

THE REPORT OF
THE AGENCY REVIEW PANEL
ON PHASE II OF ITS REVIEW OF
ONTARIO'S PROVINCIALY-OWNED ELECTRICITY AGENCIES

November 2007

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November 30, 2007

The Honourable Gerry Phillips
Minister of Energy
900 Bay Street
4th Floor
Toronto, Ontario M7A 2E1

Dear Minister:

On January 29, 2007 the Government appointed us as an Agency Review Panel to review specific issues related to Hydro One Inc., the Independent Electricity System Operator, The Ontario Power Authority, Ontario Power Generation Inc. and the Ontario Energy Board.

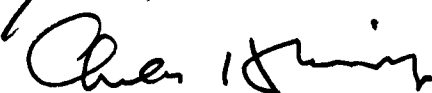
We were instructed to conduct our work in two phases, and submitted our report on Phase One at the end of May.


We are pleased to submit herewith our report on Phase Two (which has attached, as an appendix, a report commissioned from the Electricity Sector Council).

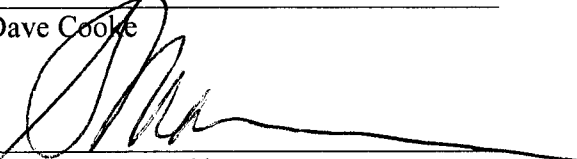
We thank you for the opportunity to have been of service.

Respectfully submitted,


James Arnett, Chair


Charles Harnick


Dave Cooke


Sharon Manson Singer

EJA/ew
Enclosure

1. Introduction

Given the importance of the electricity sector to the Province of Ontario, the Minister of Energy established the Agency Review Panel to advise on several specific matters relating to five provincially-owned agencies in the sector.

The first phase of our work (Phase I), on which we reported in June of this year, concerned executive compensation, our report being available on the website of the Ministry of Energy at www.energy.gov.on.ca.

The terms of reference for this second phase of our work required us to:

- review the roles and relationships among the five provincial agencies with a view to continuing improvements in operational performance, assessing potential overlaps between the agencies, and minimizing costs and maximizing effectiveness for Ontario consumers;
- examine human resource needs facing the sector and provide advice on recruitment, training and related strategies to address future needs.

The structure of Ontario's electricity sector has undergone major change over the past decade, moving from essentially a monopoly for generation and transmission to greater reliance on a mix of publicly and privately owned resources. Positive steps in the past few years have provided greater transparency as to government direction, formalized a long-term planning function, created a "hybrid market" for supply pricing, and put in place a plan to reduce price volatility for small consumers of electricity.

Our mandate did not extend to contemplating changes to the current market structure, and was premised on the agencies remaining in public hands. Nevertheless, we do note that, despite the progress of recent years, we believe that significant challenges remain and that addressing these will require bold response by government and its electricity sector agencies:

- The sector must soon embark on a major infrastructure renewal and expansion program;
- Current plans assume an actual reduction of demand through aggressive conservation activities; and
- There is a huge demographic gap in the workforce, with many workers close to retirement and the rest with only a few years' experience.

Delays in meeting these challenges would significantly increase risk, in terms of both the price of electricity and the reliability of its supply. Decisive action is essential, especially in light of the need to fill a significant supply gap related to the planned phase-out of coal-fired plants by 2014.

The large public impact of these activities, especially infrastructure renewal and expansion, requires that they be undertaken in ways that protect the public interest – not just as regards the price and reliability of supply, but also in such broader contexts as environmental stewardship, respect for property rights and land use planning.

This report makes recommendations in line with the scope of our mandate to help government, its agencies and other participants in the sector address these significant challenges quickly and effectively. Our advice aims to support the clear direction and timely decision-making required on many fronts to ensure an effective and economically sustainable electricity sector in Ontario, while balancing other important public goals.

1.1 The Agencies

The five provincially-owned agencies that we were asked to review, and their functions, are as follows:

- Ontario Power Generation Inc. (OPG), which generates almost 70 per cent of the electricity sold in Ontario;
- Hydro One Inc. (HOI), which owns and operates the bulk of Ontario's transmission system and also provides local electrical distribution in many areas;
- The Independent Electricity System Operator (IESO), which is responsible for both operating the wholesale electricity market and ensuring reliable operation of the electricity system;
- The Ontario Power Authority (OPA), whose responsibilities include long-term planning, contracting for new capacity, and promoting conservation; and
- The Ontario Energy Board (OEB), which regulates Ontario's electricity and natural gas industries.

Three of the agencies – OPG, HOI and the IESO – came into existence as a direct result of a restructuring of the Ontario electricity sector that began in the late 1990s. The role of the OEB changed significantly as a result of the restructuring. The OPA was later added to fill a perceived gap in the restructured sector.

The most visible impact of restructuring was the break-up of Ontario Hydro, which was Ontario's publicly-owned monopoly for the production and transmission of electricity. All five agencies carry out roles that were formerly handled by Ontario Hydro, as well as new functions that relate to Ontario's restructured electricity market.

1.2 *Process*

We asked each agency for submissions relating to our mandate for this phase of our review and met with senior management at each, as well as at the Ministry of Energy, which oversees the agencies and sets policy direction for the sector. We also received the views of several other organizations involved in the sector through submissions and meetings. Appendix A lists all organizations invited to make a submission and the respondents, as well as those with whom we met.

Navigant Consulting Ltd., which has wide experience in the electricity sector, was engaged to help the panel in identifying potential areas of overlap and duplication and to provide background information on the sector. Additional research on the agencies' operating costs was carried out by Elenchus Consulting Services.

The human resource phase of our mandate was supported by the work of the Electricity Sector Council, which was engaged to provide information about the supply and demand profile for labour in the electricity sector in Ontario and the readiness of the Ontario educational sector and the agencies to meet future workforce demands.

We also benefited from research, advice and fact-checking provided by staff members seconded from the Ministry of Energy.

We extend our thanks to all those who assisted us in building our understanding of the electricity sector in this phase of our work.

1.3 *Acronyms*

The following acronyms are used in this report:

- CEA: Canadian Electricity Association
- CEAA: Canadian Environmental Assessment Agency
- CEA Act: *Canadian Environmental Assessment Act*
- CDM: conservation and demand management

- EA: environmental assessment
- ECSTF: Electricity Conservation and Supply Task Force
- HOI: Hydro One Inc.
- IESO: Independent Electricity System Operator
- IPSP: Integrated Power System Plan
- kWh: kilowatt-hour
- LDC: local distribution company
- MW: megawatt
- NEB: National Energy Board
- NERC: North American Electric Reliability Corporation
- OEB: Ontario Energy Board
- OEFC: Ontario Electricity Financial Corporation
- OM&A: operating, maintenance and administration
- OPA: Ontario Power Authority
- OPG: Ontario Power Generation, Inc.
- PPA: power purchase agreement
- PWU: Power Workers Union
- RPP: Regulated Price Plan

2. Background on roles and responsibilities

To find out whether there were some overlaps, or gaps, between the agencies, we reviewed how the electricity sector works in Ontario today, and who does what. The first part of this section therefore provides a general explanation of how electricity systems and markets work. The middle part outlines recent history in the sector in Ontario and elsewhere. The final part of the section outlines briefly how Ontario's electricity sector and hybrid market function at present.

2.1 How electricity is delivered

Electricity generating stations can be powered by water (hydroelectricity), nuclear energy, fossil fuels (coal, natural gas, or oil), and, increasingly, by such new renewable sources as wind or solar power. Generating stations connect to a high-voltage transmission system, which is a series of towers carrying multiple power lines.

Consumers taking electricity from this high-voltage “grid” in Ontario include both some large industrial customers and roughly 50 local distribution companies (LDCs) that range in size from large corporations like Toronto Hydro and Hydro Ottawa to small organizations such as Chapleau Public Utilities Corporation. After the power is transformed to a lower voltage, LDCs carry it to homes, offices, businesses and other retail consumers. At distribution voltages, HOI provides service to roughly 30 more LDCs that are not directly connected to the grid as well as to approximately 1.3 million rural and urban customers.

Electricity is an unusual commodity in that it cannot be stored. For that reason, the electricity system must be able to produce and move enough power to meet changing demand all day, every day. Demand is highly sensitive to the weather: the greatest demand – the peak – in most of North America now occurs on hot summer days, because of the widespread use of air-conditioning. Balancing the system requires accurately forecasting average usage and peak demand, matching that with available generating and transmission capacity, and having the ability to respond to unexpected changes.

The critical role of electricity in economic activity and quality of life in modern economies underscores the need for system reliability, which includes both adequacy and security of supply.

Many jurisdictions are now running into problems of tight supply. However, adding new generation and the related transmission capacity is costly and raises environmental and land-use concerns. Given those challenges, conservation and demand management (CDM) are becoming valuable tools in balancing system supply and demand. (Conservation means reducing demand generally, while demand management means moving usage to a time of lower demand.) System operators and governments increasingly view CDM as another system resource, like new generation.

2.2 *Electricity markets*

Parts of the electricity system, in particular transmission and distribution, do not easily lend themselves to market competition. One transmission or distribution system can serve an entire geographical area at lower cost than two or more – a situation that economists call a natural monopoly. As a result, many jurisdictions traditionally regulated the rates charged for transmission and distribution, or placed transmission and distribution companies in public hands, or both. In some instances, especially where generation was a monopoly, the price of electricity was also regulated.

In the 1990s, public policy began to shift toward a more competitive model with the aim of providing greater benefits for consumers. The belief was that “merchant generation” and “merchant transmission” provided by private companies would ultimately ensure that supply met demand through competitive market mechanisms. These approaches recognized, however, that electricity supply and demand must balance in real time. This gave rise to the role of “independent market operator” or “independent system operator,” with responsibilities that could include operating the electricity system, ensuring reliability, and overseeing the electricity market and the rules under which it operated.

As it has turned out, effective and fully competitive electricity markets have been slow to develop. As a result, some jurisdictions are making adjustments to this model. For example, the New York Times¹ reported on September 4, 2007 that many states which had adopted market models were “rolling back their initiatives or returning money to individuals and businesses” because prices were felt to be too high. The article noted that the need to balance supply and demand in real time (i.e. reflecting the inability to store electricity) contributed to the difficulty of establishing and running truly competitive electricity markets.

In response to that problem, some jurisdictions are moving to the use of longer-term contracts for supply, instead of relying solely on pricing in a real-time (spot) market, and are requiring more coordinated long-term planning.

2.3 *Ontario's electricity sector*

The evolution of the electricity sector in Ontario has followed a path not unlike that in other jurisdictions. After extensive study through the 1990s, the *Energy Competition Act*,

¹ David Cay Johnston, “A New Push to Regulate Power Costs”, New York Times, September 4, 2007.

1998, set out the elements of a restructured and more commercially oriented electricity sector. The Act created several new agencies, with functions as follows:

- OPG and HOI were created as commercial entities to take over the generating and transmission assets, respectively, of Ontario Hydro. An underlying principle of the new market design was competition in the sale of electricity in Ontario in both wholesale and retail markets. Given OPG's dominant size, the "decontrol" of most of its assets was an element of market design, with the goal of reducing its share of capacity to 35% of the market by the end of ten years.
- The Independent Market Operator (now the IESO) would have the role of running a competitive electricity market, ensuring the reliability of the system and preparing long-term forecasts & assessments. The IESO would also be responsible for coordinating reliability in Ontario with that of its interconnected neighbours in the North American Electric Reliability Corporation (NERC). Its Market Surveillance Panel, which reported to the independent members of its board of directors, had the role of monitoring, investigating and reporting on activities and behaviour in the market.
- The Ontario Energy Board would take on regulation of local distribution, which Ontario Hydro had previously done, and would license public-sector and private-sector participants in the sector, including the other provincially-owned agencies.
- The Ontario Electricity Financial Corporation (OEFC) would manage the "stranded debt" of Ontario Hydro and contracts with non-utility generators that Ontario Hydro had entered into.

Consumers would pay the market price for electricity or could enter into a fixed-price contract with a retailer, who would pay the market price. Most consumers would continue to be supplied with electricity by an LDC. The LDCs would be more commercially-oriented companies than the municipal electrical utilities that preceded them.

Market opening on May 1, 2002, was followed by volatile and rising prices for electricity, a phenomenon not limited to Ontario. Several factors apparently contributed to pricing instability. Electricity supply was tight because several nuclear units were out of service, while low water levels reduced the availability of hydroelectricity. At the same time, the weather was unusually hot, pushing up demand.

Consumer reaction was strong, leading the government to freeze prices. While these actions undoubtedly sent negative signals to potential investors in the electricity sector, the collapse of Enron had already thrown merchant generation into disarray throughout North America and sparked widespread investor retreat.

The government also established the Electricity Conservation and Supply Task Force (ECSTF), which reported to the Minister of Energy in early 2004. The task force, made up of 19 members representing most parties with an interest in the sector, concluded that “the market approach adopted in the late 1990’s needs substantial enhancement if it is to deliver the new generation and conservation Ontario needs, within the timeframes we need them”. Its report included recommendations on changes to the approach, including the need to introduce a long-term planning and procurement function.

The subsequent *Electricity Restructuring Act, 2004*, shaped the current hybrid electricity market in Ontario through amendments to the *Electricity Act* and the *Ontario Energy Board Act* and legislated the end of OPG’s asset decontrol.

The provincial policies put in place through the *Ontario Electricity Restructuring Act, 2004* may be summarized as follows:

- encourage the development of new reliable supply, including supply from alternative and renewable energy sources;
- promote a culture of conservation in Ontario;
- lessen the environmental footprint of any undertakings;
- produce stable prices for small consumers, including residential and small commercial consumers;
- afford large consumers the benefits of a competitive market; and
- enhance Ontario’s competitiveness in electricity pricing.

Among other elements, the amendments to the *Electricity Act* created the OPA and gave it the following roles:

- forecasting and assessments in the medium and long term;
- delivering integrated power system plans (IPSPs);
- promoting conservation and contracting directly for both new supply and conservation measures, where the market did not provide these on its own;
- financing an annual rate plan for low-volume and designated consumers; and

- advocating for conservation through a Conservation Bureau.

The Minister of Energy was given the authority to direct the OPA as to the all-important “supply mix” – that is, the combination of resources, including CDM, to be used to meet forecast demand – for planning purposes. These ministerial directives would form the core around which IPSPs would be developed. The supply mix in the current IPSP therefore reflects the government’s policies on the phasing out of coal-fired plants, as well as the degree to which CDM is expected to constrain future demand for electricity.

Under the revisions, the Independent Market Operator was renamed the Independent Electricity System Operator and its duties were changed to reflect new pricing arrangements under the hybrid market structure.

The revisions to the *Ontario Energy Board Act* made the OEB responsible for:

- considering for approval, the IPSP prepared by the OPA;
- approving the OPA procurement processes associated with the IPSP; and
- setting rates for low-volume and designated consumers through what the OEB eventually called the Regulated Price Plan (RPP).

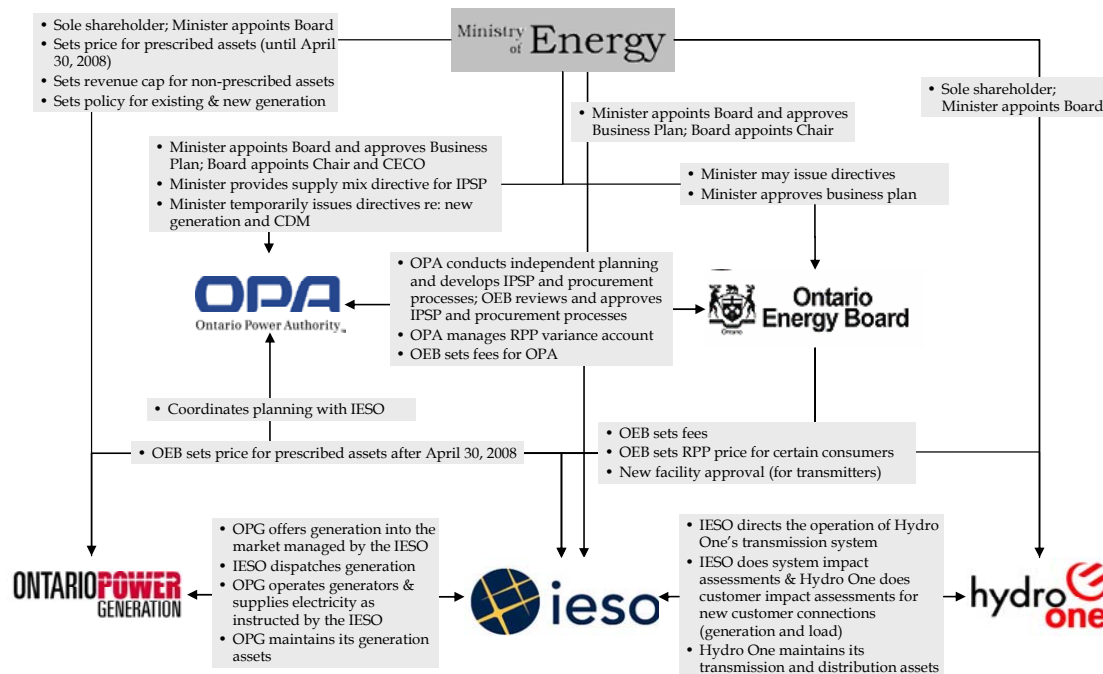
Until the OEB’s “first approval of the OPA’s procurement process”, the amendments to the *Electricity Act* allow the Minister to provide directives on procurement to the OPA. These directives, or resultant PPAs, are not subject to OEB approval.

The 2004 amendments also moved responsibility for the Market Surveillance Panel from the IESO to the OEB. Under a protocol between the two agencies, the IESO continues to provide information and services to support the Panel’s activities.

In the aftermath of the infamous blackout of August 2003, reliability standards similar to those included in the market rules for Ontario became mandatory for all members of the NERC. The IESO, which is responsible for enforcing compliance with the market rules, has recently become responsible for also enforcing reliability standards in Ontario on behalf of NERC. These standards dictate, among other things, the amount and type of power that Ontario must always have in reserve in case of an emergency.

The diagram on the next page shows the responsibilities of the various provincial entities in the sector following the changes in 2004.

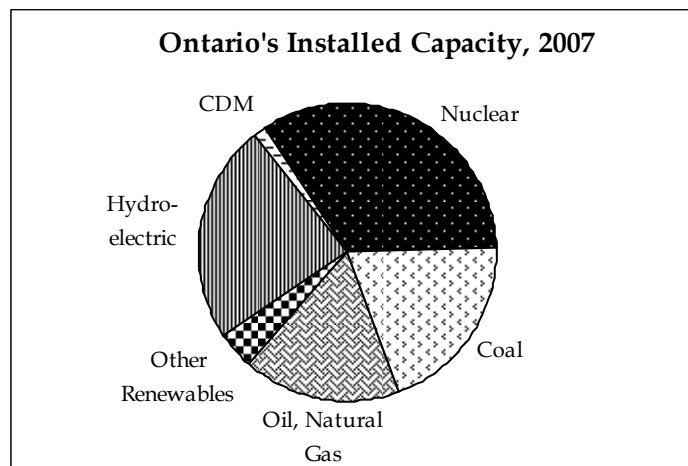
Primary Relationships between the Ministry and Agencies



Source: Navigant Consulting

2.4 Supply in the sector today

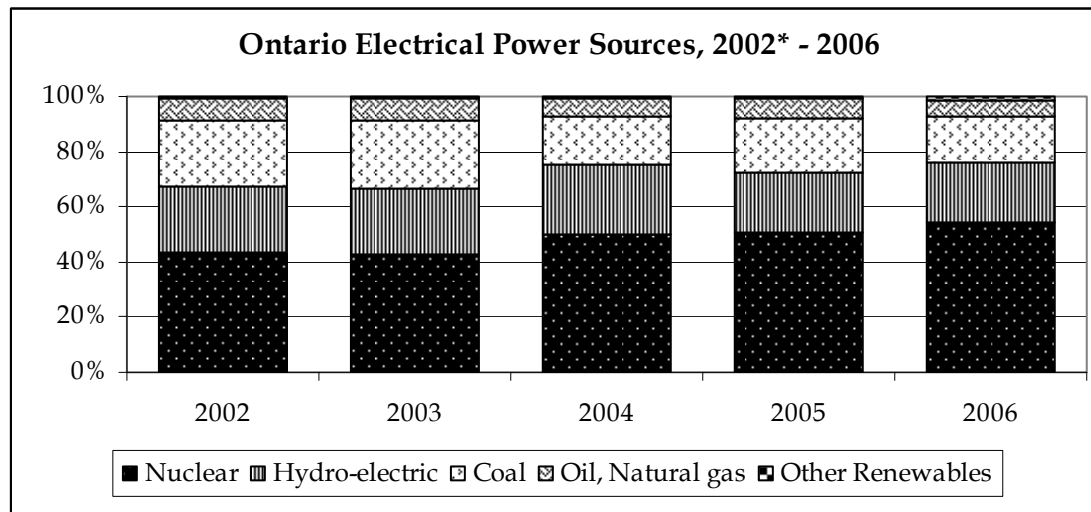
The electricity sector in Ontario relies on a mix of supply. The following chart shows the shares of different sources of supply in the installed capacity in 2007:



Source: *Ontario's Integrated Power System Plan: The Road Map for Ontario's Electricity Future*, OPA, February 2007

Actual reliance on the various sources changes through the day and over the year in response to demand, as well as availability of resources. The base ongoing demand for power is best met by such sources as nuclear facilities and “run of the river” hydroelectric plants. These base-load plants run as constantly as possible. Other sources, such as natural gas and oil-fired plants or hydroelectric plants with water storage reservoirs, are called into service only as demand peaks. Finally, the availability of such alternative sources as wind turbines and solar cells depends on specific weather conditions, which are not necessarily related to electricity demand.

The following chart shows the share of actual power consumption provided by each major source (excluding imports) since May 2002.



Source: Independent Electricity System Operator

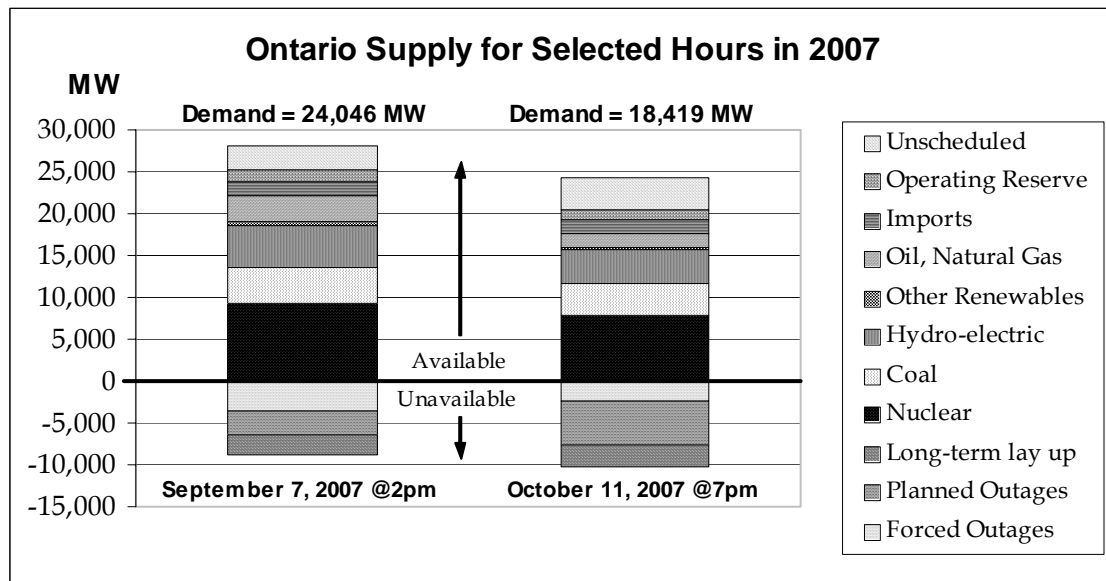
* Data for 2002 covered May-December only.

The previous chart shows the increasing share of power provided by other sources, particularly nuclear, as reliance on coal plants has declined. The share attributable to nuclear power also reflects improved performance and the return to service of a number of laid-up units.

While the installed capacity of about 34,000 MW would be enough to meet current demand in most instances, actual available capacity is much lower. Four nuclear units with a total capacity of about 3,000 MW are laid up on a long-term (and potentially permanent) basis, reducing in-service capacity to about 31,000 MW. The IESO's responsibility to maintain sufficient electricity in reserve to offset unexpected changes

in demand or supply further reduces the available total to less than 30,000 MW. Unexpected outages, the need to close units for service and other day-to-day operating factors routinely reduce the availability of the remaining supply. Through September 2007, for example, unavailable supply varied between about 4,000 and 13,000 MW.

The following chart shows the breakdown between installed generating capacity and what was actually available at specific times on two days in recent months:



Source: Adapted from "Generator Output and Capability Report", IESO; "Hourly Demand Data", IESO; and "Import-Export Schedule", IESO.

On severe weather days or when major unexpected outages reduce supply, Ontario can have problems meeting demand from local resources. As the previous chart shows, imports of electricity from other jurisdictions can help, but maximum import capacity is only about 4,000 MW.

The IESO issues requests to the public to reduce their power use during critical shortages. When public requests don't reduce demand enough, the IESO has the power to take more serious actions to ensure reliability of the grid, including imposing rotating blackouts. Even when total generating capacity appears to be adequate, transmission capacity may be insufficient to deliver the power to where it is needed. IESO measures therefore sometimes target specific areas of the province.

2.5 *The structure of the market*

Ontario's electricity market is "hybrid" in that it combines the features of a real-time market, including constantly updated pricing, with other pricing mechanisms.

The IESO operates a real-time or "spot" market, accepting offers from generators (both Canadian and American) and re-setting the price every five minutes based on their responses. The market-clearing (or spot market) price is the price paid to the last unit of generation needed to meet total demand at that time. The weighted average of the spot market prices over each hour gives the Hourly Ontario Electricity Price, also called the wholesale price.

Despite the activities of the real-time market, prices for most Ontario-based generation are ultimately set by other means, which have the effect of providing average prices that do not reflect true costs.

OPG has regulated and revenue-limited assets. In total, it receives four different prices for these assets.

- Regulated assets²:
 - o the first 1,900 MW of output from OPG's large base-load hydro plants in a given hour receives a regulated rate of 3.3 cents/kWh, and the rest receives the spot market price;
 - o its nuclear output receives a regulated rate of 4.9 cents/kWh.

These prices are intended to cover operating costs plus a 5% return on investment.

- Revenue-limited assets³:
 - o it receives a government-set rate of 4.7 cents/kWh for 85% of the output of its coal-fired and smaller hydroelectric operations.
 - o it receives the spot market rate for the final 15% of this output.

To the extent that OPG enters into other types of arrangements, it can receive other rates than these. For example, it has entered into a "reliability-must-run" contract with the

² Under the *Electricity Restructuring Act*, the government sets prices for OPG's regulated assets. The prices are to stay in effect until the OEB sets new prices, which is to occur no later than March 31, 2008.

³ The Minister has set a revenue limit on most of OPG's unregulated assets. The limit is transitional, and is to remain in effect until March 31, 2009.

IESO for the output of its Lennox generating station, with its compensation determined by that contract at a rate sufficient to compensate it for running an uneconomic plant.

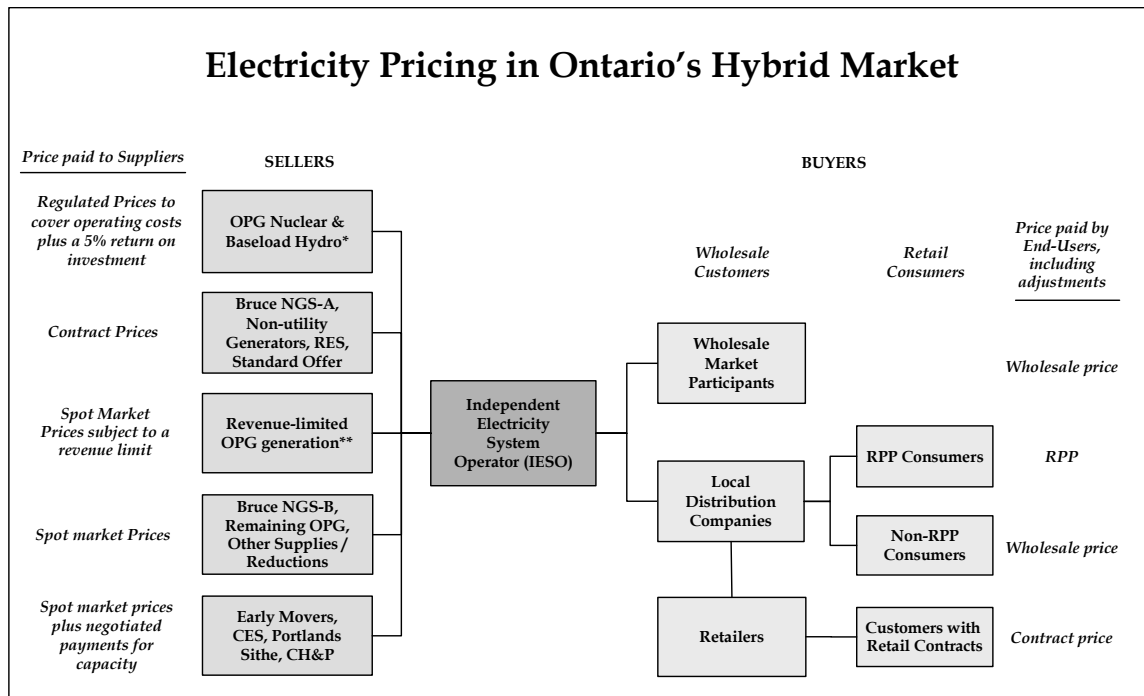
The remaining need is supplied by private-sector generators and imports. Most private-sector generators in Ontario get a rate for their output that is determined by a power purchase agreement (PPA) with the OPA or, in the case of non-utility generators, a contract with the OEFC. These contracts guarantee a price (sometimes within a range) for the generator's output. Imports and some private-sector generators in Ontario receive the market-clearing price.

These complex arrangements on the sell side of the market are balanced by adjustments to the buy side. Wholesale buyers, including LDCs, are initially charged the spot market price. Eventually, however, most consumers' accounts are adjusted to reflect the ultimate payments to sellers:

- The "global adjustment" reflects the differences between the wholesale price and either the prices paid to OPG for its regulated output or the prices paid to generators with PPAs with the OPA. It is normally a credit to buyers when the wholesale price is higher than those prices and a charge to buyers when it is lower. The adjustment is made on a monthly basis.
- An adjustment based on OPG's revenue-limited assets reflects any revenues earned by OPG in excess of the limit. The excess is returned to consumers through a quarterly adjustment to their bill, rather than through the global adjustment.

Many customers of LDCs, including low-volume consumers, are eligible for the RPP price, which is typically set every six months by the OEB. The RPP, which reflects the two adjustments described above, was introduced as part of the 2004 move to the hybrid market and came into effect in May 2005. Its intent is to recoup amounts paid to generators over time from consumers while avoiding day-to-day price volatility. To achieve this, the OEB uses a forecast of electricity costs to set a six-month RPP rate. To the extent that the forecast is higher than the actual cost, funds build up in a variance account maintained by the OPA; when the forecast is below actual cost, the fund is drawn down. Any variance remaining at the end of the six-month period is included when setting the next six-month RPP price.

The following diagram provides a more detailed look at the financial flows in the hybrid market.



Notes:

Bruce NGS-A and B are at the Bruce nuclear generation station, owned by OPG and operated under lease by Bruce Power.
Early movers and Sithe are private-sector generators.
Portlands is a partnership of OPG and TransCanada Pipelines

CES = Clean Energy Supply
CH&P = Combined Heat & Power
NGS = Nuclear Generating Station
RES = Renewable Energy Supply

3. Findings and recommendations on roles and responsibilities

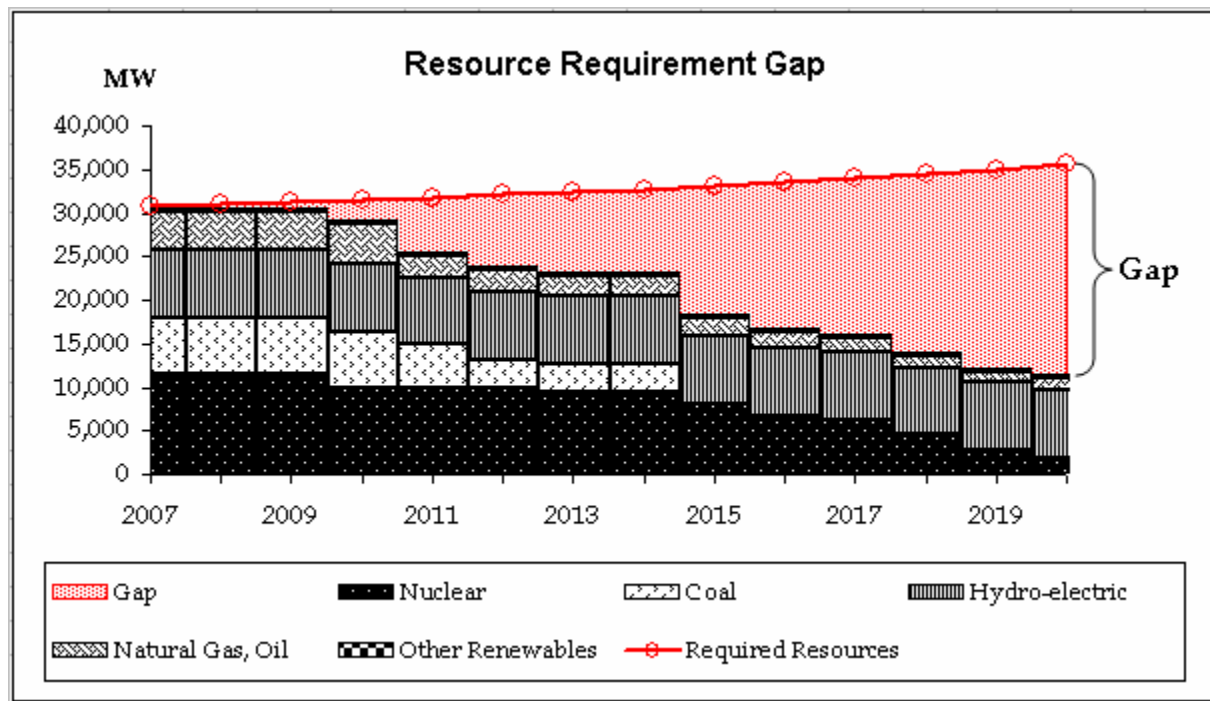
3.1 Introduction

Ontario's electricity sector and the provincial agencies within it appear to be functioning reasonably well. We acknowledge and support the need for organizational stability, which many urged on us.

With the filing of the first IPSP, the challenge for the sector is clear: Ontario needs a major infrastructure program that delivers cost-effective resources in a timely fashion. The IPSP forecasts that peak demand for electricity will be close to 29,000 MW within ten years and will reach 33,677 MW by 2027.

Current peak capacity within the province is between 26,000 and 28,000 MW. The plants providing much of that power, however, need to be refurbished or replaced over the next 20 years. The single largest source of power – the nuclear fleet – is facing the end of its expected useful life. Meeting the commitment to remove coal-fired plants from service will reduce supply further. In the following chart, which comes from the IPSP,

the distance between the “required resources” line and the stacked bars shows the looming gap between demand and supply:



Filling this gap will test the organizations in the sector and the processes for approving and implementing new projects. In particular:

- CDM will take on an increasingly important role – the IPSP shows it actually reducing demand by about 5,000 MW by 2027, a decrease of roughly 15%;
- About 20,000 MW of additional supply, including new projects and improvements to existing facilities, will be needed to fill the remaining gap;
- These projects take years to plan and build – upwards of a decade for nuclear projects and major new transmission lines – and involve complex review and regulatory processes; and
- With the expected approval of the IPSP and associated procurement processes, responsibility for implementation is supposed to shift away from the ministerial directives used to date and increasingly on to the participants in the sector, i.e. in implementing the IPSP.

Our mandate in this phase of our work required us to focus on the roles and relationships among the provincial agencies with a view to assessing potential overlaps, minimizing costs and maximizing effectiveness for Ontario consumers. Based on our

findings, we have concluded that sector effectiveness is probably reduced, and costs increased, by:

- Overlaps and duplication in functions, especially around forecasting and system planning, market settlement and CDM activities;
- Approval processes for transmission and generation projects;
- Lack of certainty about OPG's role and direction; and
- The need for further LDC consolidation.

The previous chart shows the magnitude of the potential supply problem, and the time to put in place solutions underlines the need for early decisions and effective action. It also argues strongly that this is not the time for major restructuring of the sector or the hybrid market. Stability and certainty will be critical, especially over the next months and years as important decisions must be made and acted upon.

At the same time, however, the government must also look to what will keep the sector effective and cost-efficient in the longer term. Our advice is intended to balance the need for short-term action with the necessary evolution of the sector over time.

Meanwhile, there seems to be a public perception that costs at the agencies have risen far beyond what would have been the case if Ontario Hydro had been left in place. In fact, this was not a major concern raised by market participants or other parties who responded to our requests for submissions. Because cost efficiency was an element of our mandate, however, we did look into it.

The rest of this section provides more detail about our findings and conclusions for this phase of our work.

3.2 Overlaps and duplication

Forecasting and planning

Several agencies undertake forecasting, planning, or both. (We have taken forecasting to mean predicting the most probable future situation, given current conditions and reasonable expectations. Planning sets out the steps likely to be needed to achieve a desired future outcome.)

Both the OPA and IESO are involved in looking at the future of the system as a whole, but with different time horizons and mandates.

In line with its responsibility to develop the IPSP, the OPA's view extends out 20 years. The IPSP takes into account forecast demand and the supply mix determined by the Minister of Energy. The OPA submitted the current IPSP, covering 2007 to 2027, to the OEB for approval in August of this year. The approved 20-year IPSP must be updated for OEB approval every three years.

To ensure system reliability, the outlook of the IESO is limited, by legislation, to identifying Ontario's current and short-term electricity needs. Its main focus is on the next 18 months, the period over which it assesses generation adequacy and transmission capability and approves planned outages (generally, for maintenance and infrastructure upgrades). As well, the IESO issues a five-year Ontario Reliability Outlook every six months that identifies any changes to near-term planning assumptions and includes a demand forecast.

Despite the different time horizons and purposes, the forecasting and planning functions of the IESO and the OPA are to some extent intertwined. The forecast underlying the IPSP relies on data collected by the IESO, which is intimately knowledgeable about the market. Some of the staff at the OPA who are involved in planning came from the IESO, and the OPA continues to outsource some planning-related work to the IESO.

In addition, OPG and HOI also carry out forecasting relating to their mandates as commercial entities in the sector. The OPA also outsources some forecasting to OPG.

Even though the reasons for their activities may be very different, the number of agencies involved in forecasting and planning demonstrates significant duplication of effort.

Financial flows

Settlement of the day-to-day electricity market was the responsibility of the IESO after market opening in 2002. The IESO collected funds from LDCs and other wholesale customers, and paid all suppliers. At present, the OPA is also involved in handling flows of funds arising from the move to a hybrid market. While the IESO still collects payments from buyers and pays many suppliers, the OPA makes payments to some generators with which it has entered into PPAs. The OPA also maintains the "variance account" that tracks the difference between RPP and wholesale rates, based on information provided by the IESO.

The result of these arrangements is a complex system of cash flows and reconciliations among market participants and between the two agencies.

Conservation and demand management

The Ministry of Energy, the OPA and the IESO are all involved in the Province's CDM efforts.

The roles and activities of the Ministry include:

- Determining the level of CDM underlying the IPSP through the supply mix directive, and requiring CDM activities in the shorter term through other directives.
- Establishing policies with a direct impact on how CDM is achieved. An example of this is the Smart Meter initiative. Smart Meters record when power is consumed, which allows the use of variable power rates that reflect real-time demand.
- Undertaking legislative initiatives to enforce and promote energy savings.
- Designing and administering programs in support of conservation, such as a Home Audit and Retrofit Program.
- Encouraging energy conservation and efficiency through public outreach and education, including for example the recent advertising campaign featuring David Suzuki, in line with an overall government goal of creating a conservation culture in the province.
- Establishing energy performance standards and regulations under the *Energy Efficiency Act* and working with other Ministries to incorporate energy efficiency into the Ontario Building Code.
- Influencing electricity consumption through its broader role in electricity policy, particularly where there is a pricing impact, for example, by establishing the prices for power from OPG's revenue-limited assets.

The OPA has several roles:

- Its Conservation Bureau, led by the Chief Energy Conservation Officer, has an advocacy role and also reports publicly on CDM programs and progress.
- The OPA suggests and advises on potential changes to building codes and equipment and appliance standards to improve electricity efficiency over time.

(Other authorities, such as the Ministry of Municipal Affairs and Housing, are responsible for making changes to codes and standards.)

- Other areas within the OPA are responsible for developing CDM programs and procuring CDM through incentive and educational programs, including demand response, to date under directives from the Minister. These other areas are also responsible for encouraging the growth of a conservation service industry and evaluating the results of conservation programs.
- As part of these activities and as directed by the Minister, the OPA is providing up to \$400 million in system-wide funding over three years to LDCs and other parties, such as building management organizations, for a selected number of programs that align with the Province's CDM priorities. These funds are coming from the global adjustment and would otherwise have gone to reducing consumers' bills.

The IESO has also been involved in CDM efforts, through:

- Entering into an arrangement with the Ministry of Energy to coordinate and manage the implementation of the government's Smart Metering initiative and to manage all related data on an on-going basis.
- Putting in place a program to help large customers develop the ability to take part in demand response programs.
- Providing payments to large customers to reduce or shift their power use when there is an urgent need, as part of a demand response program.

We heard from a variety of interested parties, including LDCs and the agencies themselves, that the involvement of multiple entities creates complexity, inefficiencies and occasional confusion about roles and responsibilities in the design and delivery of CDM.

3.3 Conclusions

We found no apparent gaps among the various agencies except that PPAs, even where not entered into pursuant to competitive bidding, are not subject to independent review. Where we found overlaps and duplication to exist, they mainly involve the functions of the OPA, the IESO and/or the Ministry. The OPA's unique critical task was drawing up Ontario's first IPSP in almost two decades in response to the market's failure to respond adequately to market opening. The ECSTF had suggested that the IESO take on this function, and the related function of procuring urgent power supply

in the interim. However, creating the OPA as a separate agency, without the distraction of short-term and operational responsibilities, no doubt helped ensure that the process leading to the IPSP would receive the required attention and focus.

Now that the IPSP has been submitted to the OEB for approval, we believe it opportune to reassess the need for a separate agency and have concluded that, while the OPA's functions remain necessary, housing them in a distinct agency is becoming unnecessary. Combining or integrating the various OPA functions and personnel with those of the Ministry and the IESO, respectively, would seem quite feasible with a relative minimum of organizational upheaval.

As to CDM, the Ministry already has the key roles of setting overall energy policy direction and determining the supply mix and is already designing and administering programs and delivering public outreach and education on its own and is working with other Ministries on standard-setting. The OPA's work on program design and delivery, education, advocacy and advising on potential changes to codes and standards around CDM could be transferred to the Ministry. Indeed, because electricity conservation standards must often be coordinated with other ministries, putting responsibility in the Ministry would seem sensible.

As to the Chief Energy Conservation Officer's responsibilities for reviewing and reporting on the government's progress in meeting its CDM goals, we believe this function needs to be given sufficient independence to ensure confidence in the numbers being produced.

As to planning, an update to the IPSP is required every three years. The long-term planning function and staff at the OPA could be combined quite well with the forecasting function and staff at the IESO.

The OPA's procurement function, for both supply and CDM, could also be combined with that of the IESO, which already enters into contracts for the supply of energy to maintain system reliability.

A concern about moving procurement to a combined IESO/OPA agency might be that, as the market operator, it would be perceived to be in a conflict of interest. The ECSTF had suggested that the IESO could take on the procurement role as long as appropriate governance structures and safeguards to protect against potential conflict of interest were in place. At that time the Market Surveillance Panel reported to the IESO, but now the Panel reports to the OEB. Accordingly, to the extent that any conflict of interest for

a combined agency might be perceived to exist (which we doubt), the requisite independent oversight would be provided by the OEB's Market Surveillance Panel.

If the OPA were combined with the IESO, review of PPAs by the OEB's Market Surveillance Panel might result automatically under the OEB's by-laws or could be specifically mandated.

Combining the IESO and OPA would presumably eliminate one head office. This would have no measurable impact on rates to the consumer and it would not in itself likely justify the effort and dislocation. However, other benefits would include less complexity for market participants, less duplication of effort in several areas, more robust and integrated forecasting and planning processes, increased transparency and efficiency and greater accountability for conservation activities. On balance, we think that together they could make the effort worthwhile in due course.

We therefore recommend:

- 1. That, when it seems reasonable to the Minister to do so, the CDM functions of the OPA be redistributed as follows:**
 - (a) responsibility for designing and administering conservation programs, education and advocacy and assisting in the development of standards for electricity efficiency be transferred to the Ministry of Energy; and**
 - (b) the Chief Energy Conservation Officer be made an officer with sufficient independence to ensure confidence in the numbers being filed with the Minister, detailing Ontario's progress in meeting its goals relating to the development and implementation of electricity conservation and load management measures.**
- 2. That, when it seems reasonable to the Minister to do so, but probably not before the OEB has completed its current review of the initial IPSP, the balance of the functions of the OPA be combined with those of the IESO into a combined agency.**

Of course, responsibility for the policy direction for CDM and other energy matters, including the all-important supply mix, would remain with the Ministry of Energy.

3.4 *Miscellaneous overlaps*

Participants raised a number of other overlaps and instances of duplication among agencies. We concluded that most of these are operational issues that can be handled through the cooperative efforts of the agencies, which generally seem to work quite well together to avoid unnecessary duplication.

One instance where this has not worked is connection assessments, which are required to connect new or modified supply or load to transmission. The market rules require the IESO to carry out system impact assessments in order to safeguard reliability of the grid, while the OEB's Transmission System Code requires transmitters to carry out customer impact assessments to safeguard reliability or performance of their transmission systems.

Both processes require potential generators and loads to provide much the same information to both parties, but in different formats. Since HOI operates the transmission system for most of Ontario, this same information is being provided most often to two provincial agencies.

Although the Transmission System Code notes that a transmitter should use "best efforts to coordinate its customer impact assessment procedure with the Market Rules and the IESO's market procedures as they relate to connection assessments and approvals", there is still more work to be done.

We therefore recommend:

- 3. That HOI and the IESO work together to develop a uniform approach to connection assessments that is consistent with the requirements of the Transmission System Code in order to reduce overlap, duplication and inefficiencies, for the benefit of existing and potential consumers.**

If HOI and the IESO are not able to agree, the Minister of Energy might then request that the OEB work with both parties to ensure a uniform approach.

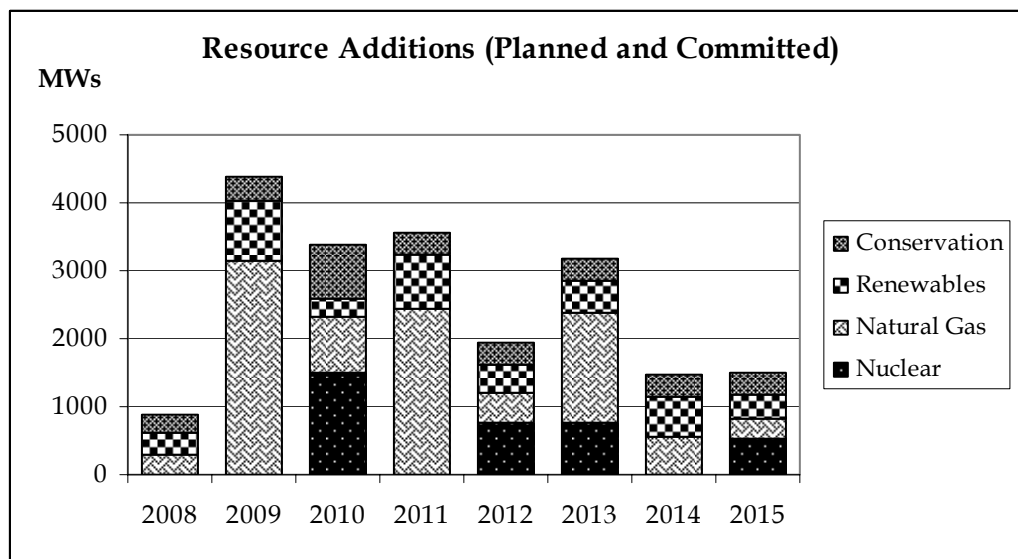
3.5 *Approvals*

We found widespread concern in the sector about the complexities and duration of the regulatory and other processes involved in approving projects.

The concern is not unique to Ontario. The premiers of Canada's provinces and territories recently stressed the need to "improve the timeliness and certainty of

regulatory approval decision-making processes while maintaining rigorous protection of the environment and public interest.” They noted that current frameworks give rise to uncertainty about energy supply availability.⁴

Ontario has, however, particular reason for concern. The province needs to add significant generating and transmitting capacity, in addition to undertaking aggressive CDM activities, to deal with growing demand, clear transmission bottlenecks, replace ageing infrastructure and phase out coal-burning plants by 2014. The following graph shows needed new additions over the next eight years alone, as identified in the IPSP:



Source: Adapted from OPA, IPSP Submission (EB-2007-0707), Exhibit D-9-1, Table 5

Note that the chart reflects the possible range of resource requirements given the range of conditions described in Exhibits D-9-1 and G-2-1.

With Engineering, procurement and construction costs increasing at around 10 percent per year in recent years, the IESO, HOI and the OPA estimated in a letter to us that a one-year delay in the approval of \$40 billion of new resources (the high-end estimate of investment needed for Ontario), could cost the province in the order of \$200 million per year for the next 20 years. In its most recent Ontario Reliability Outlook, in September of this year, the IESO noted that system reliability depends on timely approvals for a significant number of projects in a short period of time, and that regulatory-related delays were a serious risk. It concluded that “expedited, but thorough, approvals processes” were needed to ensure new facilities were ready on time.

⁴ http://www.councilofthefederation.ca/pdfs/energystrategy_EN.pdf. Accessed October 4, 2007

Current regulatory processes for individual generating facilities as well as transmission projects require separate reviews and approvals by numerous agencies, boards and regulators. This is a summary of the most significant requirements that apply to projects under provincial jurisdiction:

- The Ministry of the Environment is responsible for environmental regulation. The processes vary in complexity depending on the type and size of the proposed project. Certain projects may be subject to environmental screening only, as opposed to environmental assessment (EA), but the Minister may be requested to “elevate” any such project to a full EA.
- Municipalities are responsible for local land use planning and zoning and for by-laws approving amendments to allow the construction of specific transmission and generation projects. The Ontario Municipal Board hears appeals and applications on land use disputes.
- The OEB must grant leave-to-construct approval for transmission projects, and licenses market participants including transmitters and larger generators. The OEB also considers applications for “early access to land” and expropriation.
- In addition to provincial and municipal regulation, projects under provincial jurisdiction may also be subject to federal statutes and regulations.

Many of these processes involve duplication, especially around proving the need for a project and whether alternatives have been considered, as well as sequential processes and lengthy timelines for decisions. Appendix B provides further details.

Nuclear generation is under federal jurisdiction, and any environmental assessment must follow the Canadian Environmental Assessment Agency’s (CEAA) process. The Canadian Nuclear Safety Commission, a federal authority, manages the environmental approval process for nuclear generation on behalf of CEAA. We understand that the province has been invited to state its desired degree of involvement in the CEAA’s processes and has stated that it would not take a formal role, but would be satisfied to be kept informed of the progress of any environmental assessment process.

The experience of Enbridge in seeking approval for its Kincardine wind project illustrates the impact of current processes. Enbridge originally expected the project to be commissioned by February 2007 under a simplified environmental screening process with a 75-day time span. To date, the project has been scaled back, concrete foundations have been completed on only 40 of 110 sites and commissioning is not expected until December 2008 at the earliest. Enbridge told us that a combination of environmental

and planning issues and the obligation to consult with First Nations (see below) contributed to the additional time required. It estimates that, so far, the original cost of roughly \$400 million for this 182 MW project has risen by \$75 million; i.e. almost 20%.

Other wind power projects under contract with the OPA have been significantly delayed and in some cases cancelled because of problems getting final approvals.

We recognize, and do not intend to minimize, the importance of broader socio-economic considerations, such as environmental and land use issues when considering electricity needs. We are, however, concerned that the processes for assessing and determining these matters may in themselves be unduly costly to society, in terms of greater expense and increased risk to reliable supply.

The key to addressing this concern is to have a single integrated process, with a single integrated public hearing and a single clear timeline. This would facilitate an efficient consideration of all public interest matters without impairing the rigour of the assessments. In fact, there are a number of useful precedents in Canada and even in Ontario:

- the approvals process for natural gas pipelines in Ontario carried out by the OEB;
- the integrated, concurrent review by the National Energy Board (NEB) and the Canada-Nova Scotia Offshore Petroleum Board of the Deep Panuke Gas Project off Nova Scotia recently announced by EnCana; and
- the Brunswick Pipeline Project in New Brunswick, which was approved in June 2007, whereby the federal Minister of the Environment approved the “substitution” of the NEB hearing process for a customary environmental assessment by a review panel.

These comparative approvals processes are described in more detail in Appendix C.

We believe there should be a single integrated approvals process, but recognize that enacting appropriate legislation might take considerable time. In the meantime, it will be important to ensure the timely consideration for approvals, or otherwise, of certain projects set out in the IPSP. To accommodate this in the short term, we believe the government has the requisite powers under various sections of the relevant statutes which (if used) have the effect of modifying or even waiving the existing approvals processes in the public interest. We do not suggest that such waivers be used to avoid

the necessity of considering the full range of public interest issues, but rather to ensure that they be considered in an efficient manner.

We therefore recommend:

- 4. That, to ensure the timely consideration of urgent projects set out in the IPSP or otherwise, the government establish an understanding or protocol among its various ministries and regulatory tribunals to create, on a temporary basis and using existing legislation, a single integrated approvals process for electricity projects based upon existing legislative authorities.**
- 5. That the government enact legislation that would create a single integrated approvals process for electricity projects on a permanent basis.**

The suggested principles and legislative authorities for such a protocol are described in Appendix D.

These processes would apply to all projects under provincial authority.

3.6 Duty to consult

A new requirement has recently arisen from a series of Supreme Court decisions in 2004 and 2005 involving the Haida, Taku River Tlingit and Mikisew Cree First Nations. The court ruled that the federal and provincial Crown have a legal duty to consult and, where appropriate, accommodate when Crown conduct may have an adverse impact on established or potential aboriginal and treaty rights. Because the duty lies with the Crown, it is difficult for private enterprises responsible for new projects to ensure that it is properly met.

The panel met with representatives of the Ministry of Aboriginal Affairs to discuss the provincial approach to the duty to consult and the draft guidelines it has developed. The Ontario Energy Board earlier this year issued, for comment, its own aboriginal consultation policy, under which it will make a determination as to the adequacy of any consultation undertaken and any proposed accommodation for aboriginal concerns as part of its review of applications.⁵

⁵ http://www.oeb.gov.on.ca/documents/cases/EB-2007-0617/acp_policy_20070618.PDF. Accessed November 2, 2007

In addition, the Government of Canada recently launched an action plan to ensure consistency in addressing the legal duty of federal departments and agencies to properly consult with aboriginal groups when appropriate⁶. The plan aims to ensure that the provinces and territories, as well as aboriginal organizations and industry groups, are engaged in the development of a policy on consultation and accommodation.

While specific recommendations in this area would exceed our mandate, we note that a provincial protocol across ministries and agencies would be helpful in ensuring consistency in discharging this important duty of the Crown and, accordingly, facilitate more expeditious decisions concerning the feasibility of new projects.

We also suggest that electricity project proponents should, as a best practice and the first step in the internal evaluation of any undertaking, consult any First Nations and Métis communities that might be involved. This will be appreciated as a sign of respect by the communities and should facilitate future discussion on possible accommodation.

3.7 Ontario Power Generation's role and direction

With the break-up of Ontario Hydro, OPG took over most of Ontario's generating capacity. At the time of market opening, arrangements were put in place to reduce its potential to dominate a fully competitive market. In the move to a hybrid market, the government reconsidered these arrangements.

A 2005 memorandum of agreement between OPG and the government as its shareholder provides definition of OPG's role in the hybrid market.⁷ The agreement states that, where new generation is concerned, OPG's priority is hydroelectric projects. Investments in non-hydro renewable projects require a directive from the shareholder, and all directives to OPG are public. While the agreement says that OPG should operate on a financially sustainable basis, it adds that the government might provide financial support to OPG in some instances.

Despite the agreement, OPG continues to operate in an environment of uncertainty. It is not clear whether or how OPG will be allowed to expand in future in areas other than hydroelectric, particularly in future nuclear projects. In at least one case, it has begun

⁶ <http://www.aicn-inac.gc.ca/nr/prs/s-d2007/2-2948-eng.asp>. Accessed November 2, 2007

⁷ <http://www.opg.com/pdf/memorandum.pdf>.

work on new hydro projects pursuant to Ministerial directive without a firm arrangement such as a PPA for compensation.

Both OPG and other participants in the market expressed concern about current arrangements. From OPG's perspective, the use of directives and uncertainty about compensation, particularly the fact that only about 8% of its existing output receives market rates, can be seen as hobbling its ability to operate as a commercial company and generate earnings adequate to support new investment. From the perspective of other market participants, the possibility of support from the Province can be seen as providing OPG with an unfair advantage over private-sector generators. From the perspective of consumers, there is a lack of transparency because the rates for a significant part of OPG's output are set outside a public hearings process.

We therefore recommend:

6. **That the Minister of Energy provide greater clarity as to OPG's role, particularly with respect to:**
 - **new generation other than hydroelectric;**
 - **its ability to enter into PPAs; and**
 - **whether it should be fully, instead of partially, regulated by the OEB.**

3.8 Local Distribution Companies

There are far fewer LDCs in Ontario today than at the time of electricity sector restructuring: 86, down from more than 300. In line with legislative changes at the time of restructuring, they generally operate as municipally owned corporations with boards of directors and many have adopted a more commercial orientation.

However, small LDCs are still the rule across the province. As the following chart shows, 36 of the LDCs together serve only 3.5% of the total customers in the province, while a small number of very large LDCs, including HOI, serve almost one-half of the customer base:

Size of utility (by number of customers)	Total share of customers	Number of utilities
More than 250,000	46.3%	3
30,000 to 249,999	41.4%	24

10,000 to 29,999	8.8%	23
Fewer than 10,000	3.5%	36

Source: Ontario Energy Board, 2006 Yearbook of Electricity Distributors

The relatively large number of LDCs still in existence, and the size of many of them, requires the expenditure of considerable time, effort and costs by provincial agencies. Particularly affected are the IESO, through its role in operating and settling the market, the OEB as the regulator of LDCs, and the OPA in delivering conservation programs.

Quite apart from the savings that might be realized at the agencies if there were fewer, larger LDCs, the LDCs themselves might in some cases reduce their own (and hence their customers') costs by achieving greater economies of scale through amalgamation. PowerStream Inc., as an example, has reported realizing "significant cost savings" following the voluntary merger of LDCs serving Markham, Vaughan, and Richmond Hill.

We therefore recommend:

7. That provincial policies to facilitate the consolidation of LDCs be continued.

3.9 Cost efficiencies

Work carried out for us by Elenchus Consulting Services estimated that total operating, maintenance and administration (OM&A) expenses for the provincial agencies in the electricity sector increased by 4.3 per cent a year on average between 1998 and 2006 in current dollars. For comparative purposes, the average annual rate of inflation, as measured by the Consumer Price Index, was 2.3 per cent over the same period.

Increases at OPG and HOI (which together account for 95 per cent of the OM&A spending among the provincial agencies) reflected:

- a requirement to make payments in lieu of property, income and capital taxes after the restructuring of the electricity sector, which Ontario Hydro did not have to pay;
- higher pension and benefit expense;
- the costs of staff reduction programs; and
- the reporting of expenses between agencies that were previously internal Ontario Hydro costs.

For OPG specifically, the return to service of the Pickering A nuclear station increased OM&A costs significantly. Changes in the way OPG accounts for pension expense also had an impact.

A number of factors reduced OM&A cost over the period. These included the impact of staff reduction programs (after the initial costs), and, for OPG, a lease agreement that made OM&A related to the Bruce nuclear station the responsibility of Bruce Power.

It is very difficult to say with any great certainty, based on the high-level analysis by Elenchus Consulting Services, the extent to which higher expenses are attributable to the break-up of Ontario Hydro. OPG and HOI's payments in lieu of property, capital and income taxes are directed to the OEFC, which has responsibility for managing and paying down the considerable debt and certain other liabilities of the former Ontario Hydro after restructuring. They reflect a decision on how to pay existing debt rather than a decision to break up Ontario Hydro.

Increased pension expense triggered by falling interest rates in the early part of the decade has been a common concern over the past several years for all major enterprises and organizations. The nuclear refurbishment project that added significantly to OPG's expenses reflected to a large extent commitments and decisions made by Ontario Hydro management before the break-up.

Furthermore, the OM&A increases outlined above have not had a significant impact on the rates consumers pay, in comparison to the many other factors (including government policies) involved in setting prices at the retail level between 1998 and 2006.

We also asked the agencies to provide us with information about their efforts to achieve cost efficiencies. Appendix E provides a summary.

4. Background on human resources

Human capital is as important to a successful enterprise as is financial or physical capital, and the electricity sector is no exception. The electricity sector in Ontario faces many of the same challenges as its economy as a whole: a demographic profile that reflects the large proportion of "baby boomers," now nearing retirement age, in the general population. Given the critical nature of the electricity sector to the economy of

Ontario, the human resources challenges must be taken seriously across the entire sector.

Factors specific to the sector, however, increase the difficulties of addressing this challenge successfully. In 2004, the Canadian Electricity Association (CEA) completed two excellent surveys, one of employees and the other of employers, to gather information on workforce and demographic challenges.⁸ The results showed that close to 40% of workers in 2004 were eligible to retire within ten years, but the share of workers under 40 years of age who might replace them was smaller than in the general workforce. The education system was not producing enough qualified workers to replace retirees, either.

Balanced against this somewhat bleak picture are the efforts of the sector to understand and respond to the challenges it faces. Much of the progress toward solving the sector's human resource challenges reflects actions taken since 2004. The Electricity Sector Council (Sector Council), a not-for-profit corporation dedicated to the development of the electricity industry workforce in Canada, was created that year to help address human resource concerns. While it is a national organization, with a board comprising industry, labour, education and other interested parties, Ontario is well represented and the human resource vice-president at HOI is its chair.

Given the Sector Council's in-depth knowledge and its access to the CEA's proprietary database from the 2004 surveys, it was engaged to provide a breakdown of the Ontario responses to the 2004 surveys for this review. It also surveyed universities and colleges about their current ability to meet the sector's needs, summarized material provided by the agencies, and undertook information gathering on emerging "promising practices" in the sector. Its report is attached as Appendix F.

4.1 The shape of the sector

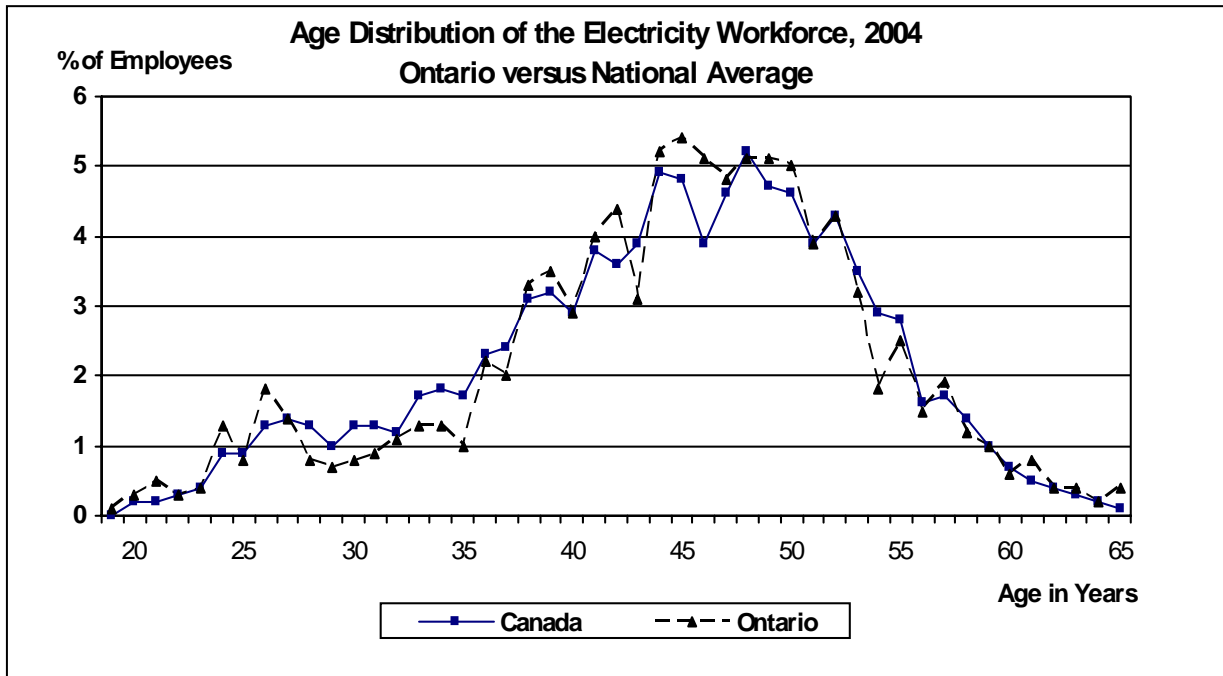
The data from the CEA 2004 survey, extracted by the Sector Council, provides a quick "snapshot" of workers in the electricity sector in Ontario:

- Most were older: the average age was 44.4 years, and almost 30% were older than 50. Workers' ages were tightly bunched: very few were under 40 or over 60.

⁸ The CEA report, *Keeping the Future Bright: 2004 Canadian Electricity Human Resource Sector Study*, is available on its website at http://www.canelect.ca/en/Pdfs/H035_CEA_Eng_Book_2004.pdf

- The demographic was relatively narrow: Roughly 70% of the workforce was male; only 2.2% were aboriginal and 8.8% members of a visible minority. The percentage of men was higher than in the Canadian workforce generally, while aboriginals and visible minorities were under-represented compared to national averages.
- Despite some earlier gains, the overall rate of enrolment of women in engineering programs has declined in the last few years, thus reducing the number of women available to participate in the electricity sector labour market.
- Years of service were typically long: the average tenure was 19.4 years.
- Most workers are eligible to retire with full pension by the “rule of 82” or “rule of 84” (that is, when the sum of their age and years of service together totals 82 or 84). Given the long average tenure, the age profile and pension eligibility requirements, workers were retiring at the relatively early age of 56 on average.
- The non-support workforce was dominated by engineers, engineering technologists and skilled trades people.
- 87% of the workers belonged to a union, split between the Power Workers’ Union (PWU) and the Society of Energy Professionals. In comparison, approximately 30% of Canadian workers in the general workforce were union members.

The demographic challenge in Ontario is slightly greater than for the Canadian electricity sector as a whole. The Ontario sector shed workers on a net basis through the 1990s and early into this decade. Because of collective agreements and early retirements, it lost its oldest and youngest workers. The following chart shows the impact of both the demographic bulge of the baby boomers and the relative gap, in Ontario, of workers in their 20s and 30s. Updated information provided to us by the agencies, which is summarized in Appendix F, shows the continuing impact of retirements on their workforce needs.



4.2 *The challenges for employers*

The 2004 surveys, information from employers and unions in the sector and other background research provides a look at some of the challenges in finding, developing and retaining human capital:

- Because of the slump in electricity sector hiring, students were not attracted to electricity sector programs, therefore universities lost much of their capacity to produce power system and nuclear engineers.
- Recruitment into the skilled trades has been affected generally by a preference for college or university education and lack of awareness about job opportunities in the sector.
- The ramp-up time once hired is long: Engineering professionals estimated in 2004 that gaining proficiency on the job took 4.1 years; for trades, it was 4.9 years after completing an apprenticeship.
- Training for nuclear operators is complex and time-consuming: Becoming a control-room operator can take six years after a three-year college degree. This has been a key issue, because nuclear power generation employees were the most likely to be over 50 years old at the time of the 2004 survey.

- Security clearances for nuclear workers can take several months if the individual has been living in Canada less than five years, which can make it difficult if not impossible to hire immigrant workers in a timely manner.
- Employers also face particular challenges depending on which sub-sector they are in: For example, while transmission workers are the youngest on average, their longer average tenure means more could retire by 2014 than in other sub-sectors. HOI estimates that it will have a complete turnover of its labour force in the next 15 years.
- The problem includes the upper echelons: While some employers are putting succession plans in place for senior management, they are aware that the “hollowed-out” age profile reduces the number of leaders who can be developed through the ranks in future.

The first half of this report noted the need for the sector to undertake a massive infrastructure renewal program over two decades. This means that the sector must also take into account the construction industry outlook, which will be stretched by the needs of not just electricity infrastructure, but ageing public infrastructure in other areas. The sector is already facing problems getting enough skilled labour to replace retiring workers and those who have left to work on major energy projects in other regions.

4.3 The potential demand/supply gap

Estimates based on the Ontario data from the 2004 CEA study suggest that the sector would face shortfalls in the range of 130 to 300 engineers and 600 to 900 trades and other non-support staff each year if the post-secondary education system were the only source of new workers between 2005 and 2014. (The range reflects differing outlooks for demand, productivity and the impact of infrastructure renewal on the workforce.) These projections are based on averages for all employers, including LDCs. Each of the provincially-owned agencies faces its own set of supply gaps, most of which are still projected for the future.

4.4 Findings and recommendations on human resources

The sector is making considerable efforts to start closing the potential workforce gap. When looking at these efforts, it is important to remember that while the agencies dominate the sector, they are not the only organizations with a stake in the future job

picture. Other electrical sector employers are involved, and in the case of Bruce Power, for example, have made human resource development a priority. The PWU and Society of Energy Professionals also have particular interests that reflect the make-up of their respective memberships.

We heard and received information from employers, the postsecondary education system, provincial education officials and the two electricity-sector unions about the following ways in which the gap might be filled:

1. Hiring from the existing Ontario workforce
2. Increasing qualified graduates/apprentices
3. Increasing the hiring of qualified people from outside Ontario
4. Increasing the hiring of under-represented groups
5. Retaining /hiring workers past their eligible-to-retire date

There are, of course, other possible means of narrowing the gap. Organizations could “poach” workers from each other, a solution that all recognize to be short-sighted and ultimately self-defeating. As for shifting the capital/labour ratio or outsourcing more functions, there are practical and institutional constraints on both. Power plants cannot be operated off-shore to provide electric power for the people of Ontario; that is, they must be operated within the grid where the power is needed.

Looking at the five ways most likely to fill the gap, we found that there are significant challenges but that the efforts of participants in the sector, including the provincial government, are starting to show progress:

1. Shifts in Ontario’s economic base are making experienced workers from other manufacturing industries, particularly automotive, available through lay-offs. Some are qualified in a trade needed by the sector. Employers are already hiring laid-off workers to some extent. Greater training investments on the part of employers and a better-focused set of provincial policies around retraining would help to increase the opportunities for laid-off workers.
2. Increasing the number of qualified graduates/apprentices who enter the sector will be a challenge. Few students go into power or nuclear engineering because of lack of programs and awareness (neither is included as an engineering specialty, for example, on popular websites listing Canadian university programs). Most students in the allied field of electrical engineering go into the

information technology and computing industries. Where the trades are concerned, students have very low awareness of electricity sector jobs.

Overall, a smaller share of the graduates of electricity courses at colleges are working in their field after graduation than in other programs, and those employed report lower job satisfaction.

The problems are beginning to be addressed, as the following examples indicate. More information is provided in Section II of the Sector Council's report, in Appendix F.

- A report by the Ontario Chamber of Commerce (October 2006) describes promising practices for the Trades. Included are re-branding the image of the Trades; a one-stop shop approach for information; and elimination of red tape for employers, employees and internationally trained workers.
- University Network of Excellence in Nuclear Engineering (UNENE), a collaboration of universities, regulators and employers, jointly funds several chairs in nuclear engineering at six Ontario universities.
- The new University of the Ontario Institute of Technology, located near the Darlington and Pickering nuclear stations, includes a School of Energy Systems and Nuclear Science funded jointly by the Province and OPG.
- Queen's University in Kingston this year added energy and power systems as a fourth year elective in its electrical engineering program.
- The PWU developed the "Trade Up" campaign to make elementary and high school students more aware of opportunities for trades in the sector. This initiative is sponsored jointly by the PWU, Bruce Power, OPG and HOI. They have distributed 150,000 information kits to students to date and provide 20,000 more a year at job fairs.
- The PWU owns and operates a training centre near the Bruce nuclear facility to train workers for Bruce Power through customized apprenticeships supported by joint scholarships, with courses delivered by nearby community colleges under contract. The PWU has identified other opportunities to act as a "broker" between colleges and employers for apprenticeships. It also facilitates the hiring of apprentices through its hiring hall.
- The University of Waterloo offers professionals in the power industry the opportunity to participate in part-time on-line graduate studies in electric power engineering. The program receives support from HOI.

- The University of Waterloo established a \$3-million Ontario Research Chair in Public Policy and Sustainable Energy Management commencing September 1, 2007. The position, one of eight new endowed research chairs, is part of a \$25-million Ontario government program established to address key public policy issues that affect the social and economic health of the province.
3. Increasing the hiring of qualified immigrants is one of the priorities of the Sector Council, but there are numerous barriers. First, federal immigration policy now focuses more on bringing in university graduates and professionals than the trades that represent the largest part of the sector's needs. Second, becoming accredited in Ontario, whether as a tradesperson or professional, is a complex process involving third-party bodies as well as government. This can limit the ability to hire qualified trades from elsewhere in Canada, as well as outside Canada. Third, an agreement between Ontario and the federal government to match provincial skills needs with skills available among immigrants was implemented only this year, after all other provinces except Quebec⁹. Fourth, a provincial program to support more positions in graduate schools does not include foreign students, who make up the majority in engineering and science graduate programs and who frequently want to remain in Canada after obtaining their degrees. Finally, as noted, the timeliness of security clearances is a serious problem in the nuclear sector.
 4. Increasing the hiring of under-represented groups is another way in which the sector could expand its potential labour pool, but there are constraints. Some jobs have physical demands that limit the range of candidates. Remedial training of some under-represented groups, such as youth-at-risk and aboriginals, would add two years, by the estimate of one agency, to the already-long timeframe needed to reach proficiency in many jobs. Increasing the representation of women, particularly in engineering positions, runs up against a widespread decline in the number of young women going into engineering and other technical/scientific disciplines.

While these challenges are considerable, the Ontario sector is taking tentative steps. The experience in other jurisdictions demonstrates promising practices.

⁹ <http://www.ontarioimmigration.ca/english/pnp.asp>

- The PWU is in the early stages of developing a strategy to make the electricity sector a viable career path for youth who would otherwise achieve below their potential.
 - The federal and Manitoba governments, as well as Manitoba Hydro, are providing \$60 million over several years to train aboriginal people for 800 construction and other jobs related to major new hydroelectric developments in northern Manitoba.
 - BC Hydro's Aboriginal Employment and Education Strategy is a long-term approach to building internal awareness and conducting recruitment outreach with aboriginal communities. Activities include working directly with youth, as well as with aboriginal educational and employment groups across B.C. to develop partnerships to support students and create regional training programs.
 - Manitoba Hydro and the Manitoba Métis Federation have entered into an agreement that aims to increase recruitment from Métis communities in that province. Section II of Appendix F provides more details, and describes programs at energy-sector employers in Canada and elsewhere to improve the participation and success of women in the sector.
5. Retaining workers past their eligible-to-retire date is a way of delaying the widening of the demand-supply gap and retaining critical knowledge in the sector. In fact, at least at the largest employer, OPG, only about 20% of workers do retire on the day they become eligible. The 2004 survey found that most workers would defer their retirement, and the deferral would be longer than a year for the majority, with relatively small incentives – such as shorter hours or more flexible work arrangements.
- Anecdotal evidence suggests that retired workers continue to work in the sector to some extent, although pension arrangements limit which employers they can work for. A promising practice through which to retain workers past their eligible retirement dates includes the PWU hiring hall, which provides a means for companies to hire workers including retirees at a preferred rate. The PWU maintains records of the employees indicating their safety and training profile. Section II of Appendix F provides further details.
 - Succession planning and knowledge transfer activities are valuable in supporting a more orderly transition as workers retire.

We have concluded that the agencies and other participants in the sector are well aware of the human resources problems and have started working toward solutions. As described in Section II of Appendix F, these solutions include support for completion of high school mathematics and science, research and scholarships at universities and colleges, skills profiles for every employee, risk assessment from a human capital perspective, and specific programs to attract women and people of Aboriginal decent.

The solutions may not be enough, given the dramatic increase in retirements over the next several years. The role of educational institutions and unions in filling the pipeline will become more important. The interface with the construction industry for infrastructure needs will be key. For those reasons, we have concluded that coordination among all of the parties – employers, educators, unions and other groups – is essential to meeting the sector’s needs. And, given the importance of the electricity sector to the economy of the province, all actions need to be framed against the contribution made by the sector to the economy.

In the health sector, as an example, the government has established a health sector council called HealthForceOntario. It has a range of initiatives designed to help Ontario identify its health human resource needs, develop people with the right knowledge, skills and attitudes, and compete effectively for health care professionals. The unit is a collaborative initiative among the Ministry of Health and Long-Term Care, Ministry of Training, Colleges and Universities and Ministry of Citizenship and Immigration.

We therefore recommend:

- 8. That the government of Ontario establish an Ontario Electricity Sector Council that would jointly report to the Minister of Energy and the Minister of Training, Colleges and Universities. Members of the Council should include representatives from employers, labour and the education and training bodies. The Ontario Electricity Sector Council could undertake several important activities, including:**
 - (a) Ensuring better and more targeted support for laid-off workers, particularly from the manufacturing sector, who need re-training to move into electricity sector jobs.**
 - (b) Raising the sector’s profile and improving its appeal to students, parents and the broader public.**

There are great opportunities to target the idealism of young people to use their talents in solving environmental problems while meeting energy

needs. Young people and other potential employees should also be informed about the income levels, benefits and job security associated with electricity sector jobs. (A fully qualified tradesperson, for example, can make well over \$100,000 a year with overtime.) This could be accomplished by getting more information to students, parents, guidance counsellors and employment and retraining service providers, and by having those currently working in the sector serve as “champions.”

(c) Developing a strategy to expand the labour pool by focussing on under-represented groups.

Particularly for OPG and HOI, which have operations in remote areas where skilled workers may otherwise be hard to find, developing approaches similar to those of BC Hydro and Manitoba Hydro may help to solve the problem. Such a strategy also dovetails with the requirement, in Ontario university accountability agreements, for universities to increase their outreach to the same groups.

(d) Analyzing in more depth why young women appear to be turning their backs on careers in engineering.

The downward trend of women’s enrolment in university engineering programs is recent, but pronounced, and participants in the sector had no clear information on its cause.

(e) Coordinating with other provincial bodies to monitor and improve the capacity of the construction sector to meet the province’s public infrastructure needs.

(f) Ensuring that agencies’ investments in education and outreach to increase the available workforce are considered prudent expenditures for the purposes of rate hearings before the OEB.

(g) Developing better information on the retention rates at universities and colleges and the success of apprenticeship programs in Ontario and, together with the results from annual performance reports, addressing specific concerns that these data may reveal.

There is uncertainty about the accuracy and comparability of data on Ontario’s retention rates for apprentices, a problem that a Statistics Canada report on apprenticeship, expected early in 2008, may help to

resolve. There are large gaps between the number of apprenticeships begun and those completed, which are unexplained. It is therefore difficult to determine the true rate of apprenticeship completions based on the data currently collected. We note that the government itself recognizes the problem of a looming skills shortage arising from an ageing workforce. At the same time, there is also a mismatch of skills as the economy continues to shift away from traditional industries such as forestry and manufacturing. The Premier has called for a comprehensive strategy to deal with human capital issues, particularly through the education system. We support that initiative, and given the importance of the electricity sector to the entire economy of the province, believe it merits sustained attention and action.

Consolidated recommendations

1. That, when it seems reasonable to the Minister to do so, the CDM functions of the OPA be redistributed as follows:
 - (a) responsibility for designing and administering conservation programs, education and advocacy and assisting in the development of standards for electricity efficiency be transferred to the Ministry of Energy; and
 - (b) the Chief Energy Conservation Officer be made an officer with sufficient independence to ensure confidence in the numbers being filed with the Minister, detailing Ontario's progress in meeting its goals relating to the development and implementation of electricity conservation and load management measures.
2. That, when it seems reasonable to the Minister to do so, but probably not before the OEB has completed its current review of the initial IPSP, the balance of the functions of the OPA be combined with those of the IESO into a combined agency.
3. That HOI and the IESO work together to develop a uniform approach to connection assessments that is consistent with the requirements of the Transmission System Code in order to reduce overlap, duplication and inefficiencies, for the benefit of existing and potential consumers.
4. That, to ensure the timely consideration of urgent projects set out in the IPSP or otherwise, the government establish an understanding or protocol among its various ministries and regulatory tribunals to create, on a temporary basis and using existing legislation, a single integrated approvals process for electricity projects based upon existing legislative authorities.
5. That the government enact legislation that would create a single integrated approvals process for electricity projects on a permanent basis.
6. That the Minister of Energy provide greater clarity as to OPG's role, particularly with respect to:
 - new generation other than hydroelectric;
 - its ability to enter into PPAs; and
 - whether it should be fully, instead of partially, regulated by the OEB.
7. That provincial policies to facilitate the consolidation of LDCs be continued.
8. That the government of Ontario establish an Ontario Electricity Sector Council that would jointly report to the Minister of Energy and the Minister of Training, Colleges and Universities. Members of the Council should include representatives from employers, labour and the education and training bodies.

The Ontario Electricity Sector Council could undertake several important activities, including:

- (a) Ensuring better and more targeted support for laid-off workers, particularly from the manufacturing sector, who need re-training to move into electricity sector jobs.
- (b) Raising the sector's profile and improving its appeal to students, parents and the broader public.
- (c) Developing a strategy to expand the labour pool by focussing on under-represented groups.
- (d) Analyzing in more depth why young women appear to be turning their backs on careers in engineering.
- (e) Coordinating with other provincial bodies to monitor and improve the capacity of the electricity sector to meet the province's needs for reliable power.
- (f) Coordinating with other provincial bodies to monitor and improve the capacity of the construction sector to meet the province's public infrastructure needs.
- (g) Ensuring that agencies' investments in education and outreach to increase the available workforce are considered prudent expenditures for the purposes of rate hearings before the OEB.
- (h) Developing better information on the retention rates at universities and colleges and the success of apprenticeship programs in Ontario and, together with the results from annual performance reports, addressing specific concerns that these data may reveal.

Appendix A. Organizations asked to provide input

The Panel invited the following to make submissions, and received submissions from all except the last four organizations on the list:

Hydro One Inc.

Ontario Power Generation, Inc.

The Ontario Power Authority

The Ontario Energy Board

The Independent Electricity System Operator

The Power Workers' Union

The Society of Energy Professionals

The Electricity Distributors Association

The Association of Major Power Consumers in Ontario

The Ontario Energy Association

The Association of Power Producers of Ontario

The Electricity Market Investment Group

The Ontario Society of Professional Engineers

The Ontario New Democratic Party caucus

The Ontario Progressive Conservative Party caucus

The Consumers Council of Canada

The Ontario Clean Air Fund

Energy Probe

The panel also received unsolicited submissions, from Allan Beaupré and John Mohle.

The Panel met with all five agencies, the Power Workers' Union and the Society for Energy Professionals, as well as with representatives of the Council of Ontario Universities, Colleges Ontario, the Ministry of Training, Colleges and Universities, the Ontario Municipal Board, Enbridge Inc., Brookfield Power Corp., Bruce Power, the Ministry of Aboriginal Affairs, the Ministry of the Environment, and the Ministry of Energy.

Appendix B. Approvals process: generation & transmission

A. Provincial Approvals

Provincial Approvals, etc.	Transmission	Generation
<p>Ministry of the Environment</p> <p><i>Environmental Assessment Act (EAA)</i></p> <p>Electricity Projects Regulation, O. Reg. 116/01</p> <ul style="list-style-type: none"> – sets out environmental assessment requirements for electricity generation and transmission projects based on fuel type and size of project; – companion “Guide to Environmental Assessment Requirements for Electricity Projects” describes a streamlined environmental screening process. 	<p>Category C Projects must complete an individual environmental assessment. Examples are transmission projects >115kV and <500kV and >=50km, or >=500kV and >2 km.</p> <p>Category B Projects must go through an Environmental Screening process if not associated with a Category B generation project subject to the HOI Class Environmental Assessment for Minor Transmission Facilities. For example, 115 kV transmission lines greater than 2 km, transmission lines greater than 115 kV and less than 500 kV, and greater than 2 km and less than 50 km.</p> <p>Category A projects are not subject to environmental assessment requirements. For example, transmission lines less than 115 kV.</p>	<p>Category C Projects must complete an individual environmental assessment. Examples are hydroelectric facilities greater than or equal to 200 MW and oil-fired facilities greater than or equal to 5 MW.</p> <p>Category B Projects must complete the environmental screening process described in the Guide. Examples are hydroelectric facilities less than 200 MW, wind turbine projects greater than or equal to 2 MW, natural gas facilities greater than or equal to 5 MW.</p> <p>Category A projects are not subject to environmental assessment requirements. Examples are wind turbines less than 2 MW, natural gas facilities less than 5 MW.</p>
<i>Environmental Protection Act</i>	Transformers require a Certificate of Approval for noise emissions.	Approvals are required for any facility that will release emissions into the air (including noise and vibration) or land (spills), and for waste management.
<i>Ontario Water Resources Act</i>	Transformers require a Certificate of Approval for spill containment equipment.	Approval is required for any works for the collection, transmission, treatment and disposal of sewage, which includes drainage, storm water, commercial wastes and industrial wastes. Also, a permit is required for the taking, diversion or storage of water in excess of 50,000 litres per day.
Ministry of Culture <i>Heritage Act</i>	Possibly, where archaeological fieldwork must be conducted or where archaeological artefacts will be removed from a designated site.	Possibly, where archaeological fieldwork must be conducted or where archaeological artefacts will be removed from a designated site.

Provincial Approvals, etc.	Transmission	Generation
Ministry of Municipal Affairs and Housing <i>Planning Act</i>	All projects except for projects exempted under section 62.0.1 of the <i>Planning Act</i> (and provided an enabling regulation is made) and projects carried out by Hydro One that are approved under the EAA (i.e. they have completed an individual environmental assessment).	All projects except for projects exempted under section 62.0.1 of the <i>Planning Act</i> (and provided an enabling regulation is made) and projects carried out by Ontario Power Generation that are approved under the EAA (i.e. they have completed an individual environmental assessment).
OEB – Leave to construct <i>Ontario Energy Board Act, 1998, section 92</i>	Transmission facilities require leave to construct. Some exemptions are made in O. Reg 161/99.	The generating facility does not need leave to construct, however, transmission lines and gas pipelines to the plant may require leave.
<i>Ontario Energy Board Act, 1998, section 98</i>	Possibly – To conduct surveys and examinations as are necessary for fixing the site of work if required by the proponent.	No (Same as above).
<i>Ontario Energy Board Act, 1998 - Expropriation</i>	Possibly – If necessary.	No (Same as above).
<i>Ontario Energy Board Act, 1998 - Licensing</i>	Yes, licenses are required.	Licenses are required for generators equal to or greater than 500kW.
Electricity Safety Authority – Inspection certificate	No - All lines above 50kV are exempt from the Electrical Safety Code.	Yes, an inspection certificate is required.
Ministry of Attorney General <i>Expropriation Act</i>	Possibly – Once expropriation approval has been granted under the <i>Ontario Energy Board Act, 1998</i> , and if agreements have not been reached with landowners, the rules and procedures of the <i>Expropriation Act</i> apply.	Not typically required.
Ministry of Natural Resources <i>Lakes and Rivers Improvement Act – Approval for Dams (i.e. location approval and approval of plans and specifications)</i>	Unlikely.	Specifically for hydroelectric projects involving the construction, alteration or improvement of dams.
Ministry of Natural Resources <i>Public Lands Act - Permit to use public lands</i>	Possibly - Where lines or construction activities will be on public lands as defined by the <i>Public Lands Act</i> .	Possibly - Where the facility or construction activities will be located on public lands as defined by the <i>Public Lands Act</i> .

Provincial Approvals, etc.	Transmission	Generation
Ministry of Natural Resources <i>Lakes and Rivers Improvement Act – Water Management Plans</i>	Unlikely.	Proponents of hydroelectric facilities may be required to submit a management plan or amended management plan to the Minister if a project will be constructed on a lake or river.
Ministry of Natural Resources <i>Public Lands Act - Work permit</i>	Yes - Where work is taking place on public lands or shore lands.	Yes - Where work is taking place on public lands or shore lands.
Ministry of Transportation <i>Public Transportation and Highways Improvement Act</i>	Yes - Where the line will be on a highway corridor control area, if work is being done within a highway right-of-way area, or if line will pass over highways.	Possibly - If project will be on a highway corridor control area or if work is being done within a highway right-of-way area.
IESO – Authorization and System Impact Assessment	Yes.	Yes - May be less rigorous for facilities that are expected to have a low system impact.
IESO – Facility registration	Yes.	Yes - If facility will be connected to IESO-controlled grid i.e. the facility is not net metered or part of the Renewable Energy Standard Offer Program.
HOI – Customer Impact Assessment	Yes.	Yes.
Approval from local Conservation Authority <i>Conservation Authorities Act</i>	Possibly - If project will be on designated conservation lands.	Possibly - If project will be on designated conservation lands or if any fill is being placed on conservation lands.
Ministry of Agriculture and Food <i>Drainage Act</i>	Possibly - If facility will require new drainage works to be built.	Possibly - If facility will require new drainage works to be built.
Ministry of Labour <i>Occupational Health and Safety Act</i>	Possibly - If triggered by the Act.	Possibly - If triggered by the Act.

B. Federal Approvals

Federal Approvals, etc.	Transmission	Generation
Ministry of Environment Canadian Environmental Assessment Agency <i>Canadian Environmental Assessment Act</i>	Possibly, if the undertaking triggers the Act, that is, if a federal authority: <ul style="list-style-type: none"> – proposes a project – provides financial assistance to a proponent to enable a project to be carried out – sells, leases, or otherwise transfers control or administration of federal land to enable a project to be carried out – provides a licence, permit or an approval that is listed in the Law List Regulations that enables a project to be carried out 	Possibly, if the undertaking triggers the Act, that is, if a federal authority: <ul style="list-style-type: none"> – proposes a project – provides financial assistance to a proponent to enable a project to be carried out – sells, leases, or otherwise transfers control or administration of federal land to enable a project to be carried out – provides a licence, permit or an approval that is listed in the Law List Regulations that enables a project to be carried out
National Energy Board <i>National Energy Board Act</i>	Yes - If line will be used to export electricity to neighbouring jurisdictions.	Yes - If the generated power will be exported from Ontario.
Transport Canada <i>Navigable Waters Protection Act</i>	Possibly - If the undertaking will place lines in, on, over or across navigable waters.	Possibly - If the undertaking will involve building facilities in or on navigable waters, as in the case of offshore wind, tidal power or hydroelectric dams.
Department of Fisheries and Oceans <i>Fisheries Act</i>	Possibly - In situations where work will cause the harmful alteration, disruption or destruction of fish habitat and where the proponent cannot follow the mitigation practices detailed in the relevant DFO “Operational Statements”.	Possibly - To approve fish guards/netting to prevent the passage of fish into a waterway or canal for the purposes of power generation.

C. Approval processes for new nuclear projects

Federal Approvals, etc.	Agency/Authority Involved	Comments
Environmental Assessment	Canadian Nuclear Safety Commission (CNSC) Canadian Environmental Assessment Agency Environment Canada	As per the <i>Canadian Environmental Assessment Act</i> . Initiated after an application for site preparation has been filed. Canadian Nuclear Safety Commission is the 'responsible authority'.
Site preparation license	CNSC	Cannot be issued without a positive decision on the environmental assessment. Assesses whether it is feasible to design, construct and operate a facility on the proposed site in a manner that will meet all health, safety, security and environmental protection requirements.
Construction license	CNSC	Must demonstrate that the proposed design of the plant conforms to regulatory requirements and, if constructed, will provide for safe operations on the designated site over the proposed plant life.
Operation license	CNSC	Applicant must demonstrate that it has established the safety management systems, plans and programs that are sufficient to ensure safe and secure operation.
Decommissioning license	CNSC	
Abandonment license	CNSC	

Note that the lists included in this appendix provide an overview of some of the more substantial approvals that electricity projects might encounter; it should not be treated as exhaustive. As well, the lists do not identify points at which either an Appeal or a Judicial Review could be launched. This legal option may be available to a person, party, proponent or intervener at points throughout various approvals processes.

In its Integrated Power System Plan, the Ontario Power Authority has identified an extensive list of over 60 approvals and permits that might be required for a typical natural gas-fired power plant. This list can be found in Table 1 of Exhibit D, Tab 10, Schedule 1, on pages 3-4.

Appendix C. Comparative Approvals Processes

Natural Gas Pipeline Projects in Ontario

The OEB authorizes the construction of gas pipelines under the *Ontario Energy Board Act*. The *Environmental Assessment Act* of Ontario does not apply to these pipelines.

Through the OEB's "Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario" (the Guidelines), the Applicant is provided with direction in the preparation of a natural gas pipeline project environmental report (ER). The ER documents the routing and siting process, selection of preferred alternatives, public and agency consultation and environmental assessment for the proposed facilities.

An environmental review of the ER is carried out by the Ontario Pipelines Coordinating Committee ("OPCC"). The OPCC, which is chaired by OEB staff, coordinates the Ontario government's environmental review. Active participants include the Ministries of Environment, Agriculture and Food, Government Services, Culture, Tourism and Recreation, Management, OEB Secretariat, Municipal Affairs and Housing, Natural Resources and Transportation, as well as the Technical Standards and Safety Authority and the Ontario Realty Corporation. In addition, affected regional and local municipalities and conservation authorities are involved.

Through the OEB's "environmental guidelines" the Applicant is provided with direction in the preparation of a natural gas pipeline project environmental report ("ER").

Once an ER is completed, the Applicant must submit it to the OPCC for its review prior to applying to the OEB for approval to proceed with construction. The OPCC is allowed 42 days to review and resolve any conflicts with the Applicant. The OPCC may accept the ER or grant approval, subject to conditions.

In its subsequent application to the OEB for leave to construct the pipeline, the Applicant is required to submit a copy of the ER and a summary of the concerns raised by the OPCC and evidence and an explanation as to how any environmental concerns were addressed. The Applicant is also to identify any concerns that remain unresolved. The OEB proceeds with notification and a hearing. The notice is served to affected landowners, interested parties and OPCC members and is typically published in

newspapers. The notice provides for participation by interested parties in the OEB proceeding.

The result is an integrated public hearing.

Deep Panuke Project

The proposed Deep Panuke Offshore Gas Development Project involves the production of natural gas from an offshore field located approximately 250 kilometres southeast of Halifax and its transportation via sub-sea pipeline to shore and, ultimately, to markets in Canada and the United States.

Jurisdiction is shared between the federal and Nova Scotia governments and both federal and provincial approvals were required as follows:

- the Canada-Nova Scotia Offshore Petroleum Board (“CNSOPB”)
- the National Energy Board (“NEB”)
- the Canadian Environmental Assessment Agency (“CEAA”)

A public review was conducted by a “Commissioner” appointed by CNSOPB and a member of the NEB. The NEB member and CNSOPB Commissioner concurrently heard evidence and received submissions, but kept their independent roles and did not constitute a “joint panel”.

Meanwhile, an 11 month environmental assessment process proceeded concurrently with the NEB/CNSOPB regulatory review. As part of this environmental assessment process:

- the “responsible authorities”¹⁰ under the *Canadian Environmental Assessment Act* (CEA Act”) used the public process before the NEB member and CNSOPB Commissioner to collect the views of the public to assist in the preparation of a comprehensive study report (“CSR”)
- the NEB member and CNSOPB Commissioner, as part of their work, prepared a joint environmental report (“JEP”)
- such responsible authorities considered the JEP in coming up with their CSR

In due course:

¹⁰ “Responsible Authorities” are federal departments and agencies involved in the CEA Act process

The federal Minister of the Environment concluded that the proposed project was not likely to cause any adverse environmental effects, basing his environmental assessment decision on the following:

- the CSR;
- public comments received during a 30 day consultation period; and
- implementation of mitigation measures and a follow-up programme.

After reviewing the NEB member's report and recommendations (including JEP), and the CSR and decision by the Minister of the Environment, the NEB adopted the report and recommendations and issued a Certificate of Public Convenience and Necessity;

- The CNSOPB approved the project; and
- The federal and provincial governments, which had up to 30 days to review, accepted the CNSOPB report (with its conditions).

As to timing, the applications were filed with NEB and CNSOPE in November 2006. Oral hearings were held in Halifax March 5-9, 2007, and the various approvals were given in September 2007. However, it must be noted that an earlier CSR had been completed for a 2002 application, which was later withdrawn, and this was used as a base for the new CSR.

The foregoing process was accomplished pursuant to:

- a 2005 Memorandum of Understanding among NEB, CNSOPB and other provincial and federal departments on "Effective, Coordinated and Concurrent Environmental Assessment and Regulatory Processes for Offshore Petroleum Development Projects in the Nova Scotia Offshore Area"; and
- a 2006 Memorandum of Understanding between NEB and CNSOPB setting out the framework for a single coordinated public regulatory review process.

The basic point is that the various federal and provincial authorities found a way to proceed with only one integrated public hearing.

Brunswick Pipeline Project

In May 2006 Emera Brunswick Pipeline Company Ltd. (the "Applicant") applied to the NEB for a Certificate of Public Convenience and Necessity to construct and operate the

Brunswick Pipeline, a 145 kilometre pipeline from New Brunswick to interconnect with a pipeline in Maine for the transport of liquified natural gas (“LNG”).

The NEB, pursuant to section 43 of the CEA Act, requested that the federal Minister of the Environment approve the “substitution” of the NEB process for a customary environmental assessment by a review panel. The CEA Act specifically allows this where the Minister of the Environment is of the opinion that another federal authority’s process for assessing the environmental effect of a project would be an appropriate substitute process. Following an exchange of correspondence in which the Chairman of the NEB confirmed they could meet certain requirements of the President of the CEAA, the Minister of the Environment approved the NEB request for substitution.

Oral hearings were held by the NEB on November 6-20, 2006 in Saint John, New Brunswick.

The NEB conducted the full environmental assessment review, taking into consideration all requirements under the CEA Act, and prepared an environmental assessment report (EA Report) which concluded that the project was not likely to result in significant adverse environmental effects provided its recommendations and mitigations measures, some within provincial jurisdiction, were implemented. The EA Report was provided to the Minister of the Environment and other federal responsible authorities in April 2007. Their response accepted all such recommendations and was approved by the Governor-in-Council in May 2007.

On May 31, the NEB approved the application for a Certificate of Public Convenience and Necessity after considering, among other things, the EA Report and such government response. The EA Report's recommendations were included as conditions in the Certificate of Public Convenience and Necessity which was issued on June 11.

The NEB noted that its responsibility is a “public interest” test and that, while the CEA Act requires a consideration of socio-economic effects only if they result from an environmental effect of a project, the NEB usually considers a broader range of socio-economic effects, such as potential for commercial impact, environmental protection and public safety, and that in this proceeding the NEB had heard evidence on engineering design and safety issues, economic considerations such as supply and markets, public engagement and aboriginal consultation, socio-economic and environmental effects of the project, and land and routing matters.

The basic point is that the various federal authorities proceeded with only one integrated public hearing.

Appendix D. Suggested principles for a provincial protocol

Suggested Principles For A Provincial Protocol On Reviewing Electricity Projects

Background

Ontario's Provincial Policy Statement has identified energy generation, supply and conservation as contributing factors to long-term economic prosperity.

The IPSP has emphasized the need for the installation of adequate new power generation and the building of transmission lines in an expeditious manner and, in particular, that certain projects (the "Designated Projects") need to be completed and on-line as early as 2008.

At the same time, other provincial policies and concerns applicable to the Designated Projects must not be overlooked or minimized.

Accordingly, various Ministries, the Ontario Energy Board ("OEB") and the Ontario Municipal Board ("OMB") would agree to a streamlined review process with a single public hearing leading to a relatively expeditious consideration of all relevant matters respecting, and a decision on whether to approve, each Designated Project.

Outline of Protocol Provisions

This suggestion is simply an illustration of how a protocol could work. We have used the OEB as an example of a body which could be mandated, by agreement, to carry out a single integrated hearing. Some other body or consolidated hearing process might similarly be mandated to accomplish the task.

The Minister of the Environment would agree that the provision for environmental review tribunals would not apply to a Designated Project and that the OEB would conduct a process (the "Substituted Process") to conduct the requisite environmental reviews, all on the condition that the Minister of the Environment would receive confirmation from the OEB on various matters, such as:

- the Substituted Process would apply fully the scope of assessment, factors to be considered and scope of factors as set out in the environmental assessment scoping document
- the environmental assessment scoping document would be publicly available

- the Substituted Process would include informal opportunities for the public to convey their views to the OEB
- the OEB would submit an environmental assessment report ("EAR") to the Minister of the Environment and other responsible ministers
- the EAR would set out the OEB's rationale, findings, mitigation measures, conclusion and recommendations
- the OEB would publish the EAR.

The Minister of Municipal Affairs and Housing, and the OMB, would similarly accept the Substituted Process on condition that the Minister of Municipal Affairs and Housing would be satisfied that the Substituted Process would deal adequately with the policy concerns of the *Planning Act*.

Other Ministries would similarly accept the Substituted Process as a forum for a transparent and public airing of policy concerns within their jurisdiction.

Authorities

The protocol would be entered into under the following authorities:

- The *Environmental Assessment Act*, Section 3.2;
- The *Planning Act*, sections 23, 47 and 62.01, as amended by Bill 51;
- The *Ontario Energy Board Act*, paragraph 127(1)(m); and
- Other relevant legislative authorities.

The relevant sections are reproduced below.

The *Environmental Assessment Act*, Section 3.2:

Declaration

(1) With the approval of the Lieutenant Governor in Council or of such ministers of the Crown as the Lieutenant Governor in Council may designate, the Minister may by order,

- (a) declare that this Act, the regulations or a matter provided for under the Act does not apply with respect to a proponent, a class of proponents, an undertaking or a class of undertakings;
- (b) suspend or revoke the declaration;
- (c) impose conditions on the declaration; or
- (d) amend or revoke conditions imposed on the declaration,

if the Minister considers that it is in the public interest to do so having regard to the purpose of this Act and weighing it against the injury, damage or interference that might be caused to any person or property by the application of this Act to the undertaking or class. 1996, c. 27, s. 2.

Note that Section 11 of the *Environmental Assessment Act* allows the Minister of the Environment to refer a matter to a tribunal, if that tribunal is authorised under another Act to decide such matters (subsection 11(4)).

The Planning Act, Sections 23, 47 and 62.01, as amended by Bill 51:

Request by Minister to amend plan

Section 23:

- (1) Where the Minister is of the opinion that a matter of provincial interest as set out in a policy statement issued under section 3 is, or is likely to be, affected by an official plan, the Minister may request the council of a municipality to adopt such amendment as the Minister specifies to an official plan and, where the council refuses the request or fails to adopt the amendment within such time as is specified by the Minister in his or her request, the Minister may make the amendment. R.S.O. 1990, c. P.13, s. 23 (1).

Hearing by O.M.B.

- (2) Where the Minister proposes to make an amendment to an official plan under subsection (1), the Minister may, and on the request of any person or municipality shall, request the Municipal Board to hold a hearing on the proposed amendment and the Board shall thereupon hold a hearing as to whether the amendment should be made. R.S.O. 1990, c. P.13, s. 23 (2).

Decision of O.M.B.

- (5) The Municipal Board, after the conclusion of the hearing, shall make a decision as to whether the proposed amendment, or an alternative form of amendment, should be made but the decision is not final and binding unless the Lieutenant Governor in Council has confirmed it. R.S.O. 1990, c. P.13, s. 23 (5); 1994, c. 23, s. 15 (1); 2004, c. 18, s. 5 (1).

Powers of L.G.I.C.

- (6) The Lieutenant Governor in Council may confirm, vary or rescind the decision of the Municipal Board made under subsection (5) and in doing so may direct the Minister to amend the plan in such manner as the Lieutenant Governor in Council may determine. 2004, c. 18, s. 5 (2).

Power of Minister re zoning and subdivision control

Section 47:

- (1) The Minister may by order,
- (a) in respect of any land in Ontario, exercise any of the powers conferred upon councils by section 34, 38 or 39, but subsections 34 (11) to (34) do not apply to the exercise of such powers; and
 - (b) in respect of any land in Ontario, exercise the powers conferred upon councils by subsection 50 (4). R.S.O. 1990, c. P.13, s. 47 (1); 1994, c. 23, s. 27 (1).

Deemed by-law of municipality

- (4) The Minister may, in the order or by separate order, provide that all or part of an order made under clause (1) (a) and any amendments to it in respect of land in a municipality, the council of which has the powers conferred by section 34, shall be deemed for all purposes, except the purposes of section 24, to be and to always have been a by-law passed by the council of the municipality in which the land is situate. 2001, c. 9, Sched. J, s. 2 (1).

Hearing by O.M.B.

- (10) Where an application is made to the Minister to amend or revoke in whole or in part any order made under subsection (1), the Minister may, and on the request of any person or public body shall, request the Municipal Board to hold a hearing on the application and thereupon the Board shall hold a hearing as to whether the order should be amended or revoked in whole or in part. R.S.O. 1990, c. P.13, s. 47 (10); 1994, c. 23, s. 27 (4).

Minister's notice re matters of provincial interest

- (13.1) If the Municipal Board has been requested to hold a hearing as provided for in subsection (10) and the Minister is of the opinion that a matter of provincial interest is, or is likely to be, adversely affected by the requested amendment or revocation, the Minister may so notify the Board in writing, not later than 30 days before the day fixed by the Board for the hearing. 2006, c. 23, s. 19 (3).

Same

- (13.2) The Minister's notice shall identify,
- (a) the provisions of the order by whose amendment or revocation the provincial interest is, or is likely to be, adversely affected; and

- (b) the general basis for the opinion that a matter of provincial interest is, or is likely to be, adversely affected. 2006, c. 23, s. 19 (3).

Effect of Notice

- (13.4) If the Municipal Board receives notice from the Minister under subsection (13.1), the decision of the Board is not final and binding with respect to the amendment or revocation of provisions identified in the notice, until the Lieutenant Governor in Council confirms the decision in that respect. 2006, c. 23, s. 19 (3).

Power of L.G.I.C.

- (13.5) The Lieutenant Governor in Council may confirm, vary or rescind the Municipal Board's decision with respect to the amendment or revocation of provisions identified in the notice, and may direct the Minister to amend or revoke the order, in whole or in part. 2006, c. 23, s. 19 (3).

Exempt Undertakings

Section 62.01, as amended by Bill 51

- (1) An undertaking or class of undertakings within the meaning of the Environmental Assessment Act that relates to energy is not subject to this Act or to section 113 or 114 of the City of Toronto Act, 2006 if,
 - (a) it has been approved under Part II or Part II.1 of the Environmental Assessment Act or is the subject of,
 - (i) an order under section 3.1 or a declaration under section 3.2 of that Act, or
 - (ii) an exempting regulation made under that Act; and
 - (b) a regulation under clause 70 (h) prescribing the undertaking or class of undertakings is in effect. 2006, c. 23, s. 24.

Same

- (2) An undertaking referred to in subsection 62 (1) that has been approved under the Environmental Assessment Act is not subject to section 113 or 114 of the City of Toronto Act, 2006. 2006, c. 23, s. 24.

The Ontario Energy Board Act, paragraph 127(1)(m):

Regulations, General

127. (1) The Lieutenant Governor in Council may make regulations,
- (m) respecting any matter that the Lieutenant Governor in Council considers necessary or advisable to carry out effectively the purposes of this Act.

Appendix E. Summary of agencies' cost efficiency activities

The agencies provided the following information.

1. Hydro One

Administrative Cost Reduction/ Structural Improvements

- Streamlining management structure, cutting 79 management positions and eliminating 53 Society-represented positions.
- Restructuring and rationalizing corporate functions, reducing cost by \$24M.
- 2000- Voluntary Separation Program (all employee groups): Reduction of 1402 employees.
- 2001- Power Worker Union Voluntary Reduction Program for Staff Acquired from municipal electric utilities: Reduction of 24 employees.
- 2002- Transfer of Staff to Inergi: Reduction of 804 employees.
- The largest initiative currently underway is the simplification and streamlining of the HOI Information Technology architecture, which is expected to lead to improvements in business decision processes and work bundling and scheduling. HOI's main initiative in this area is the "Cornerstone" initiative. Under Cornerstone, new business tools will be put in place and processes changed so that HOI achieves industry best practices. The Cornerstone Initiative includes:
 - o The replacement of the outdated enterprise asset management system;
 - o The replacement of the outdated Finance and Human Resource tools;
 - o The replacement of aging Customer Information System (customer data, information system, call centre and customer billing).

Operational Cost Reduction / Process Improvement

- Optimizing routes and reclassifying meter reading, savings \$ 13M.
- Rationalizing fleet utilization, garnering \$9M in savings.

2. Independent Electricity System Operator

Administrative Cost Reduction/ Structural Improvements:

- No increased headcount proposed for 2007, following a modest headcount reduction in the 2006 plan.
- For 2006, staff cost are projected to be \$56.4 million or some \$0.1 million below the approved budget of \$58.5million.
- Projected computer support, maintenance and equipment cost are \$ 10.2 million in 2006 or \$0.5 million below the approved budget. This variance is a result of lower than usual spending in services and software areas such as records management, finance and metering.

- In 2006, the delivery of critical IT infrastructure and other capital projects, including DACP were given incremental priority. As a result, there was a reduction in resources available for ongoing operations.

Debt Management:

- The IESO has worked diligently to manage its overall debt through re-payment and restructuring. Since 2002, \$260 million (representing over 70%) of the IESO's debt load has been repaid.
- The IESO is planning to repay a further \$33 million in debt by the end of 2009, and we are refinancing our provincial debt with a less expensive and more flexible credit facilities.

Contracted Services:

- Projected contract services and consultants are \$7.7 million or about \$ 0.7 million above the 2006 budget of \$7.0 million. The variance is a result of numerous minor differences from the plan, including an unbudgeted executive search for the IESO President & CEO and a review of the prudential framework in the physical market that was more comprehensive than expected in 2006.

Operational Cost Reduction/Process Improvement

- Total operating costs have reduced each year since 2003, including a further planned reduction in 2007.
- Reduce cost for automatic generation control.

Streamlining and Coordinating the Connection Process:

- The IESO is working to streamline connection cost for generators, with a particular emphasis on wind integration and natural gas/electricity coordination - the result of which should be a more diversified power supply in Ontario, with greater reliability and lower project cost.

Regulatory Efficiency:

- The IESO continues to work with others in the industry to promote a more streamlined approval process for transmission and other infrastructure investments. Well-defined regulatory processes, with reasonable time lines, would substantially reduce development risk, and would dramatically reduce future project cost to be charged to the consumer.

3. Ontario Energy Board

Administrative Cost Reduction/ Structural Improvements

- With an expanded mandate, the OEB has undertaken a Continuous Performance Improvement program. It has expanded staff to deal with the expanded mandate.
- As part of Continuous Performance Improvement, OEB now publishes a three-year Business Plan and ties part of compensation to performance against quantitative measures. The OEB engaged an independent auditor to verify the performance results.

Operational Cost Reduction/Process Improvement

- In OEB-1, as part of their plan for continual performance improvement:

- Planning to implement “new IT technology strategy – Include the regulatory Information Filing system and enable electronic document filing and search for stakeholders, and improve internal efficiency.
- Commenced publishing three-year Business Plan – which will address the list of quantifiable performance metrics.

4. Ontario Power Authority

Administrative Cost Reduction/ Structural Improvements:

- N/A as, the OPA is a new organization – only one full year of operations experience, new mandate with no comparable reference elsewhere.

Operational Cost Reduction /Process Improvement

- N/A, as the OPA is a new organization – only one full year of operations experience, new mandate with no comparable reference elsewhere.

5. Ontario Power Generation

Administrative Cost Reduction/ Structural Improvements:

- In 2006, OPG’s project related expenditure for existing generation assets and new development projects totalled \$875 million. Of this expenditure pertaining to OPG’s existing generating portfolio totalled \$585 million, and new generation project capital expenditure totalled \$ 290 million.

Structural Management:

- In 2002, OPG initiated a comprehensive review of its business support structure because of its mandate to ‘decontrol’ a large portion of its generation. The objective of downsizing business support functions was to ensure that these functions were resized consistent with the generation base they were supporting. At the same time, production support employees were geographically relocated to be closer to the parts being supported in order to improve ‘line of sight’ and increase focus on day-to-day operations.
 - 2002 Restructuring program reduced 1311 Staff with Salary and benefit savings of ~\$200 M/yr.
 - In 2004, OPG rationalized its senior management structure by eliminating roles related to decontrol and potential growth in other markets. This resulted in a reduction of 9 Vice-Presidents.
 - OPG’s Energy Market function was restructured in 2005 in response to the changing characteristics of the Ontario electricity market and OPG’s expected role within it. At that time, OPG exited retail marketing and reduced the number of Energy Market employees by approximately 20%.
 - Reduced labour cost by negotiating new longer term, two-tiered compensation plan for the PWU and Society that will reduce lifetime cost of new hires.

Investments in Technology and Automation:

- OPG has made investments in technology that have improved productivity and reduced cost. Noteworthy improvements have been achieved in the areas of financial transaction processing.

- Consolidation of payment processing centers from 18 to 1;
 - Electric scanning and logging of all incoming invoices;
 - Reduction in paper invoices from 100% to 40% through electronic invoicing;
 - Implemented web-based Vendor Self Service system for employee expenses with approval utilizing electronic imaging of receipts;
 - Automated processes have been implemented for time reporting application for non-regular staff to automatically generate invoices to pay for time, and plant maintenance systems to automatically create purchase orders from preferred vendors;
 - Electronic Funds Transfers have increased from 0% to 93% of the dollar value and from 0% to 75% of the number of invoices;
 - Outsourcing Non-Core Business Functions.
- In addition to cost savings realized through structural improvements, OPG has achieved noteworthy cost reduction through the outsourcing of non-core business processes, increased use of technology, and initiatives implemented within its corporate function.
 - In 2001, OPG outsourced its business-related Information Technology (IT) activities to a Cap Gemini subsidiary. OPG's IT costs were forecast to become significantly less competitive as OPG began to "de-control" stations. OPG outsourced about 600 staff and approximately \$125 M in services annually and expects to achieve a net benefit of approximately \$65 M over the 10-year life of the contract. OPG plans to continue to leverage the expertise of Cap Gemini's IT activities through future consolidation of data center activities as well as exploring the potential for off-shoring certain work programs.
 - In 2002, OPG and NNC Holdings Limited of the UK reached an agreement whereby OPG transferred 150 scientists, engineers, technologists, managers and support staff, who perform nuclear safety analysis and assessment, to Nuclear Safety Solutions Limited (NNS). NSS acquired the resources and technology to provide nuclear safety services on a commercial basis to OPG, Bruce Power and other customers. Savings over the 2003 to 2006 period are estimated to be approximately \$10M.
 - In 2003, the management of OPG's Pension and Nuclear Liability funds was outsourced to professional money managers. This enabled OPG to avoid approximately \$10 million of needed investment in IT infrastructure and system upgrades. It also improved OPG's governance, as external management of pension assets provides an arm length relationship with the managers and enables OPG to independently review and assess performance against established benchmarks.

Financial Management:

- Real estate costs have been reduced through an aggressive space management and leasing program, which more than doubled gross rental revenue between 2001 and 2007, reducing net costs by \$12 million per year over that time period.
- Cost management initiatives have improved liquidity and reduced borrowing requirements, including adjusting the scheduling of payments to suppliers and rebate payments to the IESO to better align them with the timing of OPG's revenue receipts. These initiatives are estimated to have reduced average borrowing requirements by \$50 M and reduced interest costs by almost \$2 M.

Operational Cost Reduction/Process Improvement:

- Nuclear Operation - Production
 - o Nuclear production has increased by approximately 25%, or approximately \$400 M in revenue, over the 2003-2006 period. While this increase can be attributed in large part to the return to service of Units 1 and 4 at the Pickering A nuclear station, production increases and the achievement of higher capacity factors at Pickering B and Darlington are a result of improvements in processes, plant and equipment.
- Nuclear Operation - Reliability
 - o Over the 2003 to 2006 period, forced losses at OPG's nuclear stations have been reduced by approximately 25% resulting improved reliability and higher production.
 - o The Darlington station has initiated a strategic initiative of moving from a two year to a three-year outage cycle. The three-year outage cycle is enabled through improvements in station reliability resulting from the investments made over the past four years. The primary benefit is that the station will move to an average of one outage per year, which will improve organizational focus and allow for comprehensive outage planning.
 - o OPG's nuclear stations have increased their focus on reducing elective and corrective backlogs. The goal of this initiative is to achieve sustaining asset performance by reducing the incidence of equipment breakdown. All three plants have progressed in reducing their backlogs and are trending to industry median performance over the next two years.
- Nuclear Operation - Life Cycle Planning
 - o Improvements have been made to life cycle planning for major components. Inspections have focused on major components such as steam generators, feeders, fuel channels, pressure tubes and other reactor core components. As a result, all 1,520 fuel channels on Pickering B have been inspected in the last four years ending the need for 100 day outages every two years.
 - o Steam generator cleaning and modification have resulted in performance that is more predictable and fewer discovery issues at all of OPG's nuclear plants. OPG has invested \$12 million to develop specialized tooling in anticipation of replacing feeder pipes because of feeder pipe thinning. This new equipment was successfully deployed last fall at Darlington. Early planning for feeder pipe replacement will allow OPG to deliver predictable outages.
- Nuclear Operation - Supply Chain Procurement/ Inventory Management
 - o To ensure all parts can be acquired when needed and improve inventory management, OPG has implemented improvements in supply chain procurement and inventory management. In addition, heightened focus has been placed on identifying critical spares in order to reduce the risk of parts unavailability when these are required. By the end of 2006, there were no deferrals or cancellation of planned outages due to the lack of availability of parts.
- Hydro Electric Operation - Production
 - o OPG has increased equipment efficiency, capacity and low cost energy produced by replacing turbine runner equipment with more modern and efficient equipment. Over the 2002 to 2006 period, 126 MW of low cost capacity has been added as a result of runner upgrades at a number of hydroelectric stations including: Saunders, Sir Adam Beck 2, Cameron Falls, Abitibi Canyon, and Caribou Falls. This program is continuing over the 2007 to 2011 period and an additional 65 MW of capacity is planned to be added through

runner upgrades a number of hydroelectric station including Sir Adam Beck 1, Des Joachims, Ranney Falls, Little Long and Harmon.

- Hydro Electric Operation - Reliability
 - o Station availability has improved from 89% in 1997 to 93% in 2006.
 - o Improved maintenance practices have reduced the frequency & duration of maintenance outages.
 - o Station forced outage rates improved from 5.2% in 1997 to 1.8% in 2006.
- Hydro Electric Operation - Employee Safety Performance
 - o Hydroelectric staff has achieved 1.5 years without a Lost Time Injury and three plant groups have achieved over 6 years without a Lost Time Injury.
 - o To encourage safety at its hydro sites, OPG administers an extensive Water Safety Program designed to educate, inform and protect the public about safety risk near its hydroelectric facilities. Initiatives undertaken in 2006 included: installing video surveillance cameras, improved safety booms at several of its station, and installing a new safety fence near the R.H Saunders generating station on the St. Lawrence River.
- Fossil Fuel Operation - Production
 - o OPG's Fossil stations significantly increased their production during the years that the nuclear units were laid-up. These stations have helped Ontario meets its peak summer and winter demands. For example, during the record peak demand in the summer of 2006, all of OPG's fossil station were producing electricity to prevent possible brownout or black outs.
- Fossil Fuel Operation - Reliability
 - o Reliability has significantly improved from a forced outage rate of 18.6% in 2004 to 14.4% in 2006, with a plan to achieve 12.4% in 2007, despite increased operating volatility. These improvements have been realized because of investment in precipitators, coal pulverizers, and the proactive repair.
- Fossil Fuel Operation - Environmental Improvements
 - o Environmental performance has also improved. Due to increased use of low sulphur, Power River Basin coal and strategic fuel sourcing initiative , fossil fuel cost have been reduced by approximately \$235 million over the 2002-2006 period, with savings of \$60 million in 2006.
 - o OPG's emission of Sulphur Dioxide, Nitrous Oxide and Mercury have significantly decreased resulting in a smaller environmental footprint from OPG's fossil fuel plants.
 - o Historical investments in emission reduction technologies such as scrubbers, low nitrous oxide burners, and selective catalytic reduction units have dramatically reduced emission of NOx and SO2. Mercury emissions have been reduced by 50% over the 2001 to 2006 period. OPG will continue to operate its fossil fuelled stations efficiency and in an environmentally responsible manner for as long as they are needed.
 - o Benchmarking data indicates that OPG's Lambton GS Units 3 and 4 are amongst the lowest acid gas emitting coal units affecting Ontario's air shed. Nanticoke GS Units 7 and 8 are amongst the lowest NO2, emitting coal units.

Appendix F: Electricity Sector Council report



Human Resource and Skill Needs Facing the Ontario Electricity Sector

November, 2007

Executive Summary

- ❖ **A comprehensive survey, commissioned by the Canadian Electricity Association in partnership with Human Resources and Skills Development Canada in 2004, found that a large portion of Ontario's electricity industry workforce will be eligible to retire by 2014. The survey also found that:**
 - Ontario's electricity workforce was especially short of workers under 40 years of age;
 - The industry required a highly skilled workforce;
 - Competition for skills could come from other industries;
 - The industry needed additional labour to meet the requirements for new and refurbished infrastructure; and
 - Women, aboriginals, visible and other minorities were under-represented in the workforce.
- ❖ **Recent research indicates that the educational institutions are unlikely to supply all of the graduates needed by the industry in the medium to long term without a greater level of collaboration between all stakeholders;**
- ❖ **Recently adopted "promising practices" by Ontario agencies and other industry participants are aimed at addressing these challenges.**

This report will...

- ❖ Provide a profile of electricity labour supply and demand in Ontario;
- ❖ Summarize the readiness of the Ontario educational institutions to meet future workforce needs;
- ❖ Report on the status of the Ontario electricity agencies to meet future workforce needs
- ❖ Identify promising practices in human resources.

HR and Skill Needs Facing the Ontario Electricity Sector

PART I.

The Ontario Electricity Workforce

National Study Identified Future Shortfall in Ontario Electricity Workforce

- ❖ **Based on the 2004 Canadian Electricity Association Study, Ontario reflects the national situation: an aging boomer workforce with a low percentage of younger workers...**
- ❖ **At least 3 out of 4 employees are expected to leave on their retirement date, consistent with historical uptake.**

Year of reference: 2004	Ontario	National
% of electricity workforce less than 30 years	8.4	8.0
% of electricity workforce less than 40 years	25.7	27.9
Average age (years) of an electricity employee	44.4	44.1
Average tenure* (years) of an electricity employee	19.4	18.7
% of electricity workforce eligible to retire by 2009**	16.4	17.3
% of electricity workforce estimated to retire by 2009	14.1	15.5
% of electricity workforce eligible to retire by 2014**	38.3	37.3
% of electricity workforce estimated to retire by 2014	26.1	29.6

Source: 2004 CEA Study

* Average number of years employed in the electricity sector.

** As reported by employers, based on the number of employees eligible to retire with an undiscounted pension at this date

According to supply-demand analysis completed for the National Study...

Estimated Supply and Demand Gap in Ontario– Annual Positions/Year*

Occupational Group	2005-2009		2010-2014	
	Low	High	Low	High
Engineers	151	175	131	222
Trades/other non-support	609	707	534	906
Total	760	881	665	1,128

Source: 2004 CEA Study

*Note: Excludes contact staff. For more details on assumptions and methodology, refer to Part III.

The projected supply-demand “gap” represents a hypothetical gap between industry needs and the capacity of the education and training system to produce sufficient numbers of qualified graduates that will be attracted to the electricity sector as a career (based on historical ratios). In reality, electricity employers will access other potential labour pools to address hiring needs. These other labour pools include:

- existing staff to be promoted into management/supervisory roles;
- foreign-trained workers (recent immigrants);
- trained staff currently working in other sectors;
- use of contract positions for recently retiring staff; and
- increased proportion of recent graduates who decide to work in the electricity sector.

Nevertheless, the extent of the supply-demand gap suggests that there will be an immediate need for employers and education/training institutions to develop a coordinated strategy to address current and potential hiring needs.

More findings from the National Study...

- ❖ **In Ontario, nuclear power generation employees were most likely to be 50+ years of age in 2004:**
 - 38.3% of nuclear power generation employees* in Ontario were 50+ years of age; these employees are longest to train to certification. For example, the Canadian Nuclear Safety Commission estimates it takes 10 years to train a nuclear operator.
- ❖ **In 2004, employees in transmission and distribution tended to be younger on average:**
 - 29.2% and 29.3% of transmission and distribution employees* in Ontario, respectively, were 50+ years of age.
- ❖ **With a longer tenure** than in other business lines, transmission employees have the highest proportion of possible retirees by 2014:**
 - Almost 60% of transmission employees* in Ontario were estimated to retire by 2014 compared to 55% national average.
- ❖ **With 29.1% of the Ontario electricity workforce 50+ years of age in 2004, and assuming retirement based an average age of 56, almost 30% might be retired in 2010.**

* Excluding support staff.

** Average number of years employed in the electricity sector.

Recent Ontario Survey Confirms the Trend

HR Profile and Future Needs of Ontario Electricity Agencies, by Occupational Group, 2007

	Hydro One			IESO			OPA	OPG		
	Current (#)	To Be Replaced in 5 Yrs (#)	To Be Replaced in 5 Yrs (%)	Current (#)	To Be Replaced in 5 Yrs (#)	To Be Replaced in 5 Yrs (%)	Current (#)	Current (#)	To Be Replaced in 5 Yrs (#)	To Be Replaced in 5 Yrs (%)
Management	520	101	19.4%	53	20	37.7%	57	502	200	39.8%
Trade	1,529	405	26.5%	6	2	33.3%	---	851	400	47.0%
Maintainers	n/a	n/a	n/a	0	0	n/a	---	3,093	800	25.9%
Operators	135	75	55.6%	47	10	21.3%	---	1,833	400	21.8%
Engineering	724	125	17.3%	91	25	27.5%	---	1,641	500	30.5%
Technical Support	411	75	18.2%	90	24	26.7%	---	1,315	500	38.0%
Other	793	67	8.4%	122	24	19.7%	82	2,219	600	27.0%
Total	4,112	848	20.6%	409	105	25.7%	139	11,454	3,400	29.7%
Contract Staff	60			0			32			

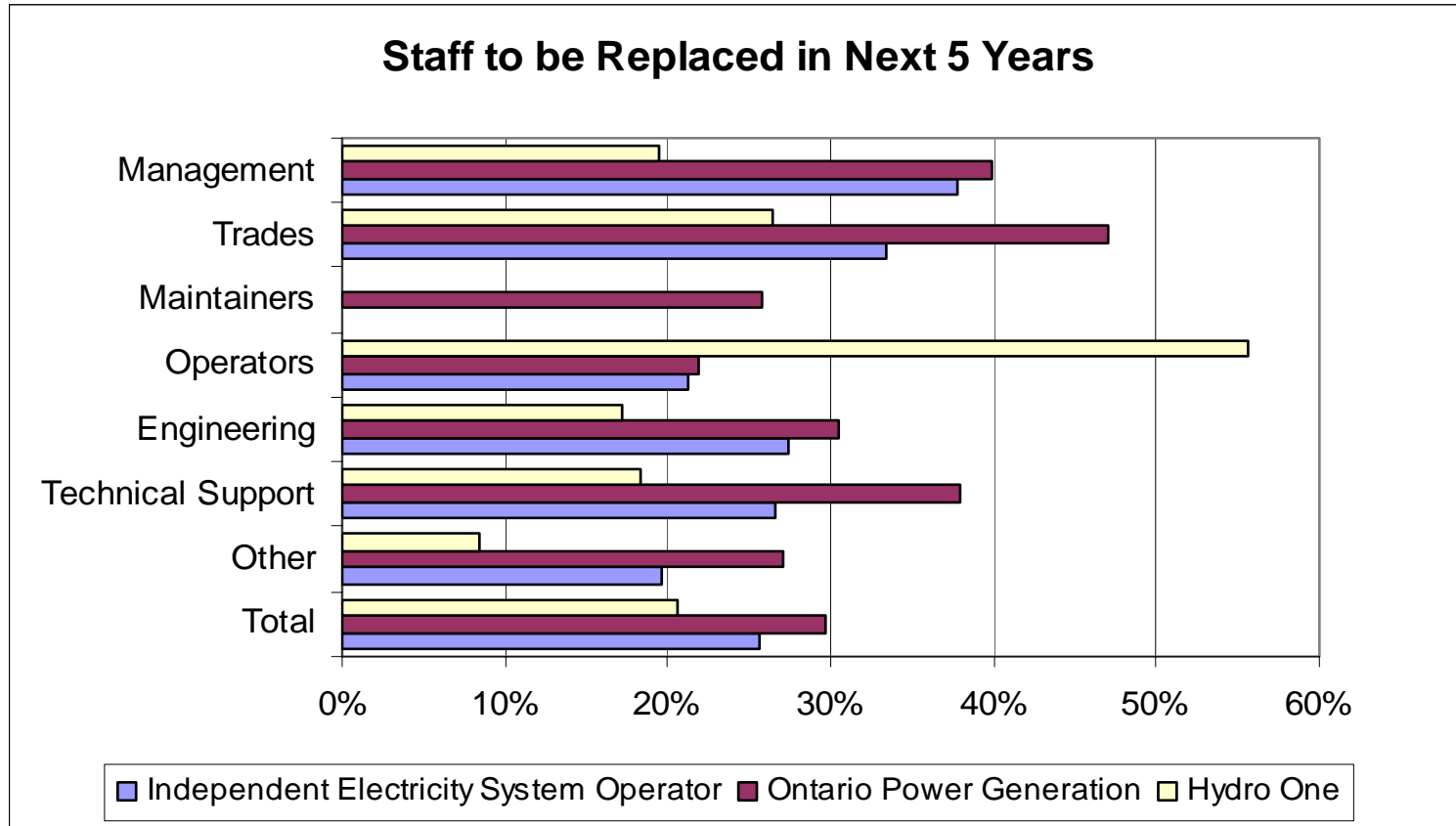
Source: Ontario Electricity Sector Agencies, October 2007

Hydro One: owns and operates the bulk of Ontario's transmission system and distributes electricity to more than one million consumers, primarily in rural areas;
 IESO - Independent Electricity System Operator: responsible for managing Ontario's high-voltage electricity system and operating the wholesale electricity market;

OPA - Ontario Power Authority: responsible for ensuring an adequate long-term supply of electricity in Ontario, building a conservation culture, and facilitating full-cost pricing for low volume and designated consumers;

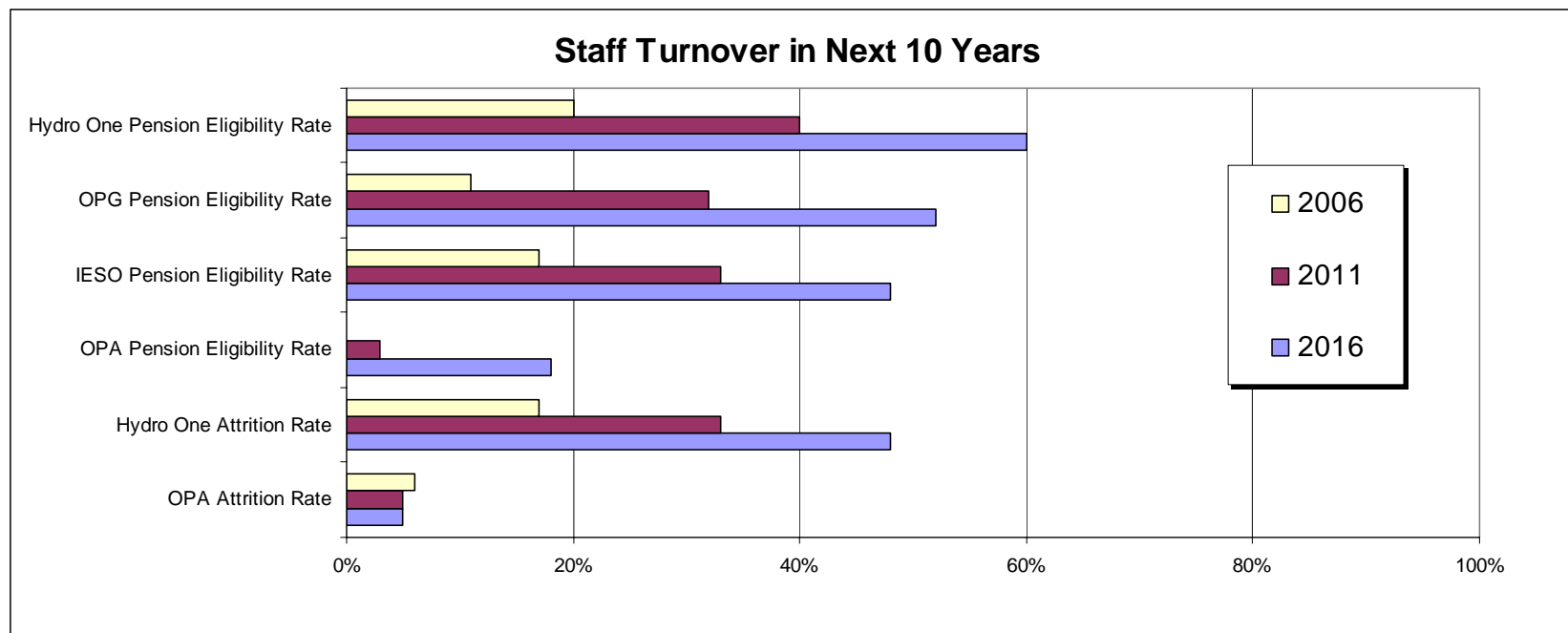
OPG - Ontario Power Generation: owns and operates Ontario's legacy generating stations.

The importance of the issue at a glance...



Source: Ontario Electricity Sector Agencies, October 2007
No data was provided for the Ontario Power Authority.

More from the Ontario Survey ...



Source: Ontario Electricity Sector Agencies, October 2007

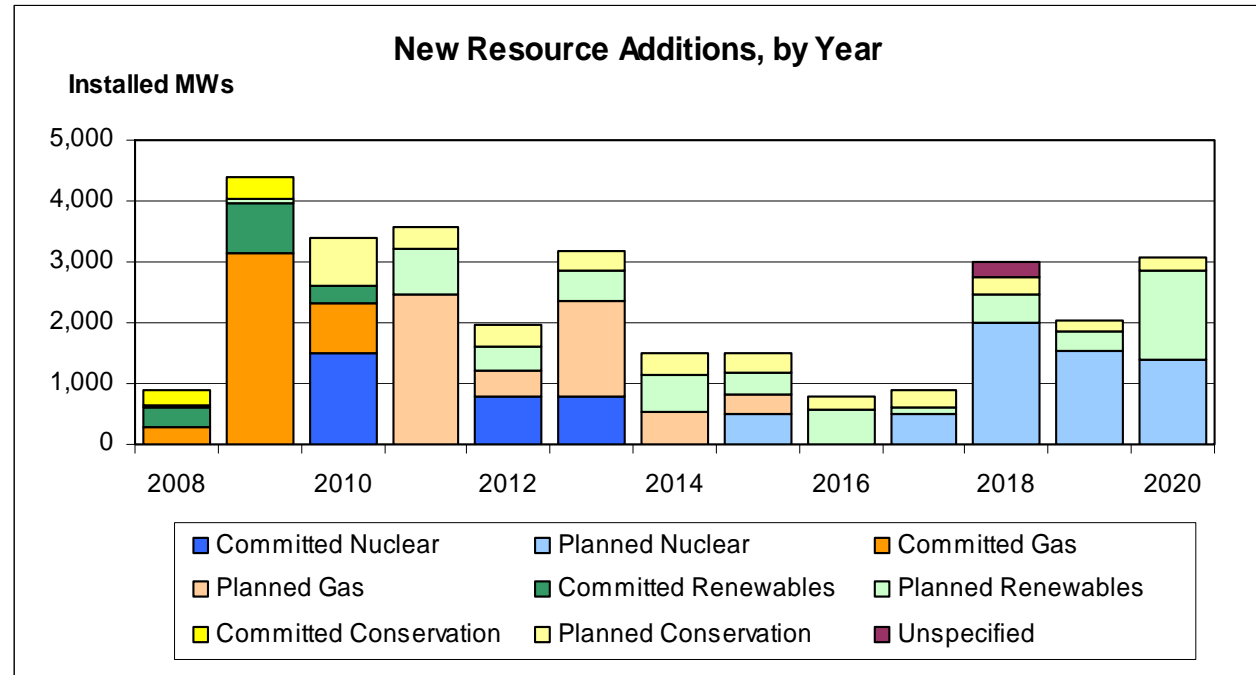
Notes:

- Values for 2011 and 2016 are cumulative
- Attrition rate estimates are not available for OPG and IESO

Demand Pressures on the Ontario Electricity Industry

❖ There is a critical need for new infrastructure...

- According to the Ontario Power Authority's Integrated Power System Plan (IPSP), the plants providing much of the province's operating capacity will need to be refurbished or replaced over the next 20 years.



- While conservation and demand management are expected to fill some of the gap by reducing demand, the IPSP makes it clear that a massive infrastructure renewal program is required to do the rest.
- The magnitude of the challenge underlines the need for human capital.

Source: Adapted from OPA, IPSP Submission (EB-2007-0707), Exhibit D-9-1, Table 5

Note: In-service dates are based on forecasts and may be subject to change; the table assumes Pickering B is refurbished.

Additional Pressure Points

❖ There is no slack in the construction industry...

- An estimated 50,000 workers will be needed to replace retirees in Ontario's construction industry.
- Ontario construction industry is also under pressure from booming demand elsewhere in the country.
- As retirees leave, the Ontario electricity industry will compete with other industries like construction for the same talent base.

❖ The skill profile is an issue...

- The electricity industry requires a highly skilled workforce.

Year of reference: 2004	Ontario
Engineers as % of electricity workforce	26.3
Average years on the job to become proficient	4.1
Trades as % of electricity workforce	58.8
Average years on the job to become proficient	4.9

Source: 2001 Census, Statistics Canada

Sources of Labour Supply for the Ontario Electricity Industry...

- ❖ **College graduates in electricity related programs in Ontario are on a modest rise:**
 - College graduates up from 6,413 in 2002 to 6,855 in 2006.
- ❖ **Numbers of undergraduate engineering degrees awarded in Ontario are improving, as are graduate engineering enrolments:**
 - Undergraduate engineering degrees awarded up from 4,068 in 2002 to 4,897 in 2007;
 - Graduate engineering enrolments up from 4,202 in 2002 to 5,070 in 2007.
- ❖ **The upward trend in total apprentice registrations in Ontario since 1999 has not been accompanied with higher completion numbers:**
 - New registrations in the Ontario Apprenticeship System have steadily increased every year, doubling since 1999;
 - This has not been reflected in completion rates. (The reasons may be revealed in a report by Statistic Canada in Spring 2008.)
- ❖ **There are fewer females in the Ontario electricity workforce:**
 - 17.7% compared to 20.4% national average.
- ❖ **There are fewer females in the Ontario University engineering programs, and their numbers are decreasing:**
 - Male registrants went up from 4,052 to 4,790 between 2000 and 2006;
 - Female registrants went down from 1,038 to 880 during the same period.

A Recent Survey of the Ontario Colleges ...

- ❖ **Most colleges indicated that there are gaps in electrical education and training programs in Ontario.**

- ❖ **One respondent's comments:**

“Employers need to understand that they are part of the educational process in providing good co-op opportunities for students. We want everything right now, but the development of well-trained people takes time. They will ask a co-op student to stay on full-time but five years later they won't have all the skills. They should be encouraging that person to finish school and come back better trained.”

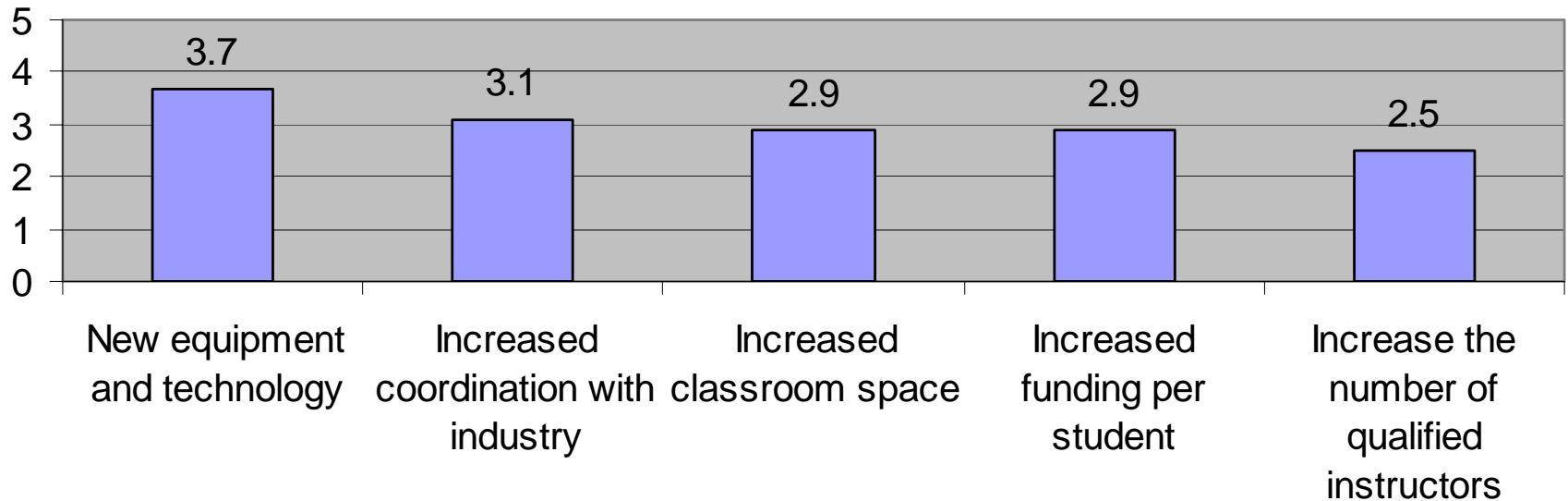
- ❖ **Ontario Colleges identified a number of activities that would make a difference in enhancing the supply of trained workers for electricity related occupations:**

- New equipment, technology and classroom space;
- Encourage primary and secondary school students to take relevant courses e.g., math and science to increase the number of qualified students entering college;
- Increase industry engagement, including partnerships, with colleges;
- Expand and increase promotion of electricity related cooperative programs;
- Industry support for apprentices;
- Raise the profile of employment and careers in the electrical area; and
- Assess and accredit immigrant workers.

More on Colleges in Ontario ...

What would be required in order for your institution to add any new electricity related programs and/or take additional students in each program? (Number of college respondents = 21)

Max. Score



A Recent Survey of the Ontario Universities ...

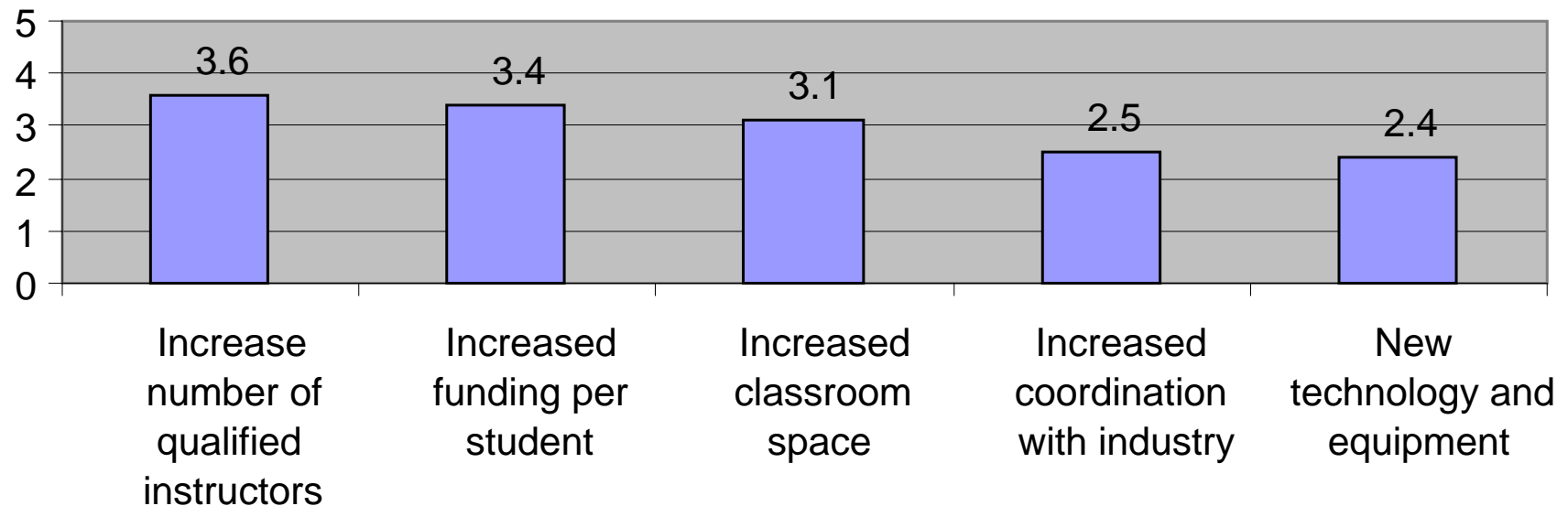
- ❖ **Universities identified fewer gaps than colleges in electrical education and training programs in Ontario. The most common ones are:**
 - Training opportunities related to renewable and emerging sources of energy are still too infrequent, new programming needs development and support
 - Power engineering training opportunities have not expanded fast enough;
 - Equipment funding;
 - Better awareness of career opportunities amongst youth and families.

- ❖ **Ontario Universities have indicated the following activities would make a difference in enhancing the supply of trained workers for electricity related occupations:**
 - Increase the number of qualified instructors and funding per student;
 - Increase industry engagement and partnerships;
 - Expand and increase promotion of electricity related cooperative programs;
 - Joint marketing campaign from industry and institutions with respect to skill shortage and career opportunities;
 - Encourage primary and secondary school students to take relevant courses e.g., math and science.

More on Ontario Universities ...

What would be required in order for your institution to add any new electricity related programs and/or take additional students in each program? (Number of university respondents = 10)

Max. Score



What are the Agencies doing?

What the Ontario electricity agencies are doing: Hydro-One

HYDRO-ONE	COMMITTEE LEVEL	
1) HR RESPONSIBILITY	The Human Resources Function is led by a Senior VP who is a direct report to the CEO and a member of the Executive Committee	
2) TALENT MANAGEMENT PROGRAMS	ONGOING	PROGRAM / ACTIVITY RESULTS
a) RECRUITMENT & SELECTION	Yes	Partnership with universities (Waterloo, Western, Ottawa); relationship with colleges (Algonquin, Northern, Mohawk, Georgian); donation & sponsorship to education (\$1Million/yr, rising). Additional partnerships are being contemplated with additional universities (Ryerson, McMaster) to develop an engineering “fellowship” arrangement.
b) PERFORMANCE MANAGEMENT	Yes	A comprehensive performance management process exists for management and Society represented staff. A less structured process exists for Power Worker Union represented staff.
c) SUCCESSION PLANNING	Yes	A comprehensive succession planning process exists for the top three levels in the company.
d) LEADERSHIP DEVELOPMENT	Yes	A custom designed leadership development program has been delivered by an external vendor for the last 5 years. The program is mandatory development for all Hydro One employees in leadership positions.
e) EMPLOYEE ENGAGEMENT	Yes	Specific employee engagement initiatives have been in place since late 2006. This program has continued throughout 2007 with tangible, measurable results. A re-energizing of the program is planned for late 2007.
f) TRAINING & DEVELOPMENT	Yes	In-house apprenticeship and management/supervisory development training has been in place since the company’s inception in 1999.
g) CONTINGENT WORKFORCE	Yes	At the peak in 2007, there were 2,708 contingent workers at Hydro One, 1,870 PWU; 744 EPSCA; 75 Society; and 19 management. These numbers fluctuate over the course of the year as the work program dictates.
h) JOINT AGENCY STRATEGY	Yes	Partnership in career awareness initiatives such as “TradeUp”. Leadership of the Electricity Sector Council as Board Chair. The ESC is committed to increasing the quantity of interested and qualified candidates for positions in the electricity sector across Canada. Leadership of the Canadian Electricity Association Human Resources Committee as Committee Chair. This committee is committed to being the voice of the human resources community in the electricity sector across Canada, and provides leadership in the full range of electricity sector human resources issues in the country. Leadership in the Conference Board Council of Human Resources Executives as an Executive Committee member. This organization is committed to upgrading and sharing best practices in the broad human resources community across Canada.

Source: Hydro-One Submission to the Ontario Agency Review Panel, October 2007

What the Ontario electricity agencies are doing: OPA

OPA	COMMITTEE LEVEL		EXPLANATORY NOTES
1) HR RESPONSIBILITY IN THE ORGANIZATION	Executive		HR Director Reports to VP Finance & Administration
2) TALENT MANAGEMENT PROGRAMS	ONGOING	PROGRAM / ACTIVITY RESULTS	
a) RECRUITMENT & SELECTION	Yes	Diversity-oriented hiring, restrained hiring from “sisters organizations”, preferred approach: “increase the pie to benefit the whole industry”.	
b) PERFORMANCE MANAGEMENT	Yes	Performance management process introduced in 2007.	
c) SUCCESSION PLANNING	Yes	Annual review for CEO, Executive and direct reports	
d) LEADERSHIP DEVELOPMENT	Yes	Part of performance management and career development process	
e) EMPLOYEE ENGAGEMENT	Yes	Employee survey.	
f) TRAINING & DEVELOPMENT	Yes	Part of performance management and career development process.	
g) CONTINGENT WORKFORCE	No	Not applicable.	
h) JOINT AGENCY STRATEGY	Yes	Informal arrangements exploring rotations and secondments for career and industry development purposes.	

Source: OPA Submission to the Ontario Agency Review Panel, October 2007

What the Ontario electricity agencies are doing: IESO

IESO	COMMITTEE LEVEL	
1) HR RESPONSIBILITY	Human Resources & Governance Committee	
2) TALENT MANAGEMENT PROGRAMS	ONGOING	PROGRAM / ACTIVITY RESULTS
a) RECRUITMENT & SELECTION	Yes	Co-op programs (recognized by NERC), on-line search and web-based programs capturing world-wide resumes, employer branding (U of Waterloo, Toronto, McMaster, Western, Mohawk College, Durham College, Sheridan College), orientation and on-boarding.
b) PERFORMANCE MANAGEMENT	Yes	Performance Assessments conducted yearly. Management Group and PWU staff have performance contracts in place which is linked with a variable compensation plan. The contracts are linked to corporate goals and objectives.
c) SUCCESSION PLANNING	Yes	Activities in place since 2003. They have received increased focus in 2007 with implementation of a succession planning framework/ strategy. Activities for 2007 include position profiles for bands 1-3, identification of potential successors and competency gap analysis, and development plans for identified successors. In addition, developmental positions have been identified as opportunities for “active learning” for selected potential successors.
d) LEADERSHIP DEVELOPMENT	Yes	The IESO has engaged in a series of Leadership development programs aimed at building a “Community of Leaders” across the Management Team. The first session in 2004 provided Vice Presidents with feedback on a Culture Survey; in 2005 the session focused on individual 360 Feedback, Personality Type (Myers Briggs Type II) and Change Style. In 2006 the session provided Management with follow-up on Departmental action plans, analysis of Conflict Handling Preferences and feedback on Preferred Styles for Interaction. The continuum for leadership development for 2007 is focused on coaching.
e) EMPLOYEE ENGAGEMENT	Yes	In January 2007, the IESO conducted its first Employee Engagement Survey in order to measure current levels of engagement and assess a comprehensive set of workplace practices. The results of the survey were very positive compared to the identified benchmark data for the Canadian workforce and that of North American Utilities. The survey results indicate that one of the top drives for engagement at IESO is that employees feel the work they are currently doing is meaningful to them. Other positive elements include IESO having a reputation as a good employer and having opportunities to learn, grow and advance on the job.
f) TRAINING & DEVELOPMENT	Yes	External secondments /exchanges such as: <ul style="list-style-type: none"> ▪ Exchange agreement with The Ontario Energy Board's Regulatory Policy Development business unit. ▪ Exchange agreement with “The Australian Energy Regulator” (AER). ▪ Ontario Government assignment in May-November, 2004 for two Directors. ▪ Secondments in our Legal department with various law firms.
g) CONTINGENT WORKFORCE	Yes	Temporary Employees – 24 / Contractors (non-employees) – 6

What the Ontario electricity agencies are doing: OPG (1)

OPG	COMMITTEE LEVEL		EXPLANATORY NOTES
1) HR RESPONSIBILITY	Executive		Senior Vice-President – Human Resources reports to President and CEO, and is a member of the Executive Committee
2) TALENT MANAGEMENT PROGRAMS	ONGOING	PROGRAM / ACTIVITY RESULTS	
a) RECRUITMENT & SELECTION	Yes	<p>Employer Branding: 4th amongst 30,000 college & university students; Targeting Youth: “TradeUp”, Passport to Prosperity, & Words on Work, Passport to Safety, Learning Zone; Partnering with education: UOIT, UNENE, Scholarship, Universities and Colleges; Reach-out Programs: foreign-trained workers, aboriginal, disabilities, women, etc.; Gold Award for Workplace Safety excellence; Young Worker Safety; Employee Ambassador program/community outreach; active student program; popular Engineering internship program.</p> <p>Excellent response rate to external job advertisements; excellent acceptance rate to external job offers.</p> <p>Enhanced employee orientation program.</p> <p>OPG has been named as one of Canada’s Top 100 Employers for 2008 for the first time and one of Greater Toronto’s Top 50 Employers for the second year in a row.</p>	
b) PERFORMANCE MANAGEMENT	Yes	<p>The foundation of performance management is OPG’s performance planning and review process (PPR). The process is an ongoing, cooperative process between the manager and employee.</p> <p>OPG will be reviewing opportunities in 2008 to further improve the effectiveness of performance management.</p>	
c) SUCCESSION PLANNING	Yes	<p>Report released in February 2006 provided a comprehensive framework for succession planning and management. Following actions were taken to address issues.</p> <ul style="list-style-type: none"> ▪ Determination of critical leadership positions ▪ Identification of succession candidates for two levels below the President ▪ Development plans for succession candidates ▪ Succession plan has been used as first source for filling vacant critical leadership positions. ▪ Introduction of Succession Measures ▪ Cascading the succession management process in Business Units ▪ Addition of Development Planning Tools to support managers on OPG Intranet ▪ 2007 Corporate Scorecard strategic initiative to have succession plans for critical roles. ▪ Use of an external Assessment Centre to strengthen leadership development planning for high potential candidates -- pilot conducted in late June 2007 	
d) LEADERSHIP DEVELOPMENT	Yes	<p>See above. Additional actions:</p> <ul style="list-style-type: none"> ▪ OPG Leadership Model and Framework has been developed and endorsed ; model being implemented across the organization ▪ A focus on individual development planning integrated with succession management. Development planning targeted to individual needs (i.e., cross-functional move, project assignment, specialized education, etc.) ▪ Ongoing first line manager/supervisory development and training programs in all the businesses and functions. High response rate. 	

What the Ontario electricity agencies are doing: OPG (2)

TALENT MANAGEMENT PROGRAM	ONGOING	PROGRAM ACTIVITY / RESULTS
e) TRAINING & DEVELOPMENT	Yes	<p>In 2006, significant internal training was delivered to employees in OPG. OPG offers employees more than 12 major training courses and about 2400 individual courses. 11,500 employees are employed by OPG representing more than 30 job families, with each family requiring different skills, knowledge and expertise. Unique features in our training include: Computer Based Training (CBT), Computer-Assisted Learning (CAL) frameworks, desktop simulators, and custom applications designed to support learning.</p> <p>On average, employees in nuclear, fossil and hydro receive 13 days a year of training and development. That time may be spent on work-based skills training or professional development, or a combination of the two. Some positions require extensive training, such as control room operators and shift supervisors who require seven years of training to qualify to perform the job. On an annual basis, certified staff requires a minimum of 200 hours of training per year to maintain licences.</p> <p>Other approaches supporting training and development include: individual development planning; internal opportunities for job rotations; mentoring; a tuition reimbursement program.</p>
f) CONTINGENT WORKFORCE	Yes	In 2006, on average, over 600 people were hired from the Building Trade Unions (BTU) Hiring Hall.
g) JOINT AGENCY STRATEGY	Yes	<p>Partnership in career awareness initiatives such as:</p> <ul style="list-style-type: none"> ▪ "TradeUp ▪ Participation in Electricity Sector Council ▪ Participation on CEA and its subcommittees ▪ Sponsor of Women in Nuclear (WiN), Durham Chapter ▪ Involvement with Aboriginal Human Resource Development Council of Canada ▪ Participation on the Minister's Roundtable on Improving Employment Opportunities for People with Disabilities ▪ Participation and sponsorship of Women in Engineering Study (barriers – opportunities) ▪ Program participants in the Mentoring Partnership (under TRIEC) and Council for Access to the Profession of Engineering (CAPE); both organizations support foreign trained workers ▪ Support to and job posting through NEADS (National Educational Association of Disabled Students) ▪ Continuing subscription to EQUITEK (broadcasts our external job advertisements through to a wide outreach network of diverse carer organizations representing individuals from all designated groups) ▪ The Learning Partnership – OPG is involved in a variety of programs under this umbrella such as Passport to Prosperity, Words on Work, Turning Points, Take our Kids to Work.

Source: OPG Submission to the Ontario Agency Review Panel, October 2007

PART II.

Promising Practices in the Energy Sector

Labour Solutions

- ❖ **In Ontario, the Power Workers Union's Hiring Hall provides a structured means for companies to hire workers, including recent retirees, on a temporary basis, at a lower cost than commercial agencies:**
 - Wage rates are negotiated to be competitive and cost effective within current union contracts;
 - Many employees (including those that have retired from the sector) are already security cleared and trained within one of the participating companies; Bruce Power, OPG or Hydro One. Employers know the safety and training profile of the individuals available.

- ❖ **A report by the Ontario Chamber of Commerce "Retooling for a Prosperous Ontario – A Global Perspective on Skilled Trades", dated October 2006, spells out promising practices for the trades:**
 - A strategic marketing campaign to enhance their image (negative attitudes among youth are a major deterrent on pursuing apprenticeships) and re-branding of apprenticeship training;
 - A "one-stop shop" approach to provision of information on apprenticeships;
 - Elimination of red tape; and
 - Elimination of barriers for internationally trained skilled workers.

Ontario is a Partnership Leader

- ❖ Bruce Power, OPG, Hydro One and the Power Workers union have partnered in a career awareness initiative called 'Trade Up', www.tradeup.ca:
 - Educational kits have been placed in all high schools, identifying opportunities in the industry;
 - 'Trade Up' provides an opportunity for employers to promote their own trade or occupation to youth and for youth to gain greater understanding of the opportunities.
- ❖ Hydro One has established relationships with both colleges and universities providing scholarships, internships, research and development contracts, support to capital equipment purchases and, assisting in curriculum development.
- ❖ OPG has developed an industry profile as a leader in recruitment, placing 4th in a national survey of engineering students.
- ❖ The Canada Wide Science Fair program is another initiative through which youth can get valuable exposure to the sciences. OPG is a sponsor.
- ❖ In Canada, George Brown College's Tech in the City competition provides a year's college tuition to the winner, who must design something using mechanical skills. This contest promotes the trades and helps to attract students.

UNENE: an important partnership for Ontario

- ❖ The University Network of Excellence in Nuclear Engineering (UNENE) is an alliance of universities, nuclear power utilities, research and regulatory agencies for the support and development of nuclear education, research and development capability in Canadian universities:
 - The main purpose of UNENE is to assure a sustainable supply of qualified nuclear engineers and scientists to meet the current and future needs of the Canadian nuclear industry through university education, university-based training and by encouraging young people to choose nuclear careers.
 - The primary means of doing this are to establish new nuclear professorships in six Ontario universities and to enhance funding for nuclear research in selected universities in order to retain and sustain nuclear capability in the universities. The Network will organize and deliver through its universities educational programs appropriate to students planning to enter the industry and to those already employed.
 - Funding is provided by both industry and government and supports the development of talent in the nuclear industry.

Succession Planning in Ontario

- ❖ Succession planning is a systematic approach to develop internal talent. Most firms use this capability to develop leadership talent, few use it for developing talent in critical and scarce skills.
- ❖ For OPG, succession planning is a priority based on two key challenges it will face over the next decade: meeting the growing demand for electricity, and replenishing up to 50% of its knowledge-based, skilled workers that are expected to retire in this time period.
- ❖ Direct Energy, a Canadian firm, has a comprehensive corporation-wide employee database “Map your Career” which allows for automated personnel evaluation and talent management:
 - All employees have a skills profile on the system;
 - Computerized searches can identify employees with specific skills;
 - Some staff have found themselves being offered a promotion for positions they did not even know were available;
 - An automated talent management system supports the identification and development of internal talent.

Building Your Own Supply Chain: Hydro-Québec

- ❖ In 2001, a partnership between Hydro-Québec and six Québec-based universities created the « Institute for Electrical Power Engineering »:
 - HQ provided \$4 million start-up funds to guarantee the necessary capital and equipment is purchased for all participating institutions;
 - Funds have since been leveraged with additional monies from the Canada Foundation for Innovation (CFI) to ensure power engineering graduate studies is an option for students;
 - The Institute was designed to pool scarce human and financial resources, reduce redundancies, and promote concerted action in universities and industry;
 - In the fourth year of undergraduate studies, up to 50 students come together to access common teaching and laboratory resources; each university provides up to two faculty members and input into the design of the common fourth-year of study;
 - Additional industry partners provide scholarships and aid to students and participate in the design of curriculum.

Expanding Through Diversity in Canada

- ❖ Manitoba Hydro and the Manitoba Métis Fédération have signed a memorandum of understanding to increase recruitment from the Métis community:
 - Manitoba Hydro has a pre-apprenticeship program for Aboriginal peoples to facilitate experience in 3 different industry trades.
- ❖ In Newfoundland and Labrador, Husky Energy has developed the 'White Rose Project' to expand diversity within the workforce;
- ❖ Enbridge has formalized its 'Women@Enbridge Community' which focuses on leadership development for women.
- ❖ The nuclear industry is subject to an employment equity audit at the federal level*; however, data comparators are challenging.

** which assesses whether an employer is taking the necessary steps to identify, correct or eliminate the effects of employment discrimination, intentional or otherwise, on the four designated groups: women, Aboriginal peoples, persons with disabilities and members of visible minorities*

A Success Story in Workforce Planning: Valero Energy (U.S.)

- ❖ Valero Energy Corporation is a Fortune 500 company based in San Antonio, Texas. It is the largest refiner in North America, with approximately 21,000 employees and assets valued at \$38 billion.
- ❖ Company was able to grow from a small to a large international company over a six-year period by changing the focus of its HR approach from reactive day-to-day administration to more strategic long-term planning in close collaboration with senior management:
 - Process included mapping every component of the recruitment process, purchasing a hiring management system, performing a labour gap and needs analysis, and developing a “labour supply chain” which linked HR’s business with the corporate and business unit plans and assigned quantifiable values to the company’s human capital (e.g., in a project with five engineers which earns \$200 million in revenue per year, each engineer has a value of \$40 million per year).

Another Success Story: Tennessee Valley Authority (U.S.)

- ❖ Tennessee Valley Authority, a major US firm with thermal and nuclear generating facilities, uses multidimensional metric sheets for managing talent:
 - Metrics include: talent flow into and out of the business, trending against recruitment targets, risk assessment for critical or scarce skills moving to retirement, and succession planning capability;
 - Critical to this work is the use of accountability measures to ensure usage of the capability.
- ❖ TVA's three-step process captures the undocumented knowledge of employees nearing retirement:
 - identifies endangered knowledge and skills;
 - evaluates the risk associated with losing them and focuses on high-risk areas;
 - implements measures for managing this risk, including documentation, mentoring, training, and so forth.
- ❖ From this, TVA created a Work Force Planning Program that includes recruiting initiatives, a training pipeline, a knowledge retention program, and planning for key leadership succession.

Attracting Women: a European Goal

- ❖ “*The Impact of Restructuring on Women in the Electricity Industry*”, a report prepared for several European organizations, highlights a number of promising practices with respect to recruiting and retaining female workers:
 - Opportunities for part-time work;
 - Flexible scheduling; training and part-time work opportunities during maternity leave;
 - Mentoring;
 - Childcare assistance;
 - Training to overcome prejudice against women;
 - Career development training for women.

Revamping the Image: Company Branding Examples

- ❖ The global electricity sector has an image problem: viewed as conservative, outmoded, not “sexy”, low tech, bureaucratic, slow moving, and its advantages in terms of compensation and working conditions are not widely known.
- ❖ Industry should emphasize that electricity offers secure, well-paid careers (not just jobs) and that working conditions have evolved, with new technologies and ergonomic tools to ease workers’ tasks.
- ❖ Involvement in the community and investment in renewable energies could improve the image of the industry:
 - In Australia, the EE-Oz network is attempting to re-brand the national industry by means of a marketing campaign featuring a new high-tech logo, an updated website, new brochures for itself and its partners;
 - The Australian Power Institute has produced a promotional DVD/video demonstrating how power engineers can make a difference in society.

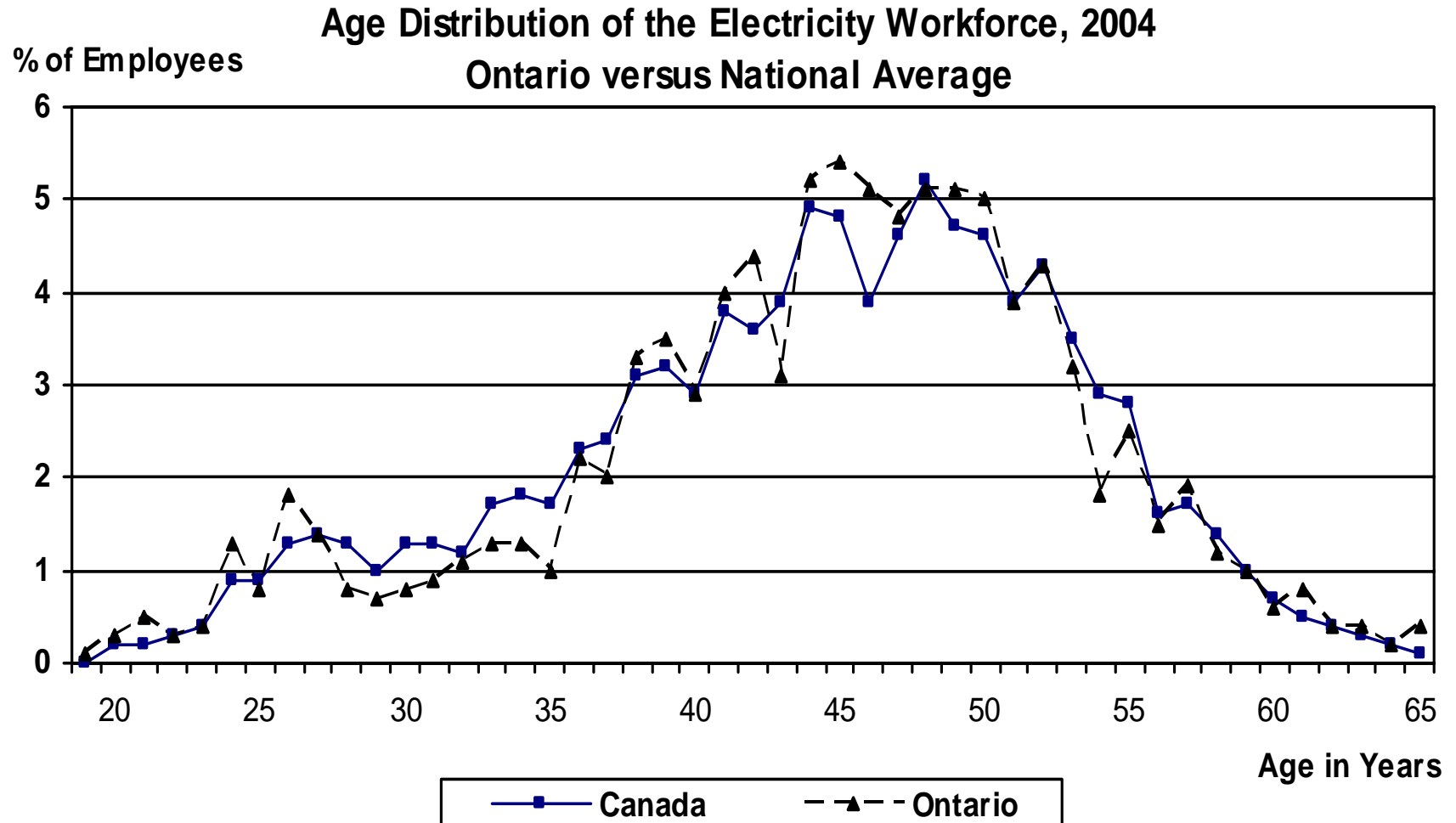
Supporting Education Initiatives

- ❖ To ensure an adequate pool of labour in the future, it is necessary to develop initiatives which foster math and science at primary and secondary school levels.
- ❖ The electricity sector may be able to partner with other groups which share this goal; in the U.K., for example, the Science, Engineering, Technology, and Math (STEM) program is a national initiative to ensure that sufficient numbers of students have high math and science skills to supply future labour force needs:
 - Competitions and scholarships for high school students sponsored by the electricity industry are promising avenues. In the U.K., the Engineering Education Partnership, run in collaboration with local schools, provides an opportunity for high school students to compete on an engineering-related project;
 - In North America, NASA and Honeywell International have developed an interactive show that combines hip-hop dancing, music and videos to inspire the minds of future scientists. To date, it has been shown to more than 140,000 students and teachers at 339 schools in Canada and the U.S.

PART III.

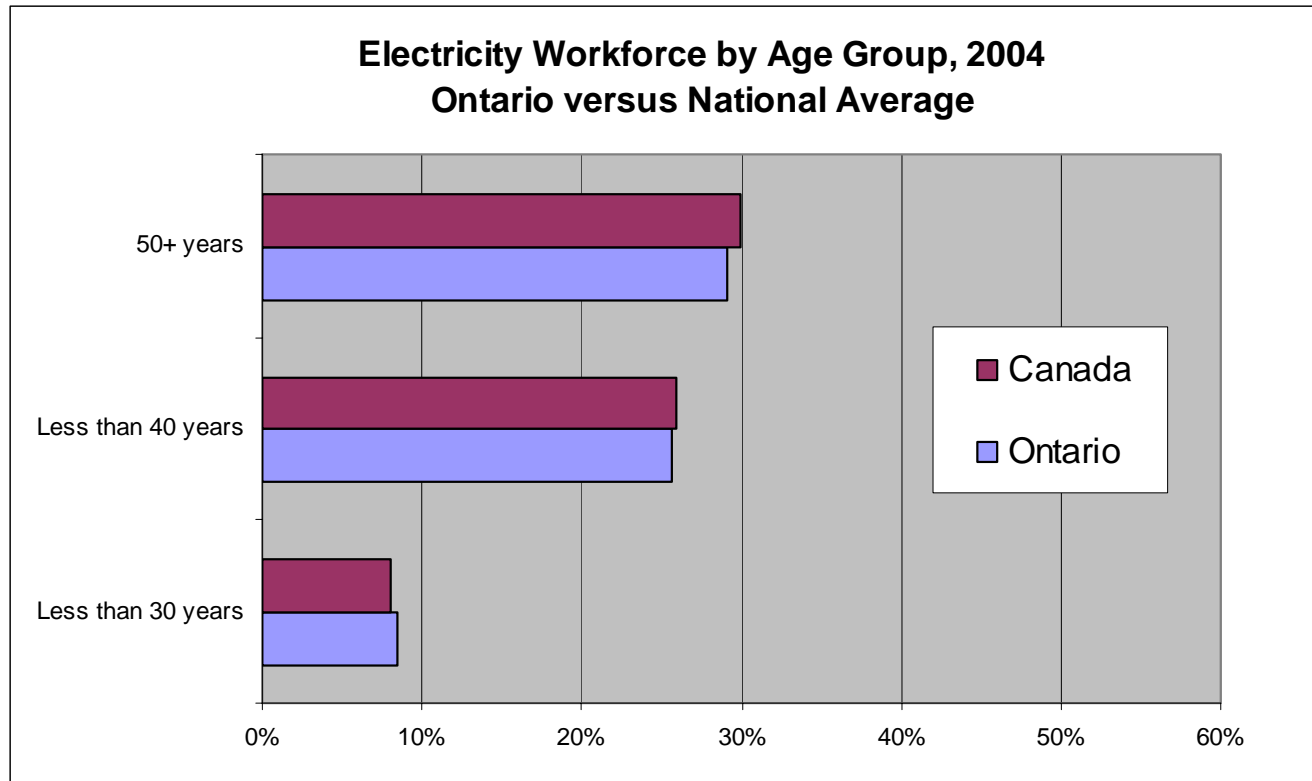
Data and Statistics

Average age in 2004: 44.4 years for Ontario versus 44.1 years for Canada



Source: 2004 CEA Study Employee Survey (n=3,514; for Ontario n=1,201)

Based on a retirement age at 56, 30% might have retired in next 3 years



Source: 2004 CEA Study Employee Survey (n=3,514; Ontario n=1,201)

Power Line Workers have highest tenure* next to Management

**Employees Age and Tenure by Key Occupation, 2004
Ontario versus National Average (in Years)**

Characteristic	Ontario		Canada	
	Age	Tenure	Age	Tenure
Trades (All Trades)	43.9	20.2	44.3	21.0
Power System Electrician	42.4	19.4	42.4	19.4
Power Line Worker	43.9	22.0	44.7	22.8
Engineers (All Engineers)	42.3	15.7	42.3	16.4
Electrical Electronics Engineers	39.6	14.1	40.8	15.2
Utilities Managers and Supervisors	47.3	23.5	47.8	23.6
Corporate and Support	44.8	16.0	43.1	14.0
Average for All Occupations	44.4	19.4	44.1	18.7

Source: 2004 CEA Study Employee Survey

* Average number of years employed in the electricity sector.

Ontario's workforce generally mirrored national average

Demographic Characteristics of the Electricity Workforce, 2004 Ontario versus the Rest of Canada and Canada

Characteristic	Ontario	Rest of Canada	Canada
Number of Employees in Sample	1,201	2,313	3,514
<u>Employee Profile:</u>			
Average age (in years)	44.4	44.0	44.1
Years employed in sector	19.4	18.3	18.7
Years employed with current employer	16.7	15.7	16.0
Average # of hours worked per week	40.7	40.8	40.7
% Working full-time	96.5%	95.8%	96.0%
% Regular position	96.0%	96.5%	96.3%
% Of employees <30 years	8.4%	7.7%	8.0%
% Of employees <40 years	25.7%	29.0%	27.9%
% Of employees 50+ years	29.1%	30.3%	29.9%
% Female	17.7%	21.8%	20.4%
% Aboriginal	2.2%	2.3%	2.3%
% Visible minority	8.8%	4.6%	6.0%
% Disability	2.4%	2.1%	2.2%
<u>Education:</u>			
% With high school or less education	24.1%	16.4%	19.1%
% With technical/ apprenticeship/vocational certificate	24.0%	34.7%	31.0%
% With college diploma	24.1%	20.9%	22.0%
% With university degree or higher	24.1%	26.9%	25.3%

Source: 2004 CEA Study employee Survey

Highest average age in generation; highest average tenure in transmission

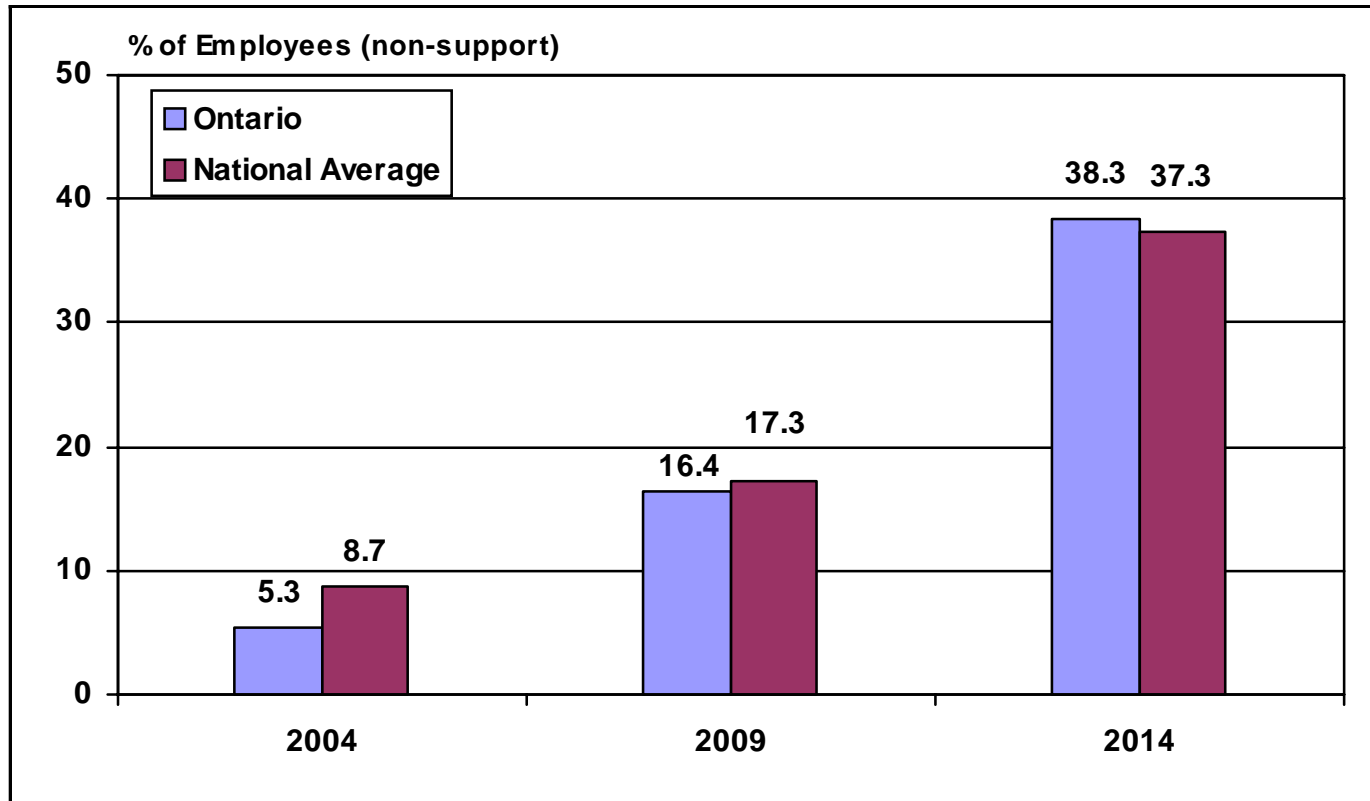
Employee Characteristics by Line of Business, 2004 Ontario versus National Average

Characteristic	Ontario (n=1,201)	Canada (n= 3,514)
Average Age of Employee		
Generation	48.1	48.1
Transmission	45.0	44.4
Distribution	42.9	42.8
Integrated	n/a	44.5
Other	n/a	38.6
Overall	44.4	44.1
Average Number of Years Employed in the Electricity Sector		
Generation	19.7	19.7
Transmission	21.5	20.1
Distribution	17.9	17.6
Integrated	N/A	18.9
Other	N/A	9.5
Overall	19.4	18.7

Source: 2004 CEA Study Employee Survey

Almost 4 out of 10 eligible for undiscounted pension over 10-year period

Proportion of 2004 Employees* Eligible to Retire Ontario versus National Average



Source: 2004 CEA Study Producer and Associate Producer Survey (n=63)

* Excluding support staff

Based on historical uptake, at least 3 out of 4 will retire on eligibility date

Proportion of 2004 Employees* Estimated to Retire By Line of Business

Business Line	Estimated # to Retire within Next 5 Years (to 2009)		Estimated # to Retire within Next 10 Years (to 2014)	
	Ontario	National Average	Ontario	National Average
Generation	12.0%	12.3%	11.5%	24.3%
Transmission	37.2%	34.5%	59.9%	55.1%
Distribution	7.5%	8.3%	16.5%	16.6%
Integrated**	n/a	16.3%	n/a	35.4%
Total	14.1%	15.5%	26.1%	29.6%

Source: 2004 CEA Study Primary Producer and Associate Producer Survey (n=63); not all producers provided data concerning retirement

* Excluding support staff

** Only one employer provided data in this category for Ontario, thus data is not provided

16.4% of 2004 employees said they will leave the business by 2009

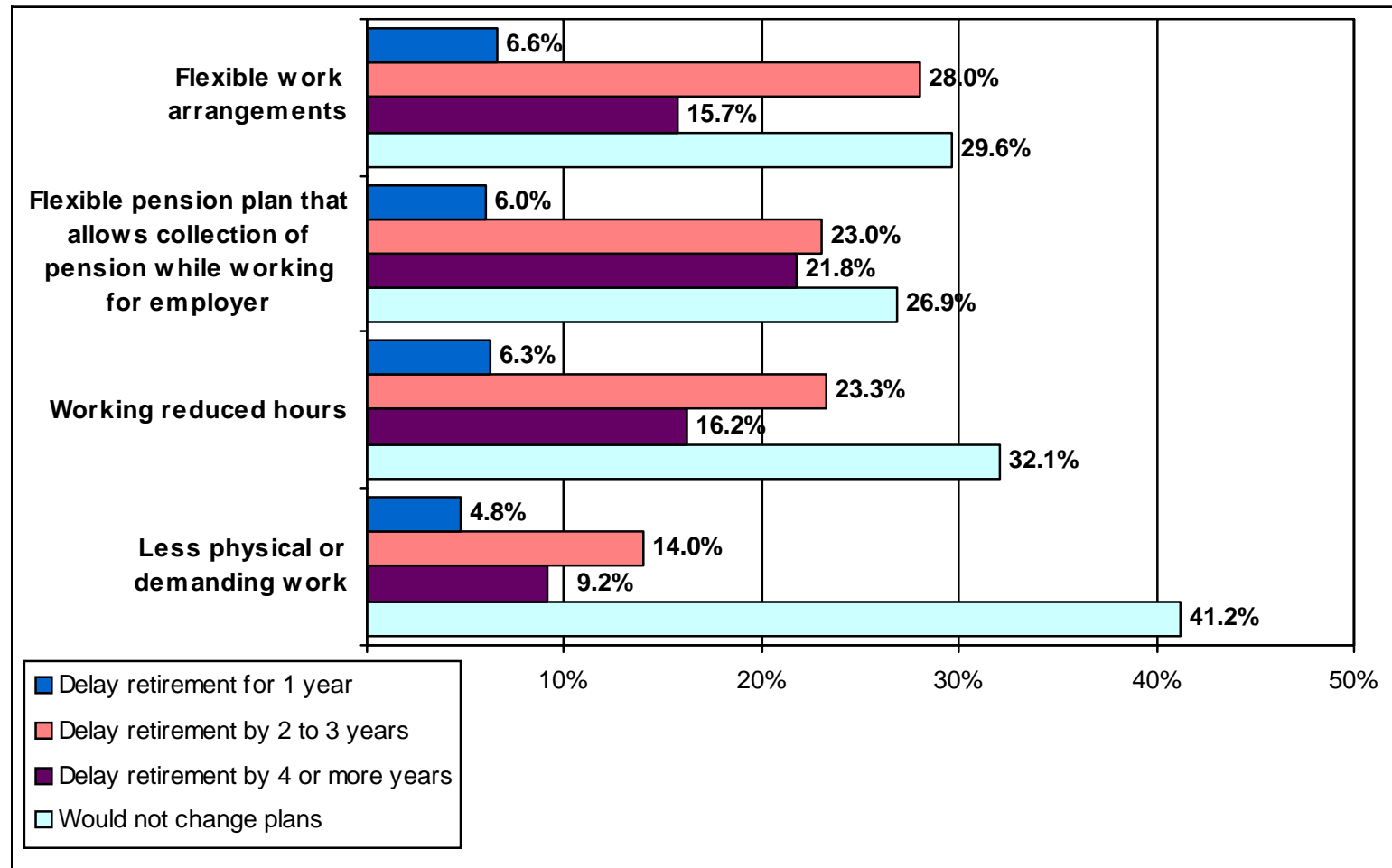
Future Plans of Employees (next 5 years – to 2009) Ontario versus National Average

Statement	Ontario	Canada
Working at the same/higher job <u>within</u> organization	68.1%	66.4%
Working at the same/higher job <u>outside</u> of the organization (but in the electricity sector)	6.8%	6.7%
Working outside of the electricity sector	3.1%	4.1%
Retired	13.3%	13.8%
Other/Don't Know/No Response	8.7%	9.0%
% definitely leaving organization (combined responses)	23.2%	24.6%
% definitely leaving electricity sector (combined responses)	16.4%	17.9%

Source: 2004 CEA Study Employee Survey

Flexible work or flexible pension might keep them ...

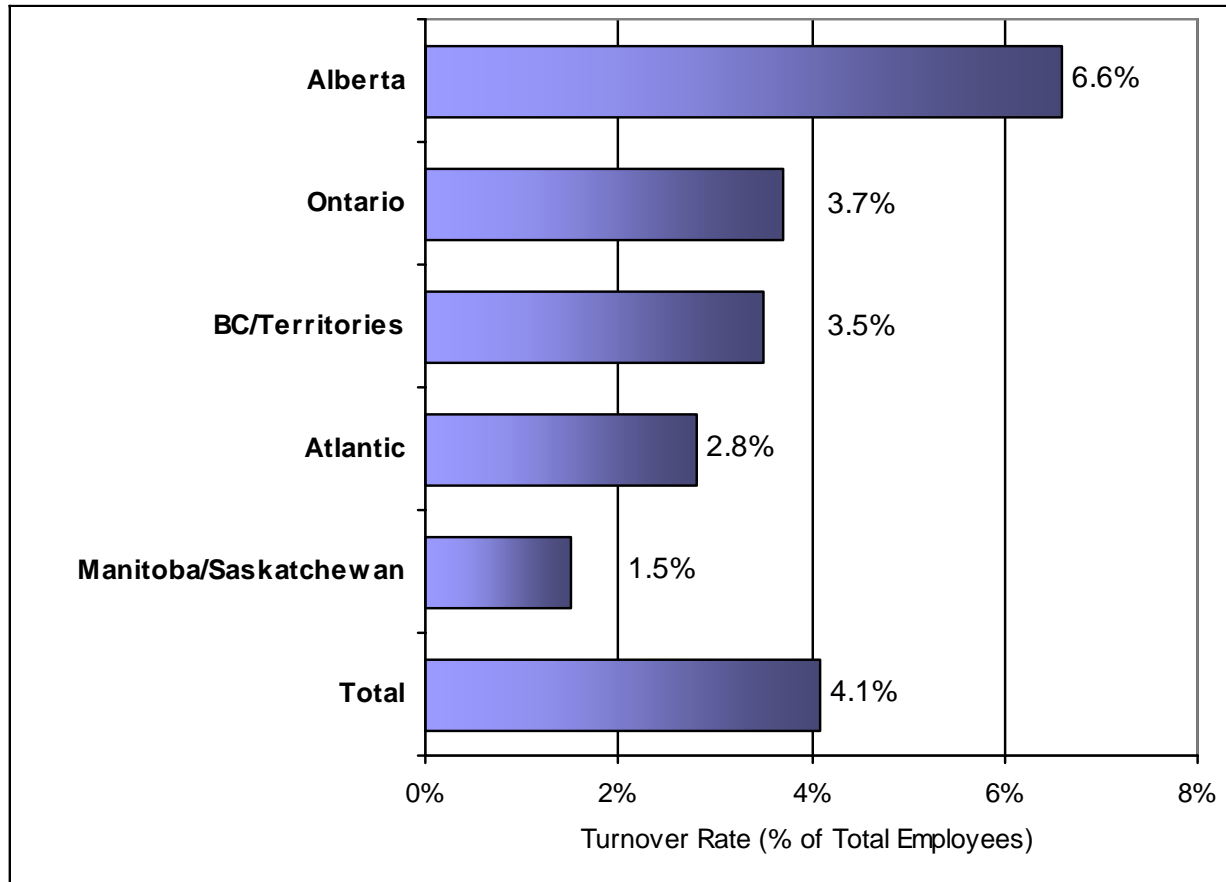
Potential Accommodations – Effect on Retirement Plans Ontario Region



Source: 2004 CEA Study Employee Survey

Ontario turnover is low, the majority that leave are Retirees*

Voluntary Turnover by Region (including retirements, on an annual basis)



Source: 2004 CEA Study Employee Survey

*Note: A detailed breakdown of those who leave the industry in Ontario show that they are retirees

One of the most highly unionized provinces

Average Percentage of 2004 Employees* Belonging to a Union by Region

Region	%
Manitoba/Saskatchewan	90.7%
Ontario	86.8%
British Columbia	70.8%
Alberta	67.6%
Atlantic	58.5%
Average	81.8%

Source: Primary Producer and Associate Producer Survey (n=63)

Quebec was not displayed due to limited data available

* Excluding support staff

Based on Census data, Trades are largest share of electricity workforce

**Distribution of Electricity Workforce by Major Occupational Group
Ontario versus National Average (2001 Census)**

	Ontario		Canada	
	Number	% Share	Number	% Share
Managers/Supervisors	2,210	14.9%	5,015	14.4%
Engineers				
Electrical/Electronic	2,115	14.2%	4,755	13.7%
Mechanical	995	6.7%	1,800	5.2%
Engineering Technologists/Technicians	795	5.4%	2,700	7.8%
Total – Engineers	3,905	26.3%	9,255	26.6%
Trades				
Power System Electrician	1,090	7.3%	3,285	9.5%
Construction Millwright/Industrial Mechanic	715	4.8%	1,715	4.9%
Stationary Engineers	560	3.8%	1,230	3.5%
Industrial Instrument Tech/Mechanic	755	5.1%	1,075	3.1%
Power Systems and Power Station Operator	2,985	20.1%	5,600	16.1%
Power line Worker	2,630	17.7%	7,565	21.8%
Total Selected Trades	8,735	58.8%	20,470	58.4%
Total *	14,850	100.0%	34,740	100.0%

Source: Statistics Canada, 2001 Census

* Total excludes support/other positions

Years on the job to develop skills for the roles

Employee Estimate of the on-the-job Experience Required to Become Proficient in Their Position by Major Occupational Group

Group/Time	Ontario	Canada
Management		
< 1 year	7.7%	5.0%
1 to 2 years	10.3%	15.3%
3+ years	69.2%	68.5%
Average (years)	5.0 years	5.0 years
Trades (once certified)		
< 1 year	8.6%	7.2%
1 to 2 years	9.9%	10.9%
3+ years	70.4%	70.1%
Average (years)	4.9 years	5.0 years
Engineers		
< 1 year	8.6%	6.4%
1 to 2 years	23.5%	23.1%
3+ years	50.0%	53.3%
Average (years)	4.1 years	4.1 years
Corporate Support		
< 1 year	12.4%	12.5%
1 to 2 years	37.8%	44.8%
3+ years	27.0%	24.0%
Average (years)	2.3 years	2.3 years
Total – All Employees		
< 1 year	9.4%	8.2%
1 to 2 years	18.5%	22.8%
3+ years	57.%	54.3%
Average (years)	4.3 years	4.2 years

Source: 2004 CEA Study Employee Survey

Estimated Ontario supply/demand gap – low growth scenario

Group/Period	Average Annual Estimates	
	2005-2009	2010-2014
Current Total Workforce¹	27,717	27,717
Engineers	4,464	4,464
Trades/other non-support	18,253	18,253
Estimated Demand – Low Growth Scenario²		
Engineers	171	152
Trades/other nonsupport	697	621
Total	868	772
Estimated Supply³		
Engineers	20	21
Trades/other non-support	88	87
Total	108	108
Supply-Demand Gap⁴ (per year)		
Engineers	(151)	(131)
Trades/other non-support	(609)	(534)
Total	(760)	(665)
Total Projected Deficit (total for period)		
Engineers	755	655
Trades/other non-support	3,045	2,670
Total	3,800	3,325

¹ Total estimated workforce in electrical occupations based on employment data detailed in 2004 Survey of Employment, Payroll and Hours (SEPH), excludes support positions

² No additional employment growth required for demand increases or replacement requirements. Retirements based on organization estimate of likely retirements, not the proportion eligible for retirement.

³ Portion of graduates who secure employment in electricity sector upon graduation (same ratio as national average)

⁴ Difference between estimated demand and current education supply capacity.

Low Growth Scenario

- electricity demand continues to grow at 1.8%/year, worker productivity matches demand growth
- no additional workforce issues associated with the replacement of existing infrastructure
- estimates of retirement patterns based on Ontario employer estimates of actual retirements (14.1% - next 5 years; 26.1% - next 10 years)
- need to recruit to fill voluntary separations would be minimal (1%/year)
- electricity sector attracts 5% of engineering graduates and 8% of electricity-related trades/technical graduates; Ontario attracts a 30% share of all such graduates

Estimated Ontario supply/demand gap – high growth scenario

Group/Period	Average Annual Estimates	
	2005-2009	2010-2014
Current Total Workforce¹	23,167	23,115
Engineers	4,541	4,452
Trades/other non-support	18,567	18,573
Estimated Demand – High Growth Scenario²		
Engineers	194	243
Trades/other nonsupport	795	994
Total	989	1,237
Estimated Supply³		
Engineers	20	21
Trades/other non-support	88	87
Total	108	108
Supply-Demand Gap⁴ (per year)		
Engineers	(175)	(222)
Trades/other non-support	(707)	(906)
Total	(881)	(1,128)
Total Projected Deficit (total for period)		
Engineers	875	1,110
Trades/other non-support	3,535	4,530
Total	4,410	5,640

¹ Total estimated workforce in electrical occupations - Primary Producers and Associate Producers Survey, plus approximately 1.8% increase in required workforce year-over-year

² Additional employment growth estimated for demand increases and infrastructure replacement requirements and eligible retirements

³ Portion of graduates who secure employment in electricity sector upon graduation (same ratio as national average)

⁴ Difference between estimated demand and current education supply capacity.

High Growth Scenario

- electricity demand continues to grow at 1.8%/year, worker productivity does not match demand growth (0.8% difference)
- replacement infrastructure demands represents approximately 9% increase in the required workforce by 2010
- estimates of retirement patterns based on Ontario employer estimates of eligible retirements (16.4% - next 5 years; 38.3% - next 10 years)
- electricity sector attracts 5% of engineering graduates and 8% of electricity-related trades/technical graduates; Ontario attracts a 30% share of all such graduates

Ontario student survey: awareness of Trades

Total Sample Size: Parents n=2203, Students n=808

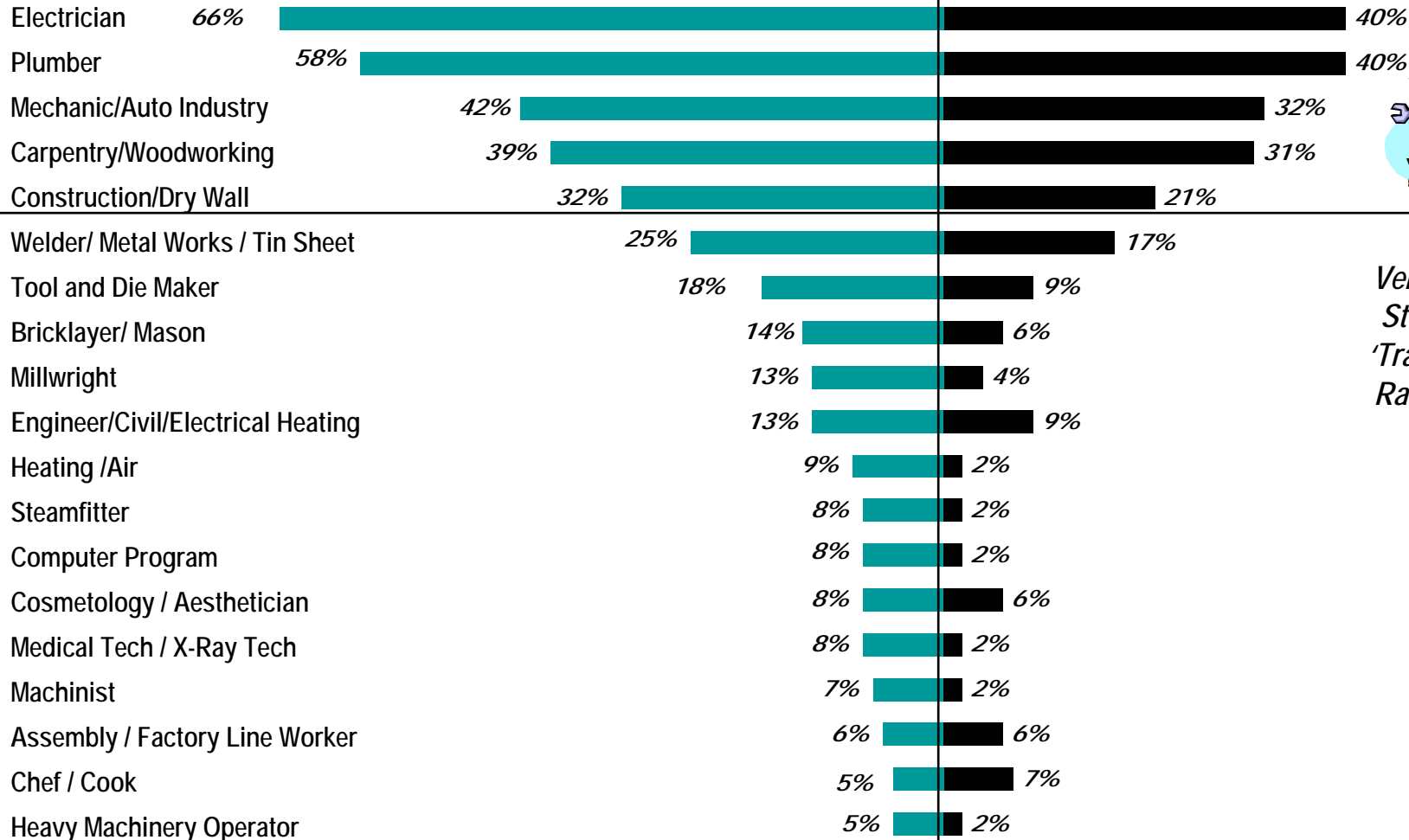
Joint survey by Recruitad for Ontario Hydro Successor Companies 2005

Professions Associated with Trades

(% Saying – Unaided Multiple Mentions)

Parents

Students



*Very Traditional
Stereotypes of
'Trades' are Top
Rated Mentions*

Power/ Nuclear/Hydro Line Worker

5% 2%

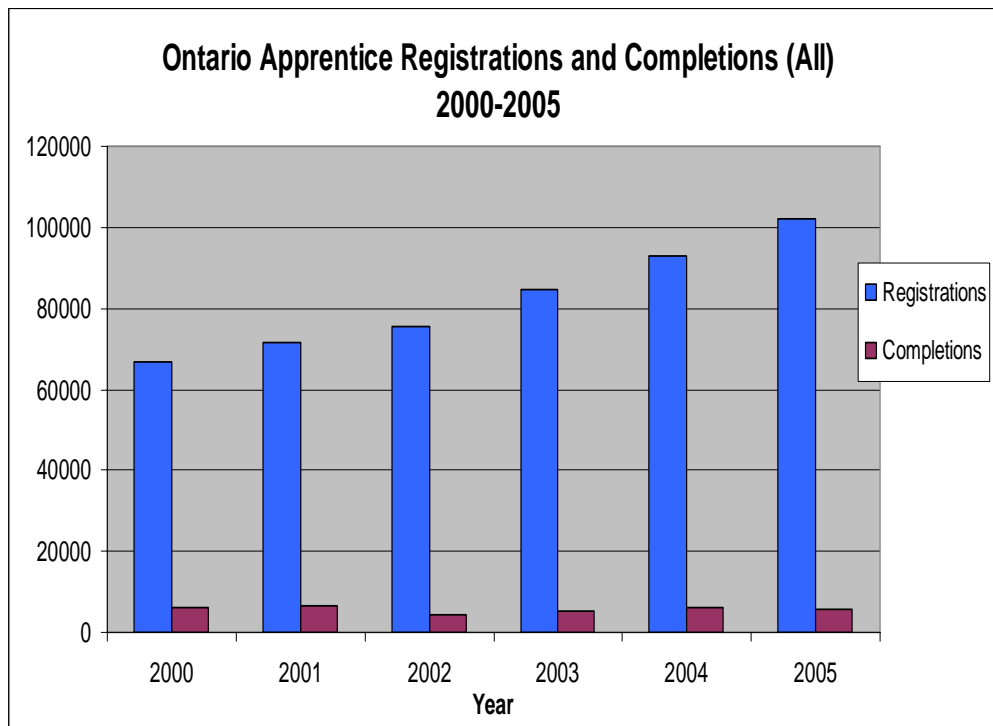
Low Association

Other / Don't Know

21%

A Canadian Challenge: Why a large # of non-completions?

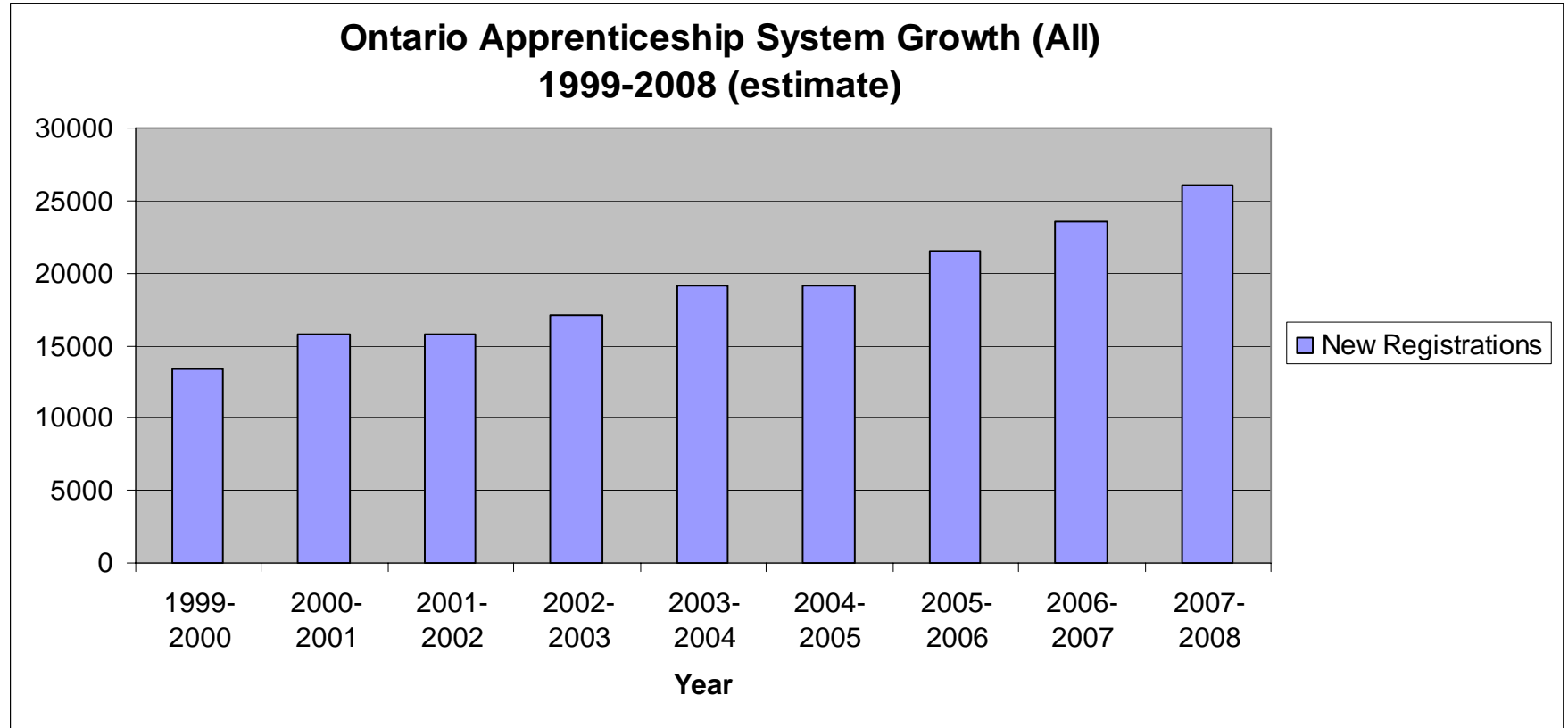
NOTES



Source: Ministry of Training, Colleges and Universities – August 2007

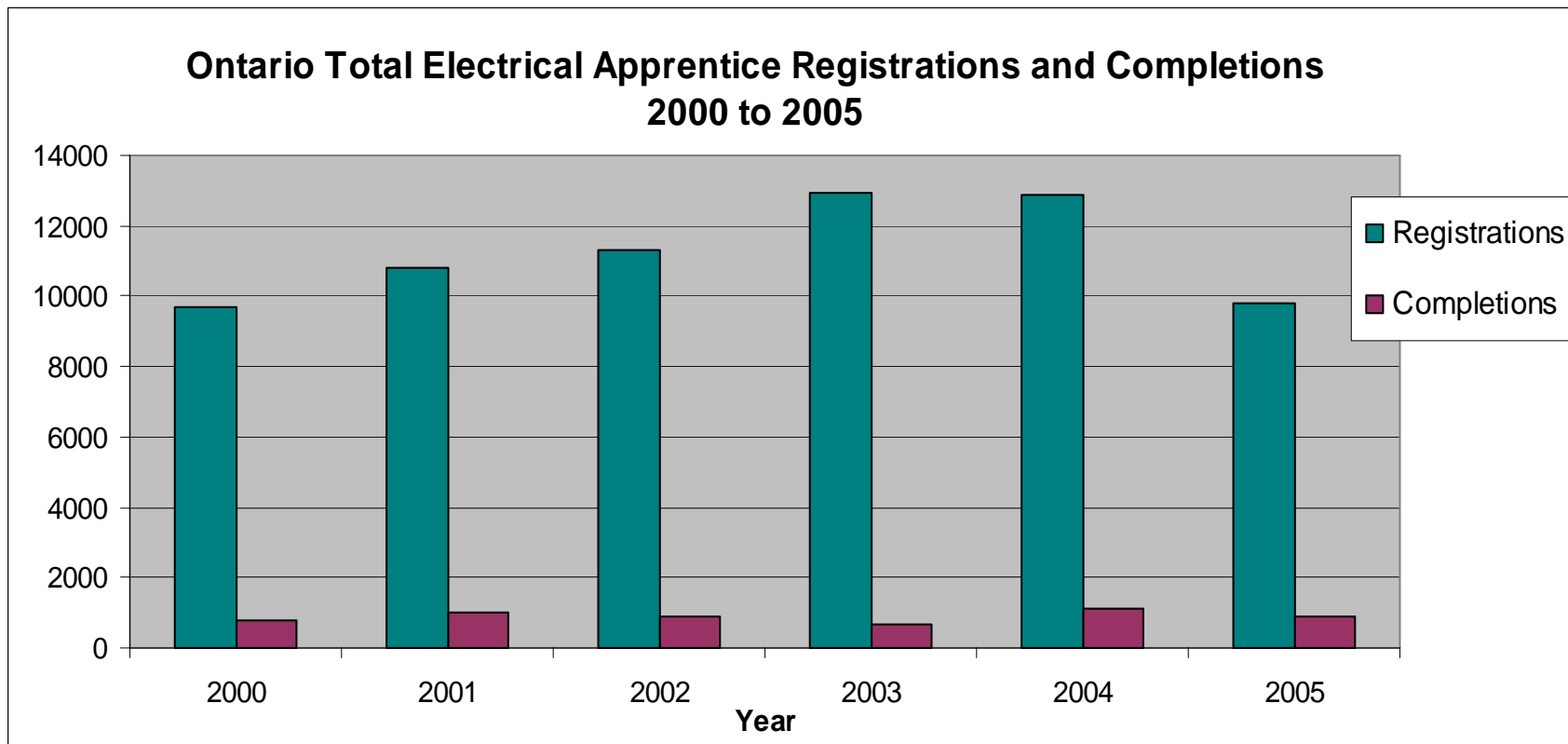
- Registrations are the total # of apprentices still pursuing their apprenticeship, or that have not completed their apprenticeship – “active apprentices”. Excludes drop-outs.
- Completions are the # of apprentices who have been issued a certificate of qualification of apprenticeship in a given year.
- Apprentice programs vary from 2 to 5 years. As illustrated, apprentices can remain active for more years than the program length, which is usually due to market conditions (by nature of their training, apprentices are in the labour market as well as in the educational system).
- In the spring of 2008, Statistic Canada will release the results of a National Apprenticeship Survey which objectives are:
 - To better understand why a large percentage of registered apprentices do not complete the program;
 - To better understand to what extent program completion affects the labour market outcome of journeymen;
 - To identify why some apprentices take much longer to complete the program than expected.

The bright side is the # of registrations is increasing



Source: Ministry of Training, Colleges and Universities – August 2007

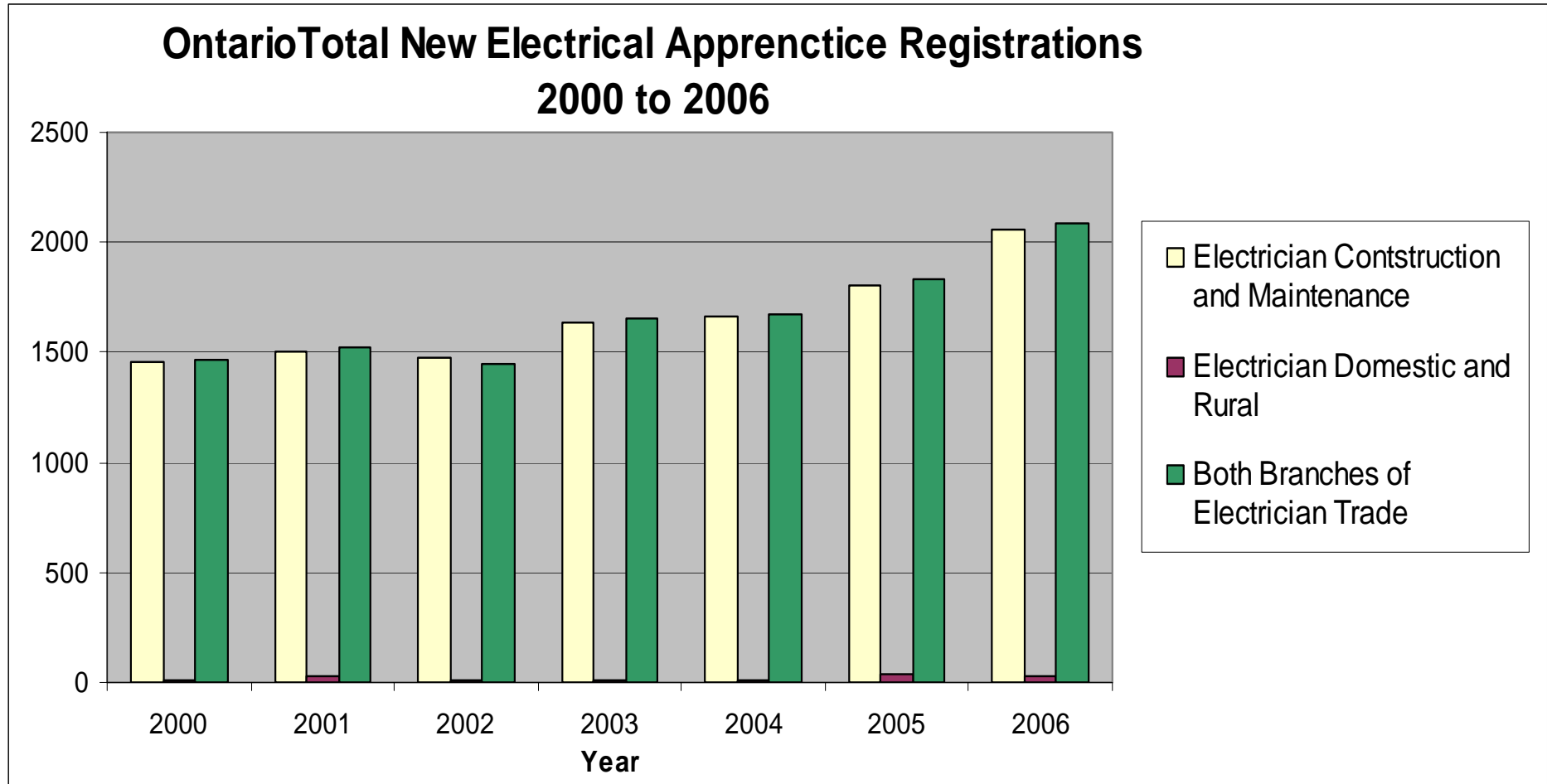
Statistics include construction & utilities electrical trades



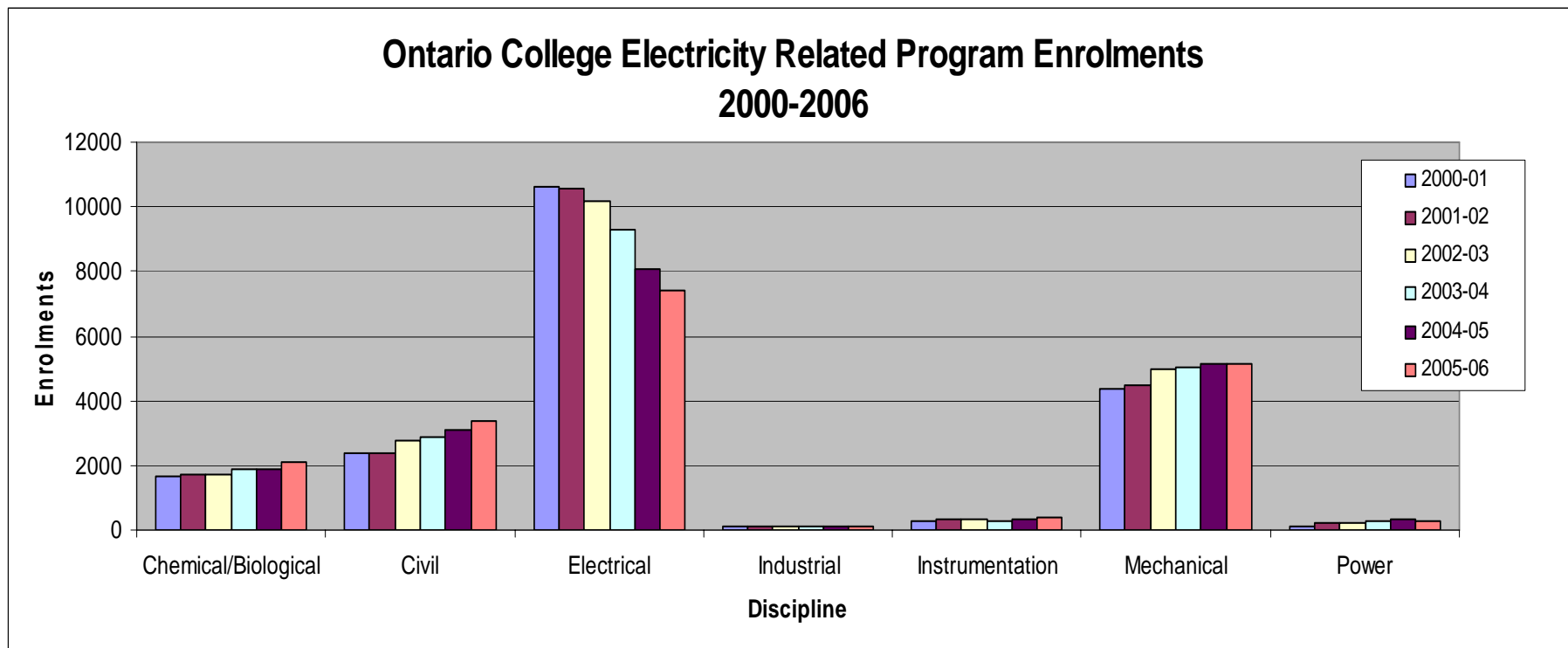
Sources: Statistics Canada's Registered Apprenticeship Information System; Ministry of Training, Colleges and Universities – August 2007

Note: Further breakdown of electrical apprenticeships between those seeking employment with utilities and those with the construction sector would show the former has better completion rates due to more stable working conditions.

Solid interest in the electrician trade, primarily construction

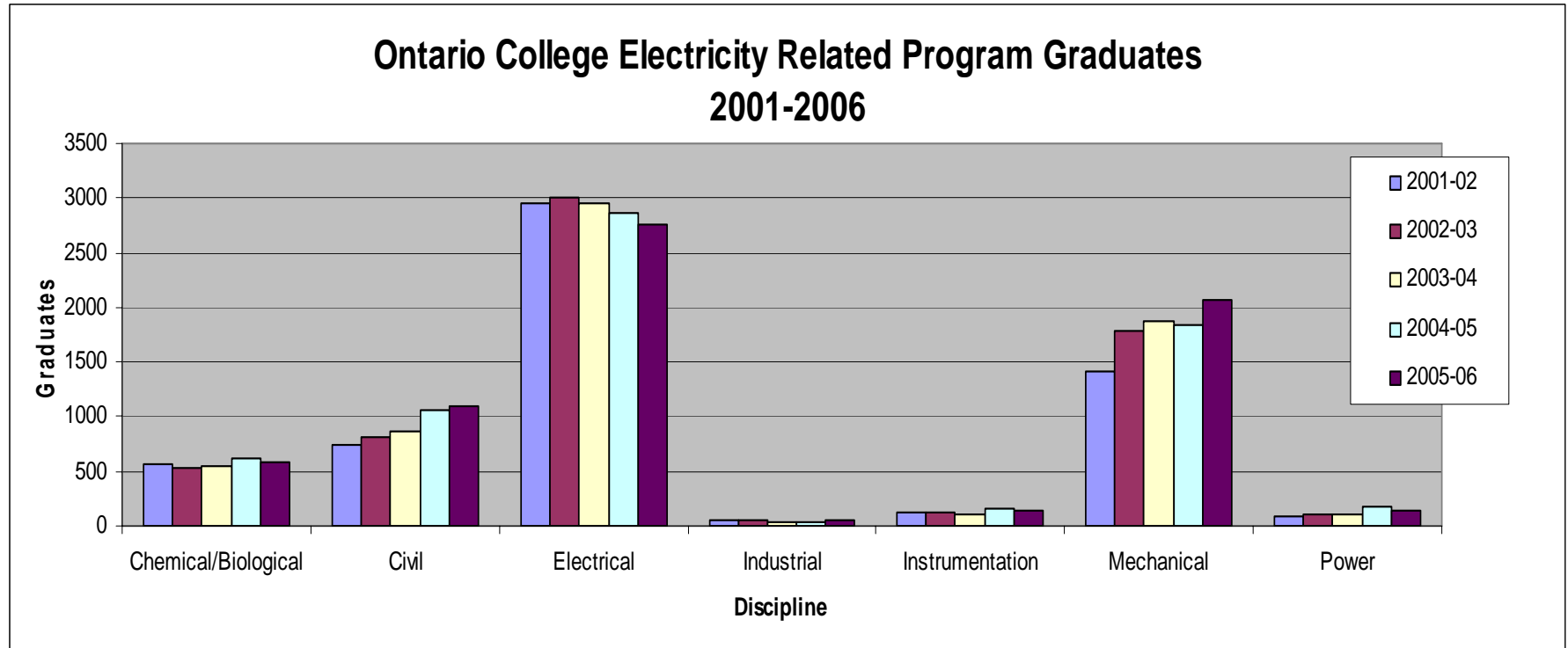


College enrolments steady but for the electrical program



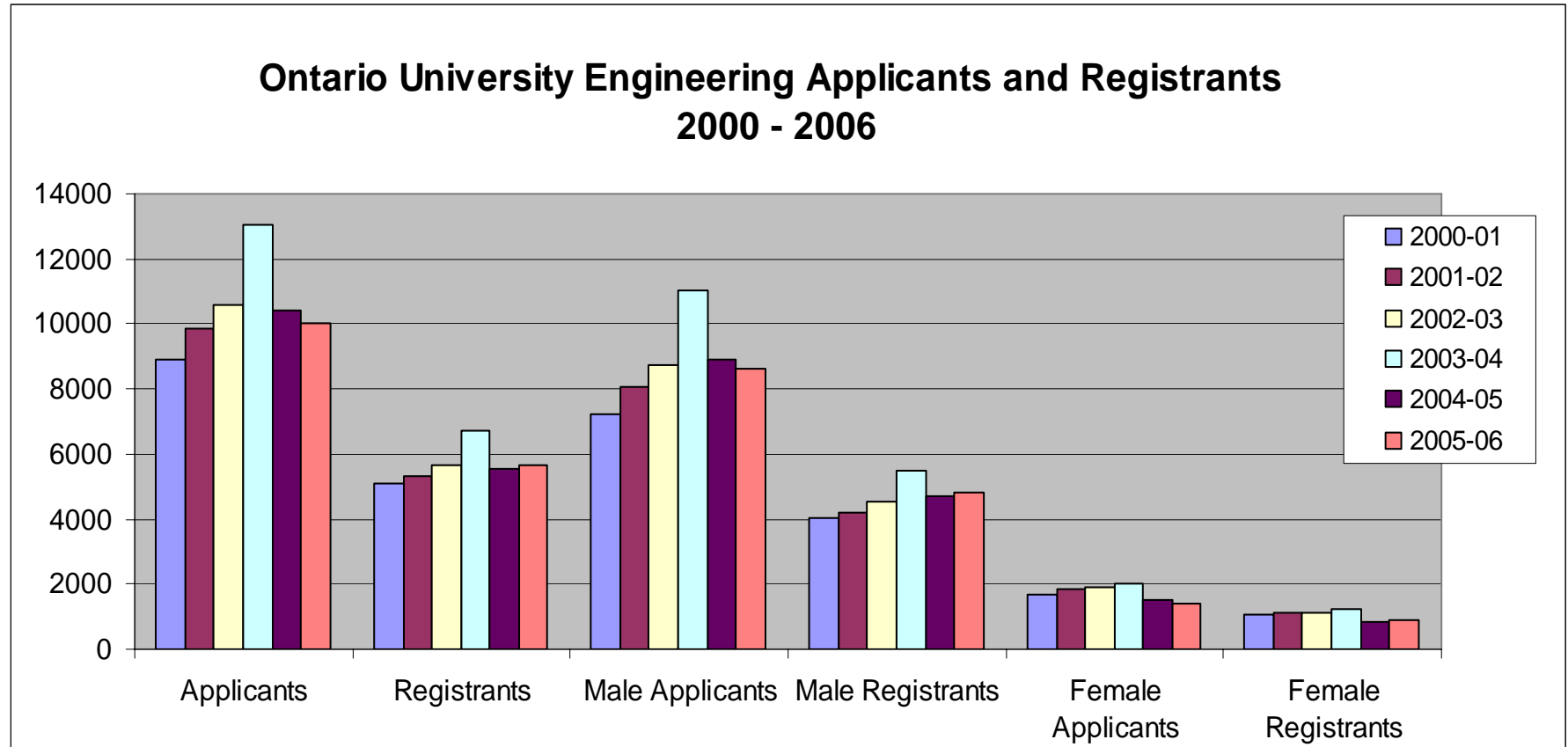
Source: Ministry of Training, Colleges and Universities – August 2007

Graduations in step with enrolments



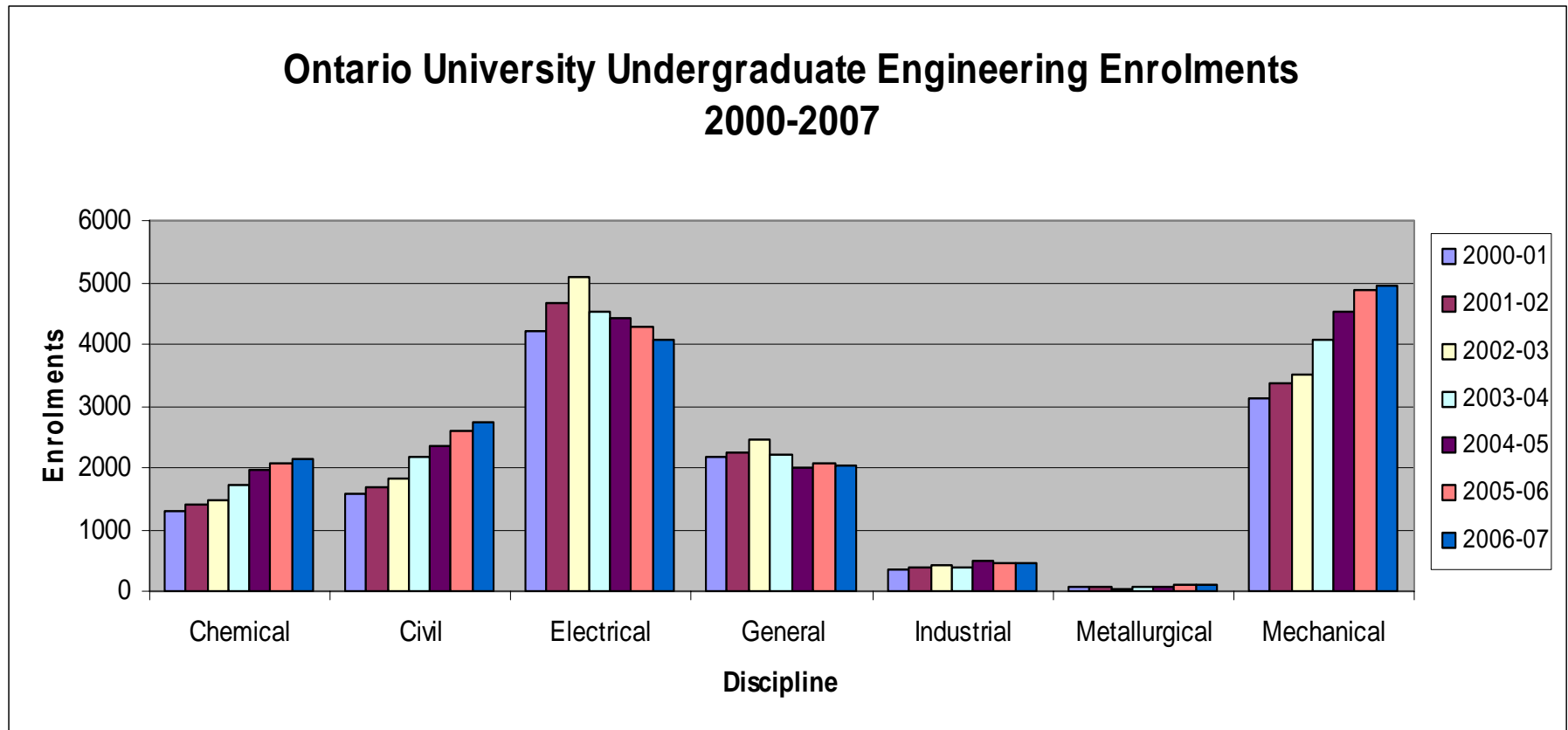
Source: Colleges Ontario and Ministry of Training, Colleges and Universities – August 2007

More males and fewer females



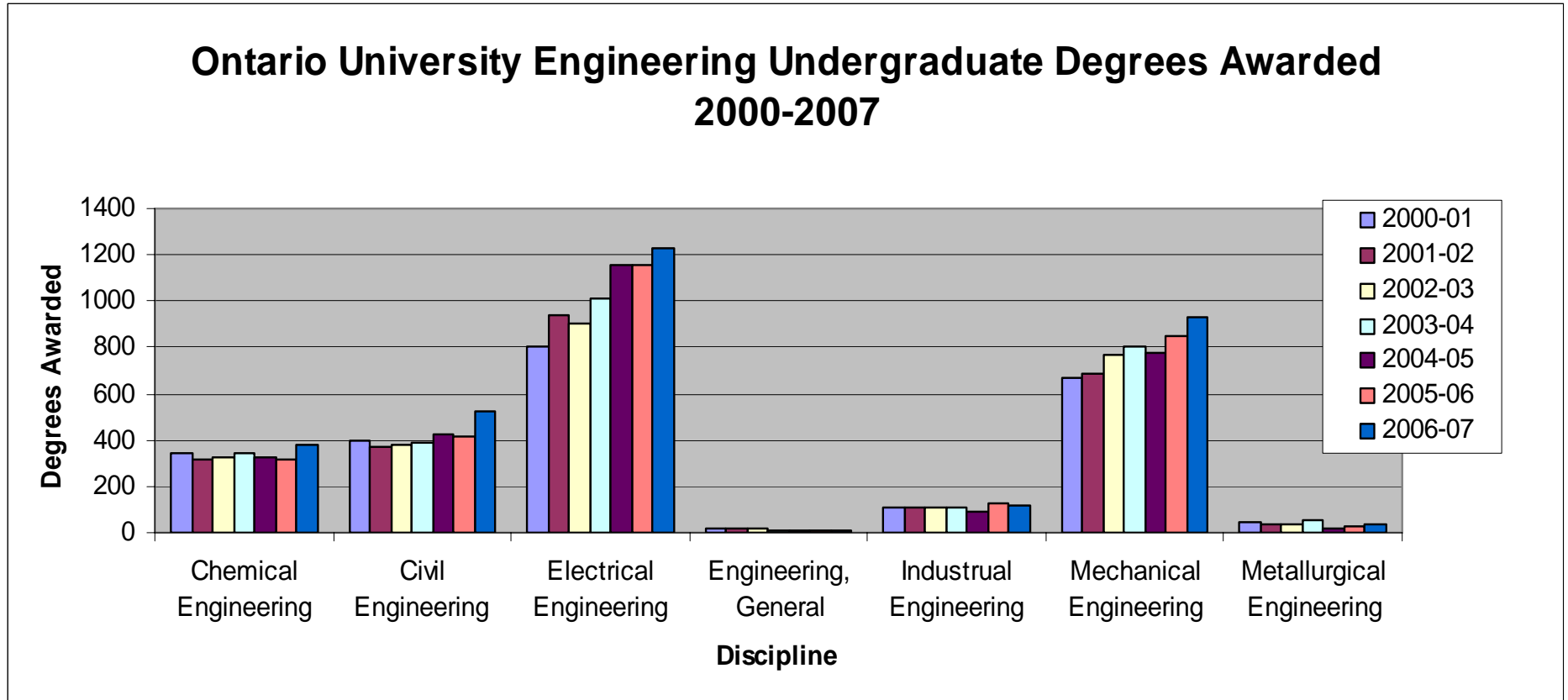
Source: Council of Ontario Universities Program Application Data – August 2007

Electrical engineering is popular



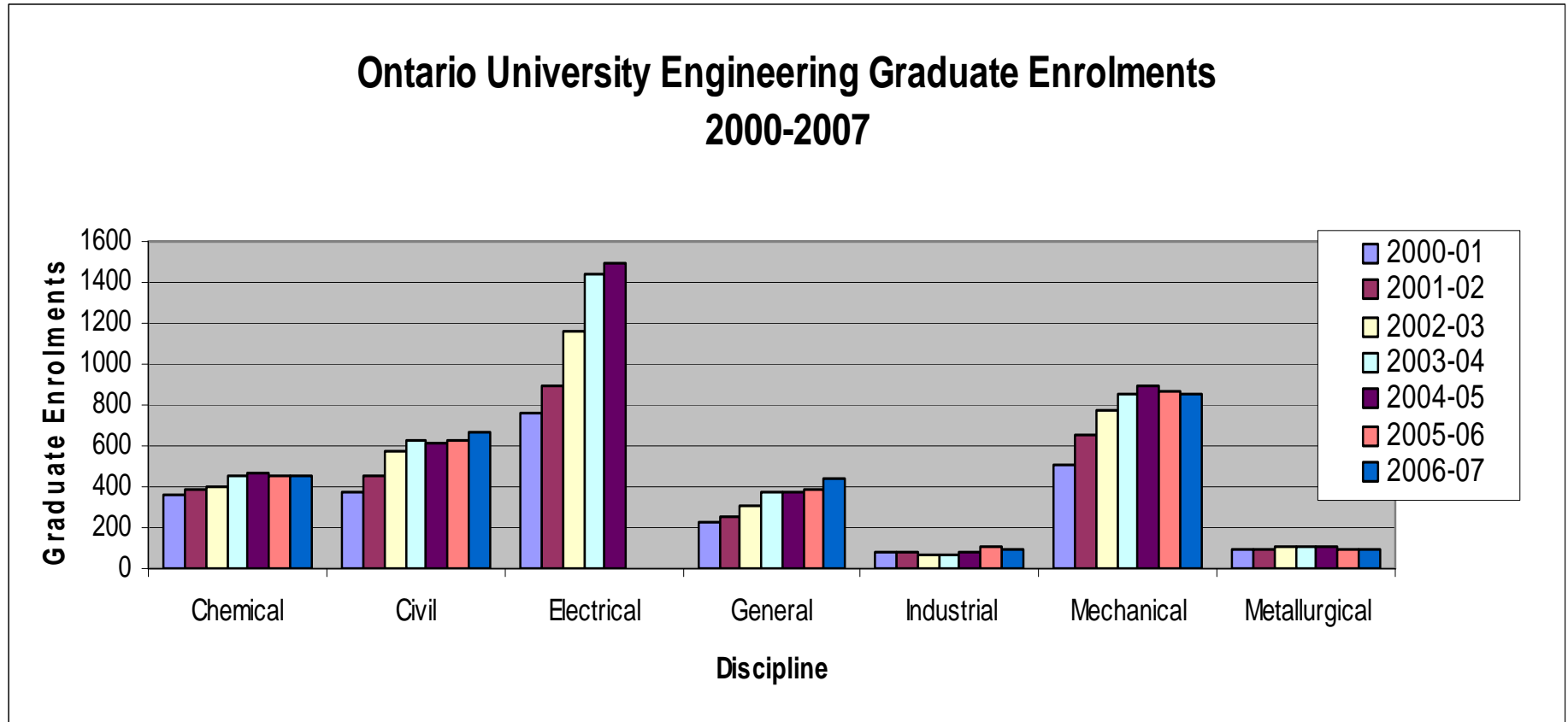
Source: – Council Of Ontario Universities and Ministry of Training, Colleges and Universities – August 2007

Electrical engineering total degrees awarded trending upward



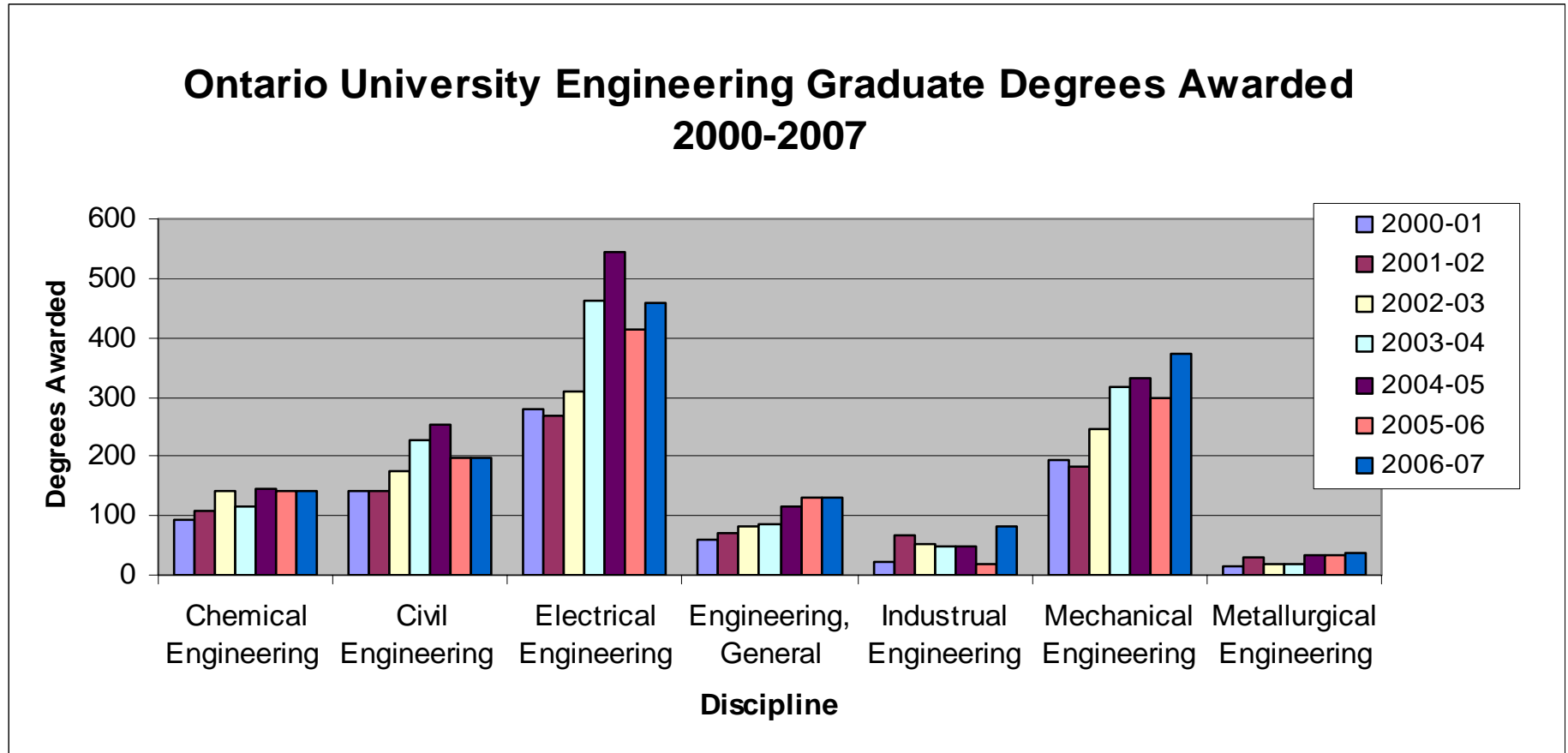
Source: Council Of Ontario Universities and Ministry of Training, Colleges and Universities – August 2007

Electrical engineering attracts a solid contingent of graduates



Source: Council Of Ontario Universities and Ministry of Training, Colleges and Universities – August 2007

But graduate degrees awarded trending down in recent years



Source: Council Of Ontario Universities and Ministry of Training, Colleges and Universities – August 2007