

Introduction

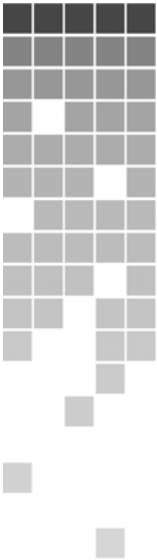
Ontario's electricity system is increasingly fragile. On the hottest and coldest days, people worry if there will be enough power. The province relies more on imports than ever before. The system of wires, transformers and towers that brings us electricity is pushed to near capacity. Three nuclear generating units owned by Ontario Power Generation Inc. (OPG) lie idle – and faith in its ability to return them to service has been shaken.

While there are many reasons for these problems, two stand out. First, the sector has been destabilized by more than a decade of abrupt and often unpredictable policy swings. That turmoil took the attention of key players away from long-term supply and transmission needs. It also created an environment that threatens the operational and financial health of OPG.

Second, and equally significant, are problems within OPG itself. As our largest electricity generator, its troubles both reflect and contribute to the fragility of the sector as a whole:

- Senior management has changed frequently, often in step with policy changes that have shifted the company's focus from its core job of generating electricity.
- Accountability and governance have been weaker in many areas than they should have been, and the culture is marked by low morale and a low sense of worker engagement.
- Cost overruns and delays in returning Unit 4 at the Pickering A nuclear station to service and unplanned costs at other stations have bled billions from the company since 1999 and reduced the supply of electricity.

In sum, OPG looks, to people on the inside and outside, like a company that is neither well-run nor well-governed. It is not getting the value it could and should be getting from its assets – whether physical assets like generating plants, or the human capital of its workforce.



In light of these concerns, Ontario's Minister of Energy announced on December 16, 2003 the creation of the OPG Review Committee. Its members, drawn from the public and private sectors, were asked to provide the Province with recommendations on how to fix what is wrong at OPG. Appendix A provides brief biographies of the committee's members.

The specific areas we were asked to advise on may be summarized as:

- the future role of OPG in the electricity market;
- the future structure of OPG;
- the appropriate corporate governance and senior management structure; and
- the potential refurbishing of Pickering A Units 1, 2 and 3.

This report provides our recommendations and advice to the Minister in these areas. While we were not asked to make recommendations on the appropriate structure for the electricity sector as a whole, we do make a number of observations on this broader issue.

The complexity of the issues and the sheer size of OPG made this an extremely challenging task. We felt very strongly the need to get it right – not just for OPG but for everyone in Ontario. Getting it right is critical, because:

- The generating assets owned and operated by OPG are capable of providing more than 70% of our electricity supply, so their role is vital to Ontario's economy and quality of life and to keeping our supply reliable and competitively priced.
- Ontario faces a potential supply shortage of between 5,000 and 7,000 megawatts (MW) by 2007 – or about 16 to 23% of Ontario's current capacity – and to worsen steadily from there on. Decisive action is needed now to head off the crisis.
- OPG, in the current environment, risks becoming a further burden on ratepayers or a drain of tax dollars. This can't be allowed to happen.
- Finally, OPG and its predecessor, Ontario Hydro, have been through too many false starts over the past decade. People in Ontario and at OPG need a better solution.

How did we proceed?

Our starting point was the need to ensure the publicly owned assets that form the backbone of Ontario's electricity supply – from the historic Beck station at Niagara Falls to its huge and complex nuclear stations – are run and maintained as well as can be.

This is a critical stewardship role, and our first question was: who should be entrusted with it?

There are those who would argue that OPG's problems are so severe that it is no longer capable of handling the complexities of running and maintaining one of the largest portfolios of generating assets in North America.

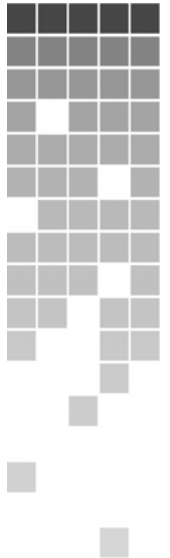
We took a hard look at the company – not just its present condition, but also the history of its problems and the future performance it might be able to achieve.

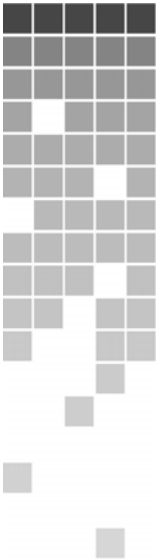
We looked to the assets themselves, and our dependence on them no matter in whose hands they are.

In the end, we decided that OPG should continue to play its role as the owner and operator of these assets. There are strong reasons for our decision:

- Policy chaos and poor governance have not allowed OPG to perform to its potential.
- Public-sector and private-sector ownership both present risks. At present, we believe the risks related to keeping OPG's assets in public hands are easier to manage. We have recommended ways of doing this.
- For the foreseeable future, the Province needs to maintain, in the public sector, core expertise in operating and maintaining generating assets.

In short, we believe that OPG has a vital role to play in ensuring the best use of public assets to meet critical needs in an evolving sector. This does not preclude it from entering into arrangements with other parties to ensure that its assets are put to their best use. Our





full rationale, and a more detailed description of OPG’s proposed role, are set out in Chapter II.

We need to underscore, however, that we are not proposing to go back to the old days of one supplier to almost all of Ontario’s market. That model may have worked well in the past, but the world has changed.

Now we have – and need – an array of increasingly sophisticated options to meet demand: distributed generation that puts generating capacity close to where it is needed, conservation, renewable energy and co-generation.

This has created a different landscape for the sector that offers opportunities for many different players. We certainly see a role for OPG, but it must be one of many suppliers offering a diversity of generating sources. Its size and structure must not work against other market players.

This leads us to three principles that will help to define the outcome that is best, in the current environment, for Ontario:

- OPG remains a government-owned company;
- OPG is given the tools and mandate to become an effective steward of public assets; and
- OPG is one of many suppliers to the Ontario grid.

To work, this needs a policy framework that properly fits OPG into the new landscape for the sector.

Specifically, OPG must become a rate-regulated commercial utility focused on running and maintaining its core generating assets. (“Rate regulation” and other technical terms used in this report are defined in Appendix D.) OPG also needs a structure and governance framework that let it operate like a commercial business.

This requires that the government must act as a responsible shareholder, the company must run like a commercial business, the policy environment must allow the market to bring in new players – and everything must be open and transparent.

Get that right and the rest should follow. We believe our recommendations comprise a realistic plan for getting it right.

Removing the obstacles

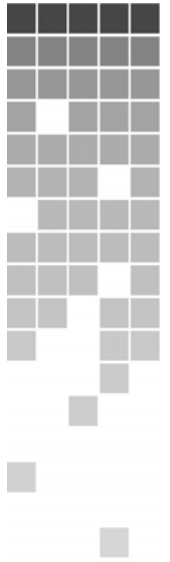
We expect that there will be understandable cynicism about yet another “plan” for Ontario’s generator.

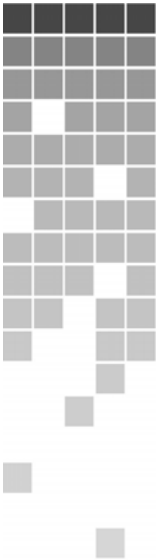
We believe that our plan removes from the equation three huge obstacles to success in the past:

- **OPG and its predecessor were too often used as a vehicle for carrying out public policy goals.** We believe that public policy goals are best carried out by government, and our recommendations address this.
- **OPG and its predecessor have been subject to political interference by governments of the day.** We believe that the best way to govern and run a utility is to select people with the right skills and experience, give them the authority they need, make them accountable, and ensure the right controls – internal and external – are in place and working. Our recommendations address how to do this.
- **Most important, OPG senior management was not held accountable for decisions and performance.** OPG needs greater transparency, clarity in its mandate and accountability for results.

Our picture of what success will look like is:

- public assets are operated and maintained to get the best use from them over the long term;
- private equity, not Ontario taxpayers’ money, bears the risk in most major new projects;
- OPG supply to the grid is reliable and cost-competitive;
- the people of OPG work in a positive, constructive environment, see that they are valued, and are accountable for their performance;



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- as a rate-regulated company, OPG's focus is on providing supply from core assets into a healthy electricity sector as one of many participants;
 - effective regulation ensures electricity ratepayers are not at risk for the missteps of OPG in future; and
 - OPG performance is measured by benchmarking against comparable utilities.

All of these goals are measurable, some quite precisely. Measurement and benchmarking can provide the basis for tracking OPG's progress in future. It is an objective way of telling whether the plan is working.

Consultations and information gathering

The OPG Review Committee began its work on December 16, 2003. During our deliberations, we heard from a wide variety of individuals and organizations, through four main channels:

- direct presentations to the committee from electricity generators, distributors and transmitters, electricity industry consultants, labour organizations, members of the financial community, regulatory authorities, government organizations, and environmental groups;
- a roundtable meeting with energy sector associations, environmental groups, major industrial consumers and small business consumers;
- submissions from major industrial associations who were invited to contribute; and
- the thoughts of interested citizens provided through a website established by the committee.

To get an in-depth picture of the organization and technical information about operations, we met with senior OPG officials from all areas of the organization. We also met with representatives of OPG's two labour organizations and with other employees past and present.

We thank everyone who took the time to provide us with their views. A list of those who met with us or sent a submission appears in Appendix B. Copies of submissions received electronically are available on the website at www.opgreview.org.

As well as drawing on the information provided by the individuals and organizations, the committee worked closely with the following expert advisers:

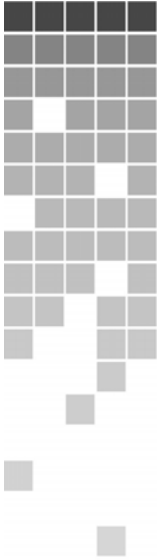
- on financial matters, CIBC World Markets Inc. and PJBTO Associates Ltd.;
- on corporate governance and corporate law, McCarthy Tétrault LLP; and
- on project oversight in relation to the Pickering project, Schiff Hardin LLP, working with J. Wilson and Associates, and Meyer Construction Consulting Inc.

For communications advice and help in drafting the report, we drew on the skills of The Strategic Counsel and Coutts & King Inc. Senior officials in the Ontario Public Service helped us by carrying out research and offering advice, and other Ontario government staff provided logistical support. Appendix C lists research sources.

We also had access to drafts of a report prepared by the accounting firm KPMG LLP that was being prepared in parallel with our review. The analysis KPMG carried out was very helpful to us. It was particularly valuable in highlighting the significant problems in forecasting costs – not just for the Pickering project but also for annual operations and maintenance – in the nuclear division of OPG.

In Chapter I of this report we set out broader issues in the electricity sector, and our observations on these. Subsequent chapters outline our detailed thinking and recommendations in each of the specific areas of our mandate as they apply to OPG.

We believe that our recommendations will put OPG on a realistic and achievable path to better results, and strengthen Ontario's electricity sector as a whole. In Chapter VI we set out crucial first steps in moving towards success. Our recommendations appear where relevant throughout the chapters on role, structure, governance and the Pickering project. As well, a list of all recommendations is included after the appendices.



A final note

In working towards a solution to the problems of OPG, the goal guiding us has been to help government make the most effective choices possible to ensure that OPG contributes as it should to a healthy and reliable electricity sector in Ontario. An equally important goal has been creating the conditions in which the people of OPG can contribute as fully as they are able to the company's success. These goals are not in conflict – in fact, we believe that the first relies on the second.

I. Setting the course

In carrying out our work, we looked first at a number of vital issues that must underlie any thinking about OPG and its future. One is the potential supply shortage identified by the Electricity Conservation and Supply Task Force, referred to here as the Task Force, and the means available to bridge it. The other is the policy environment, which has been prone to abrupt and unpredictable change.

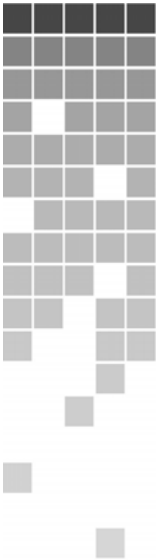
In this chapter, we discuss these areas and set out our views on what is needed to ensure the soundness of OPG and the sector as a whole.

The supply shortage

Remarkably, given the province's history as a leader in electricity production, Ontario is now facing a supply problem that could become serious as early as 2007 and worsen over the longer term.

There are several major reasons why supply is not keeping pace with demand:

- Based on recent information from the Independent Electricity Market Operator (IMO), new capacity currently planned or under construction is well short of what Ontario will need in the foreseeable future.
- Ontario's nuclear fleet is not operating at full capacity, with several units at the Pickering and Bruce plants still out of service from a 1997 shutdown and others at Pickering running well below their potential. Over the longer term, there are serious concerns about the longevity of the entire nuclear fleet.
- Many generating assets are reaching the end of their current useful life or, in the case of coal-fired plants, are slated to close.
- For more than a decade, there has been no effective long-term supply planning. In particular, because market forces were supposed to attract new supply after market opening in 2002, Ontario lost years of valuable planning and construction time from the late 1990s onward.

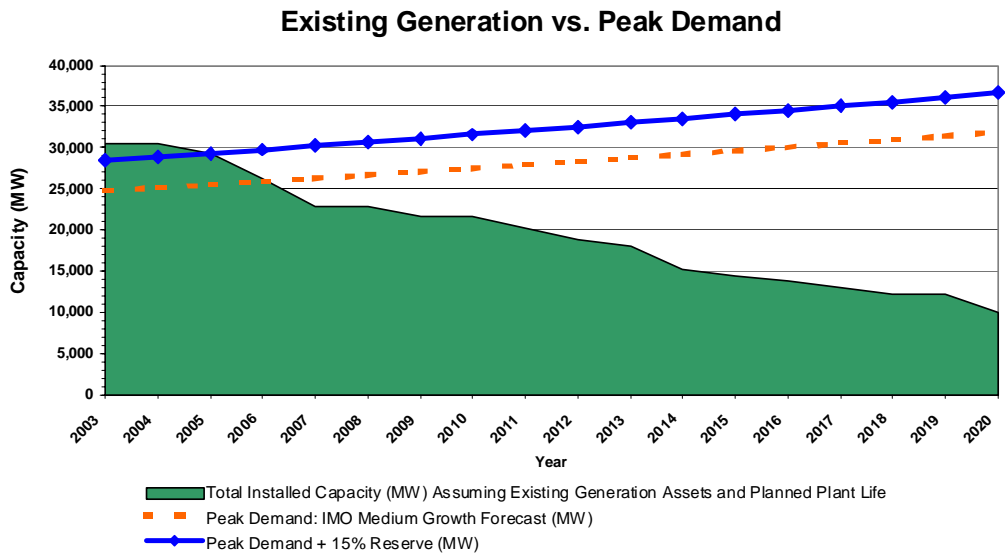
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- Demand continues to rise, as the population grows and the economy expands. For example, greater use of air-conditioning in recent years has made summer a high-demand season, as winter has always been.

The conclusions of the Task Force reinforce just how little time is left before demand consistently outruns supply.

In March 2003, a 10-year outlook prepared by the IMO indicated that the province should have adequate supply up until 2007, even in high-growth demand scenarios (although planned reserves would be lower than desired in some cases). But the Task Force updated the outlook to reflect several important factors that would cut into available supply:

- many planned projects in the IMO outlook that would have added 8,700 MW of capacity had been put on hold;
- closing all other coal-fired plants, in addition to the 1,140-MW Lakeview plant included in the IMO forecast, would remove a further 6,420 MW of generation capacity by 2007; and
- the most optimistic of the IMO scenarios had included the three remaining units of the Pickering A nuclear plant, with total capacity of roughly 1,500 MW. Uncertainty about whether and when they would be returned to service had grown in the meantime.

The Task Force's report indicates that under those circumstances, a serious supply gap would start to open by 2007 and would steadily widen.



Meeting Ontario's needs

We agree with the view of the Task Force that a stable and consistent electricity policy framework is essential to increasing supply. This has not been the case.

Major shifts in policy over the past decade and efforts to change first Ontario Hydro and then OPG have resulted in huge staff reductions at Ontario Hydro, a confused role for the company, a loss of focus on supply needs, and considerable uncertainty for the sector as a whole. This timeline shows some of the major events that have had an impact on Ontario Hydro and later OPG and others in the market:

1993	Having declared Ontario Hydro “a corporation in crisis,” CEO Maurice Strong announces significant staff cuts; rate freeze begins; massive corporate restructuring begins
1994	Further staff cuts
1996	Report to new government from Macdonald Commission recommends competition in generation, break-up of Ontario Hydro
1997	New nuclear team arrives, 4 nuclear units taken out of service; White Paper recommends break-up of Ontario Hydro
1998	<i>Energy Competition Act</i> introduced; a further 3 nuclear units removed from service; Ontario Hydro starts process to break up into 5 separate entities
1999	OPG created from Ontario Hydro break-up, decontrol of assets/MPMA begins
2000	Fossil decontrol stopped
2001	Fossil decontrol restarted; Lakeview directed to close by April/05. Bruce nuclear plant leased to private-sector operator.
2002	Market opens, prices soar; government caps price for many consumers. Pickering A nuclear unit restart clearly in trouble. Fossil decontrol stopped. MPMA rebates accelerated.
2003	Report of panel into Pickering A problems, resignation of board and senior management. New government moves to raise electricity price; names interim OPG leadership; says coal plants will be replaced.

The changes accelerated with legislation in 1998 that redesigned the market in preparation for full competition in electricity generation and marketing. But the market that opened on May 1, 2002 failed to achieve key goals and quickly led to more changes.

What went wrong? The reasons were complex and are outlined in more detail in the report of the Task Force. Essentially, though, the market didn't work as expected. Too many consumers were exposed to prices that were high and volatile at a time of supply shortage.

Consumers expressed shock. Between media focus on the price spikes that hit on the hottest days, heavy use of air-conditioning and new charges on utility statements that reflected the impact of market restructuring, electricity bills suddenly seemed too high, their components too confusing and pricing too uncertain. Consumer rebates built into the market structure to help deal with some of the changes would not arrive until the next spring – well after consumers had received their new bills.

In response, the government of the day stepped in. Late in 2002, the price of electricity for certain classes of consumer, who together use about 50% of supply, was set at 4.3 cents per kilowatt hour (KWh). Other consumers (mainly large-volume ones who hadn't arranged contracts) still dealt through the spot market. The delivery of rebates was accelerated.

But one feature that was not changed was the rebate mechanism. Most of the funds for the consumer rebate came from OPG's revenues, through the Market Power Mitigation Agreement (MPMA). This was tied to a plan to have OPG give up control of most of its assets over a 10-year period. Although the decontrol process was stopped in 2002, the payments under the MPMA were not. To January 31, 2004, OPG had made a total of \$2.65 billion in payments for consumer rebates under the MPMA.

At present, the government has committed to creating greater certainty and stability in electricity policy and to pricing that better reflects the cost of producing electricity. As a starting point, it has:

- moved to introduce an interim pricing system effective April 1 of this year that will tie the price consumers pay per kilowatt to the amount used, benefiting low-volume consumers and encouraging conservation; and

- directed the Ontario Energy Board (OEB), the regulator, to develop a new pricing mechanism to be put in place by May 1, 2005.

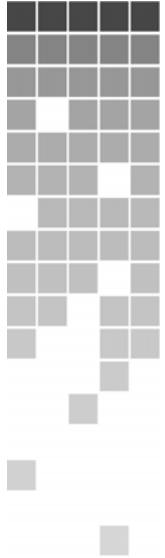
While we were not asked to recommend a specific market design, we provide the following as our views as to the outcomes any design should promote. A key element needed to achieve all of these outcomes is pricing, which must reflect the full cost of electricity.

Ontario should aim to be self-sufficient in electricity, including an appropriate reserve margin, over the long term

- We are reaching the limits of the import transmission system. Building new transmission lines can take longer than building new capacity.
- On the days we run short of power because of severe weather, the nearby jurisdictions from which we can most easily import power are likely to face high demand as well. That makes us dependent on their supply strategy.
- The price of power available for import increases significantly when supply is tight. This could make Ontario a less competitive place to run a business.
- Import dependency that puts supply at risk can have serious economic impacts if businesses have to curtail usage or shut down.
- There are strong environmental reasons for keeping supply in Ontario, where government policy can set higher environmental standards. For Ontario, nearby states that depend heavily on coal plants are a major source of imported power. These plants typically operate at lower air-quality standards than the new standards planned for Ontario, yet their emissions drift into our air shed.

Electricity costs must be competitive

A mix of generating sources and new investment will help to ensure that Ontario's electricity prices remain competitive, which is key to economic success. As the report of the Task Force pointed out, the energy efficiency of Ontario's economy has increased, particularly as the province shifts to a greater share of service and knowledge-based businesses. However, Ontario's future as an attractive place to invest and create jobs depends on electricity prices remaining competitive against other jurisdictions that want to attract the same businesses.



There should be a diversity of fuel sources

Diversity of supply enhances reliability and security of supply. It also allows the most efficient mix to meet fluctuating power needs.

We believe a supply strategy for Ontario should include:

- growth in “green,” renewable power and other solutions that use innovative technologies;
- best possible use of existing hydro-electric assets, and adding new hydro capacity where it makes economic and environmental sense;
- building of natural gas-fired plants where needed across the province; and
- sufficient nuclear generating capacity, provided cost-effectively.

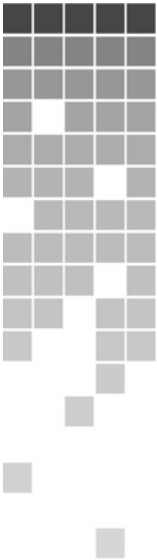
There should be new private investment in electricity generation

New investment is key because:

- Ontario needs more supply and needs it quickly. New investors are well positioned to add new supply in the short time available.
- Diversity is important, as noted above. New investors are well-suited to increase supply diversity with sophisticated new technologies and approaches.
- Investing in new electricity generation involves business risks. We believe private investors are generally better able to allocate capital and better positioned to assess, manage and bear those risks.

Ontario should promote conservation

Conservation represents the cleanest means of filling Ontario’s supply gap. A recently released report from the OEB recommends ways of promoting conservation and removing unintentional barriers to it.



As the OEB noted, price signals are crucial to conservation. If consumers don't pay the full cost of electricity, they are less likely to make the investments needed to conserve it.

We understand the government is committed to conservation as an approach to deal with the supply shortage. In fact, in its recently announced plans to issue a request for proposals for the supply of power, the government has indicated it will consider demand side management proposals.

Regulation should be effective

Our recommendations include an expanded role for the OEB as the regulator of OPG. We believe that whatever the final shape of the sector, regulation must be transparent, effective and certain. The OEB must be a strong, independent and effective regulator.

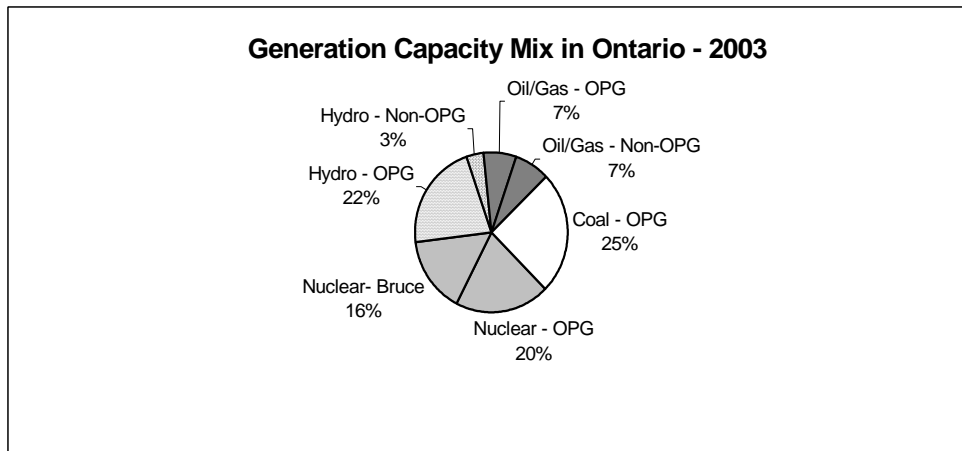
Other supply issues

There are two additional factors relating to supply that merit discussion. The first, which relates to the near-term supply question, is the policy direction on coal. The second is the long-term importance of nuclear generation in Ontario's electricity supply mix.

i. Coal

Coal is a major source of electricity generation in North America. It is the single largest source of supply in the United States, and is especially important in states close to Ontario. North America has very large reserves of coal: enough, it is projected, to last more than a century. U.S. reliance on coal is expected to grow, with an estimated 94 plants planned across 36 states.

At present, OPG operates five coal-fired plants that provide more than 20% of Ontario's electricity supply. On a typical day over the past winter, they generated about 5,500 MW of power from a total available capacity of 7,500 MW.



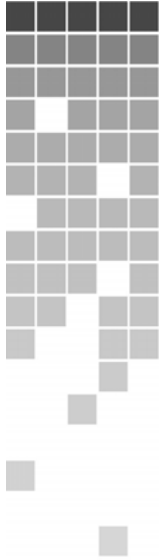
Note: Other Non-OPG generation sources (not shown) are sources such as wind and waste. These account for less than 0.3%.

The government has set the objective of replacing the province's coal-fired plants by the end of 2007 for health and environmental reasons. The majority of market experts have said that meeting the 2007 target date will present challenges and will result in significant increases in the cost of electricity. In the new sectoral framework, planners, OPG and other suppliers will need to work towards an orderly transition that manages the supply and price concerns.

The IMO reported that for the period from May 2002 to November 2003, coal was the price-setting fuel in Ontario 56% of the time, at an average price of 3.38 cents/KWh. Gas/oil, an alternative to coal generation, set the price of electricity 30% of the time at an average price of 7.88 cents/KWh.

Although our focus in this review has been on OPG as a business, with a larger view to the pivotal role the electricity sector plays in Ontario's economy, we believe that improved air quality is an important and valid goal. While there will be costs associated with action on coal, there are also serious costs to inaction. These may be difficult to quantify, but they manifest themselves in increased costs to our health care system and to the economy through lost work days and productivity declines. Clearly, these costs must also be taken into account.

We understand that there are other approaches that could reduce current emission levels substantially through closing or converting to gas most of the plants, and installing new



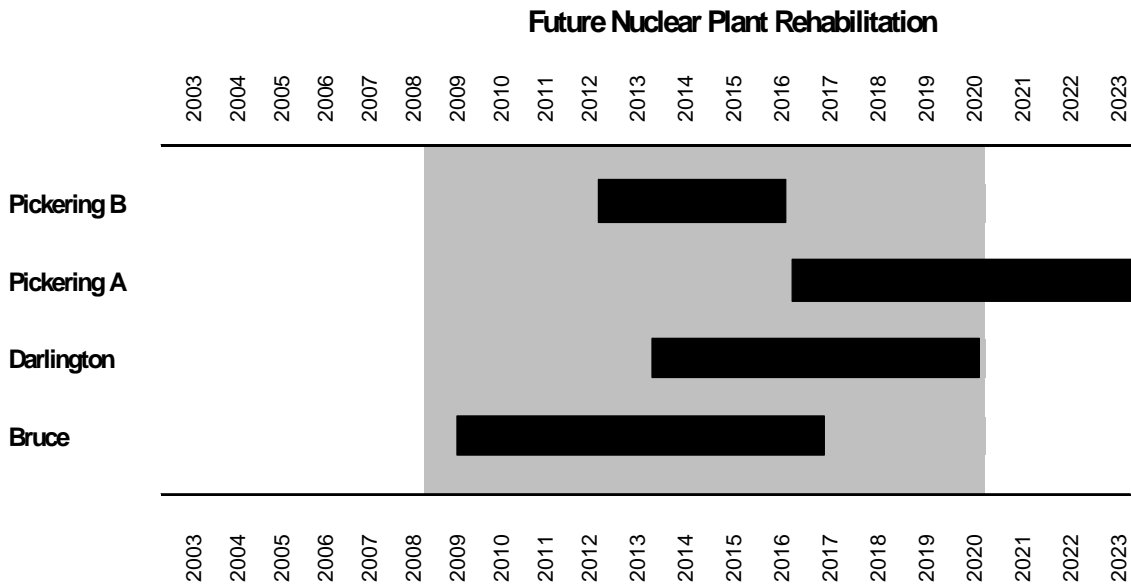
technology to reduce the emissions of any remaining coal generation. These, too, are factors for the government to consider as it moves towards its objective.

ii. Nuclear

Nuclear plants are well suited to provide base load power needs. A base load power plant is most efficient when it can run continuously with relatively low operating costs. This brings stability to the cost of producing the foundation of electricity supply.

At present, nuclear plants provide most of Ontario’s base load power needs. Apart from major hydro-electric facilities, Ontario has few other options for base load power.

However, plants operating today will need major investments starting in 2009 that would take up to 15 years to keep them running safely and efficiently. Depending on the condition of units and the business case, the industry can handle up to three concurrent unit rehabilitations. These requirements give rise to the possible schedule as shown in this chart:



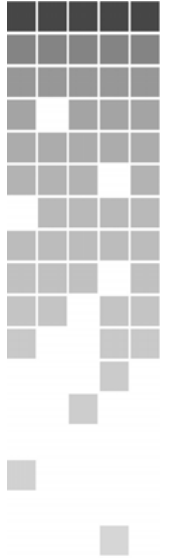
Based on our review of the experience with nuclear power in North America and worldwide, we have concluded that Ontario must begin planning now to supplement and

ultimately replace its ageing nuclear assets with new and better generations of nuclear technology.

There are several reasons for this need:

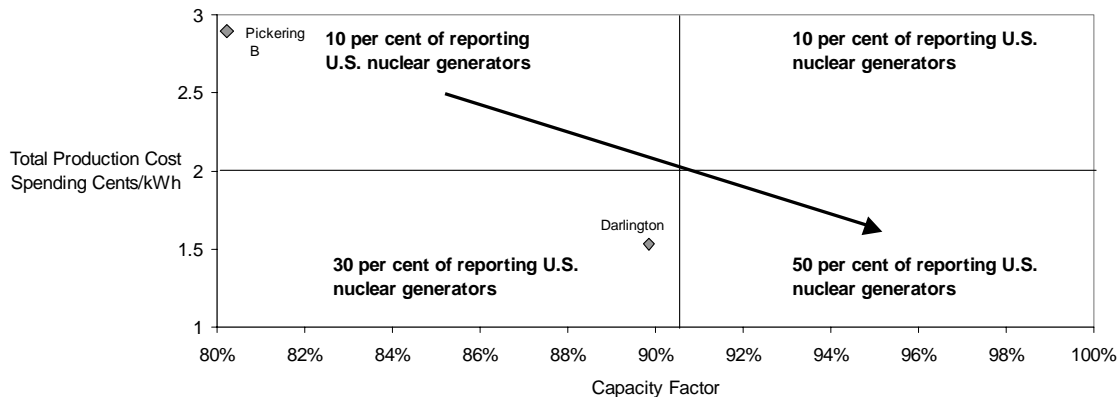
- As noted, nuclear plants can be a cost-effective source of base load generation. Initial construction costs are high, but the operating costs of a properly maintained and run plant are relatively low and steady. This means the price of power they generate is stable over time.
- Ontario has few opportunities left to build major new hydro-electric projects that fit the profile for providing base load.
- Coal and gas are both used elsewhere for base load. However, Ontario is decreasing its dependence on coal. Gas prices are now high and volatile, and expected to stay that way for the foreseeable future. Relying heavily on gas to provide base load would push up the level of Ontario's electricity prices and make them unstable.
- Renewable energy sources, conservation and co-generation are all important, but cannot fully bridge the supply gap.
- Ontario's existing nuclear plants are based largely on technology developed in the 1950s and 1960s and tested for the first time in Ontario. While it is possible to extend the life of these plants, the next generation could benefit from new and emerging technologies.
- Nuclear power does not contribute to air emissions the way coal and gas do, and does not involve the complex watershed management issues of hydro projects. While safe long-term disposal of spent fuel is vital, there is a cooperative process under way between the federal and provincial governments to ensure this will be done.

In our deliberations, we looked closely at the Canadian and international nuclear industries. We met with regulators, industry consultants and plant operators.



Nuclear power now meets more than 20% of U.S. and European electricity needs. The nuclear industry in a number of countries, including the U.S., operates cost-effectively, safely and at high standards.

Capacity Factor and Total Production Costs



Note: Capacity factor is the percentage of time the plant is up and running.

But we also learned that success in this highly complex industry is far from given. We believe Ontario can and must learn from the experience and approaches of other jurisdictions. We offer the following observations on issues critical to Ontario’s nuclear future:

- A nuclear strategy should be driven by what is best for Ontario’s electricity sector only. A broader industrial development strategy for the domestic nuclear industry should not enter into decisions.
- Ontario should not be biased towards choosing Canadian-developed technology, but should seek out the best available technology worldwide.
- The new electricity sector framework will have to include a planning function. Planners should use a rigorous competitive process for nuclear projects that puts all potential suppliers, whether based in Canada or elsewhere, on the same footing. Ontario should be able to draw on the best expertise in the world to build, operate and maintain them.

- The construction and operation of nuclear plants involve substantial financial risks, including cost overruns. In the past, ratepayers have borne the impact. In future, the financial risks that arise from cost overruns must be managed so that both ratepayers and taxpayers are substantially protected.

Given the long lead time required to construct a nuclear plant, planning should start now, but should not take the focus off short and medium-term challenges, such as improving the performance of OPG's existing nuclear assets.

In sum, we believe that the right nuclear strategy will play a key role in ensuring that Ontario has reliable, competitively priced power over the long term.

