electricity generation. An independent study on the hidden costs of coal-fired generation confirmed that coal replacement will reduce health and environmental costs in Ontario. These hidden costs mean that the true cost of coal-fired electricity is very high, and more expensive than other options for Ontario. Ontario's coal-fired plants are the largest industrial source of greenhouse gas emissions, sulphur dioxide (SO₂) and oxides of nitrogen (NO_x) in the province. Greenhouse gas emissions are subject to the Kyoto treaty on climate change, while SO₂ and NO_x are contributors to smog.

The plan set out by the government on June 15, 2005 ensures coal-fired generating stations are closed only as sufficient new clean capacity is established. To support the replacement of coal-

fired generation, the government is taking action to add about 9,000 MW of cleaner capacity to Ontario's electricity system.

Scheduled Closure of Ontario's Coal-Fired Generating Stations

Coal Plants	Capacity (MW)	Planned Closure Date
Lakeview	1,140	2005 (closure completed)
Atikokan	215	2007
Thunder Bay	310	2007 (conversion to gas)
Lambton	1,975	2007
Nanticoke	3,938	2008-2009

Nuclear Power

Ontario has invested heavily in nuclear power. By the mid-90s, 20 units were operating at Ontario's three nuclear power plants: Pickering Generating Station, Darlington Generating Station and Bruce Generating Station. Ontario's nuclear assets are aged and electricity production from the plants saw a decline in the late 1990s. An increased focus on operational maintenance and refurbishment has reversed this trend. Today, nuclear plants account for more than one-third of Ontario's electricity generating capacity.

As Ontario moves into the future, it will have to consider the further refurbishment or replacement of the existing nuclear fleet, and the government has asked the Ontario Power Authority to consider the opportunity, issues and options for new nuclear capacity.

Renewable Energy Sources

The Ontario government has set a goal of generating five per cent (1,350 MW) of the province's total generation capacity from new renewable sources by 2007. A series of competitive procurement processes have been established to help reach this goal and develop renewable energy sources. This has already resulted in the announcement of 395 MW from renewable sources, including hydroelectric, wind and landfill gas. A second process announced in April 2005 seeks projects with a capacity of 20 MW or more and could collectively boost green power in Ontario by up to 1,000 MW. In July 2005, a third request was announced to seek up to 200 MW of power from small and medium-sized renewable energy projects under 20 MW.

Cumulative Additions to Generation Capacity

Between 2004 and 2007, Ontario will secure more new generating capacity than any other jurisdiction in all of North America. This includes:

- Pickering A Unit 1 Return to Service – 515 MW
- Clean Energy Supply and Demand Side Projects – 1,955 MW
- Niagara Tunnel – 200 MW
- Renewables 1 RFP – 395 MW
- Renewables 2 RFP – 1,000 MW
- Renewables 3 RFP – 200 MW
- Replacement of Thunder Bay Generating Station with Gas-Fired Generation – 310 MW
- Co-generation – 1,000 MW
- Downtown Toronto – 600 MW
- West GTA – 1,000 MW
- Demand-Side Management and Demand-Response – 250 MW
- Tentative deal with Bruce Power for refurbishment of Bruce A Units 1 and 2 – 1,500 MW

In total this is the equivalent of nearly 9,000 MW of new capacity.

In addition to generating power within the province, Ontario has an ability to import power from neighbouring jurisdictions such as Quebec and New York State. The province's transmission system is currently able to import about 4,000 MW of electricity, which contributes to the reliability of Ontario's electricity system.

Ontario is pursuing opportunities to import additional electricity from the provinces of Manitoba and Quebec. The potential projects are:

- the Clean Energy Transfer Initiative, which includes a proposed hydroelectric power project in Northern Manitoba and strengthened transmission connections, could bring over 1,500 MW of power from Manitoba to Ontario; and
- a joint proposal with Hydro-Quebec and SNC Lavalin to support strengthened transmission connections and development of a major hydroelectric generation project at the Lower Churchill River in Labrador could bring about 1,000 MW of clean power to Ontario.

As noted earlier, the Ontario Power Authority is developing an Integrated Power System Plan, from which the OPA will develop procurement processes for additional new supply and demand management.