Speaking Notes: Peter Falconer and Rick Prudil—Power Workers’ Union

Rick

Good morning. I am Rick Prudil, Vice President of the Power Workers’ Union. With me this morning is Peter Falconer, also a Vice President of the PWU. The PWU represents over 15,000 workers operating and maintaining the Ontario electricity system—including workers in nuclear, coal, hydroelectric and natural gas generating stations. Well over 500 PWU members and their families live in the Hamilton area.

For six decades, the PWU has been an independent voice in Ontario’s energy policy discussions. During the last two years, the PWU has fully participated in the consultations for Ontario’s first Integrated Power System Plan or IPSP.

We hope we can assist you in making informed decisions regarding the motions being considered today.

We believe that the provincial government’s stated goal of closing the Nanticoke station by 2014 is unachievable and certainly not without importing more expensive, higher emission, replacement power from Ohio coal plants, switching to much more expensive, less plentiful natural gas and jeopardizing the reliability of supply in Ontario.

Historically, Nanticoke supplies enough electricity to meet the needs of 2.5 million households annually.
The government has had to defer their closure date for the station twice. As the Ontario Power Authority said, closing Ontario’s coal plants “is the largest and most significant electricity system change ever undertaken in Ontario and involves major technical considerations and involves significant risks and challenges that need to be addressed.”

On top of this, as gas-fired generation has come on stream in Ontario, electricity prices have increased. An Independent Electricity System Operator report shows that gas generation set an hourly average price of $95 per Mega Watt Hour in 2005, compared to coal generation at $47. Coal supplies are abundant in North America, with Canada alone having over 250 years of proven reserves offering energy security in a time when oil and gas supplies are heavily influenced by global politics.

Replacing coal with higher efficiency combined cycle plants isn’t the solution either. Retrofitting Ontario’s four remaining coal-fuelled plants with state-of-the-art emissions technology is more financially viable. Including enabling transmission enhancements, the cost of coal replacement is $8.7 billion for a 2015 closure timeline without producing one additional kilowatt.

Technological changes at our coal stations since the mid-1980s have enabled more energy production than in the early 1980s with 60 percent lower acid gas emissions and emission rates. For example, installing selective catalytic reduction technology or SCRs, on two of Nanticoke’s 8 units, reduced NOx emissions from these units by 80 percent from 2000 levels.
A recent OPA analysis shows installing SCRs on two more units at Nanticoke and scrubbers on 4 of the plant’s 8 units can reduce mercury emissions by 86 percent; NOx by 80 percent; and, SO2 by 86 percent at a total cost of about $1.6 billion.

Hamilton is affected by Nanticoke only when the winds come from the south. Our Environment Ministry says transboundary air pollution, which is largely beyond our control in Ontario, contributes more than 50 percent of the smog-causing pollutants affecting the City.

The best plan for Nanticoke is to retrofit the remaining units with clean coal technologies now. This will significantly reduce unnecessary smog emissions from the plant and help secure our electricity supply at a critical time.

Turbine efficiency upgrades and mixing biomass, such as wheat shorts and corn cobs with the coal will reduce greenhouse gas emissions. Other efficiencies can be gained by using excess heat from the generation process for residential and commercial heating or industrial processes.

**Peter**

This is not to say, however, that the property at Nanticoke would not be an excellent site for nuclear power production. Quite the contrary, in fact, the Nanticoke site is ideally located on Lake Erie, has ample property and has invaluable transmission systems in place. The sound socio-economic sense of utilizing existing generating station properties to host future power
generation, whatever the technology, before the use of new properties, is obvious.

The PWU believes that climate change and air quality friendly nuclear power is the next best alternative to clean coal technology for the Nanticoke site. It is likely, however, that the Darlington and Bruce sites will host new nuclear capacity first.

The nuclear moratorium motion indicates that Germany and Belgium have recently legislated the phasing out of nuclear reactors in favour of green energy options. Germany obtains one third of its electricity from nuclear energy. In 2001 the operational lives of nuclear power plants were limited to an average of 32 years, effectively deferring any closures. It is worth noting that Germany has about half of Europe’s installed wind generating capacity, amounting to about 22% of its total capacity, but providing only 4.8% of its electricity. To back up the intermittent supply of wind power and to supplement nuclear production, Germany primarily uses coal generation.

Belgium has seven nuclear reactors providing more than half of its electricity. In 2003, legislation prohibited the building of new nuclear plants and limited the operating lives of existing ones to 40 years. These requirements can be overridden by a recommendation from the regulator if Belgium’s security of supply is threatened.

According to the Government of Canada, there has never been an accident in a CANDU reactor where a worker has received radiation exposure which
required medical treatment. Thousands of our members work their entire careers in CANDU plants. I worked as an electrical control technician in the Bruce and Pickering stations for 30 years. I truly believe these plants are safe and the track record supports my belief. The plants operate under a very strict regulatory regime administered by the Canadian Nuclear Safety Commission. The huge majority of employees in the industry live in the communities surrounding the facilities. You can see the Pickering plant from my back yard.

The Canadian Government notes these major design differences between Chernobyl and western-water-cooled reactor designs.

- A CANDU Reactor is fully enclosed in a strong concrete containment structure;
- CANDU safety shutdown systems are independent of operating systems and are much faster than those at the Chernobyl plant; and
- While the Chernobyl reactor core was filled with very hot, flammable graphite, the CANDU reactor core is filled with heavy water, and cannot burn.

Nuclear energy has safely met Ontario’s electricity needs for 40 years. It emits no greenhouse gases or smog causing pollutants.

This technology has created a multibillion dollar a year industry that provides 21,000 direct and 10,000 indirect jobs, supports 150 firms and generates $1.2 billion in exports. In addition, Atomic Energy Canada supplies over half of the world’s radioisotopes used in 18 million medical
procedures a year and 75% of the world's cobalt-60 used to sterilize medical supplies.

For Ontario to have secure, reliable, safe and reasonably priced electricity we need a diverse energy mix that includes both nuclear and coal. Documents prepared by Ontario's Power Authority show that:

- Ontario has limited economically viable hydroelectric potential to develop
- Wind potential is greatest in areas of the province that are furthest away from urban areas. In addition, as the German experience shows wind power is limited, intermittent and requires even more fossil fuel backup capacity.
- Conservation and demand management takes significant time and money to change human behaviour. We need to be realistic about the targets and the costs.

To learn more about what Ontario needs to have a better energy plan and a better environment please visit our website at www.abetterenergyplan.ca

We have provided additional information to the Committee in written form. If we can be of any further assistance please do not hesitate to contact us.

Thank you for the opportunity to speak to you this morning.
May 11, 2007

Ms. M. Gallagher,
Coordinator, Committee of the Whole/
City Council
City of Hamilton,
71 Main St West,
Hamilton Ontario

Dear Ms. Gallagher,

On May 14, 2007, the City of Hamilton’s Committee of the Whole will be considering a motion 7.1 containing two parts (a) Moratorium on the Construction of and New Nuclear Power Plants within the Municipal Boundaries of the City of Hamilton and (b) which asks the Provincial Government and Ontario Power Generation be requested to move with great speed to close Nanticoke or if it is to continue operations, to convert the facility to a gas-burning operation no later than 2009.

The Power Workers’ Union (PWU) has requested that we have the opportunity to speak to the Committee of the Whole about both aspects at this May 14th meeting. In addition, we offer the attached information for the Committee’s consideration. In our opinion, it is critical that any decision affecting the continued supply of reliable, secure, safe and reasonably priced electricity for Ontario consumers be based on an informed discussion.

The PWU represents more than 15,000 men and women who help operate Ontario’s electricity system. For over sixty years, the PWU has been an active participant in electricity sector policy discussions affecting this province. During the last two years, the PWU has been actively involved in the Ontario Power Authority’s (OPA) process to develop the province’s first Integrated Power System Plan (IPSP). As part of our contribution, the PWU engaged international energy experts from Canada, Europe and the United States to prepare input to the OPA’s consultation on the IPSP Discussion Papers.

The suggestion that the highest possible levels of energy efficiency, increased reliance on renewable sources such as wind and solar power and a shift to technologies such as hybrid and fuel cells to move people and goods around can eliminate the need for coal and nuclear generation is wishful thinking.

Experience in other jurisdictions like California clearly indicates that it takes time and significant and sustained investment to change human behaviours related to energy use and consumption. Ontario’s current conservation and demand management target, the equivalent of removing the City of Toronto’s demand from the grid, is very optimistic.
Renewable energy, such as wind power, is environmentally attractive, but it provides minimal energy and at a high cost to consumers. Germany has about half of Europe’s installed wind generating capacity, amounting in 2005 to about 22% of its total capacity, yet providing only 4.8% of its electricity. To back up the intermittent supply of wind power and to supplement nuclear production, Germany primarily uses coal. According to the government of Ontario, Germany’s average electricity rates in 2006 were 12.5 cents/kWh (US) compared to Canada’s 7.0 cents. Hybrid and fuel cell technology still require significant research and development before it can be determined if they are commercially viable.

CANDU nuclear plants have safely met Ontario’s electricity needs for 40 years while emitting no greenhouse gases or smog causing pollutants. This world class Canadian technology has created a $5B/year industry that provides 21,000 direct and 10,000 indirect jobs, supports 150 firms and generates $1.2 billion in exports. In addition, Canada supplies over half of the world’s radioisotopes for nuclear medicine used in 18 million medical procedures a year and 75% of the world’s cobalt-60 used to sterilize 40% of the world’s medical supplies.

During this time nuclear waste has been securely stored at the reactor sites for more than four decades. Spent fuel bundles are contained in wet bays and are later placed in dry storage facilities. These facilities are licenced and monitored by the Canadian Nuclear Safety Commission.

Ontario Power Generation and Bruce Power are proud of the solid relationships they currently enjoy in the three communities that host the province’s nuclear reactors and both have submitted plans to the Canadian Nuclear Safety Commission to build new reactors at these existing sites.

With respect to the Ontario Clean Air Alliance’s proposal to convert Nanticoke Generating Station to burn natural gas, rather than shutting it down, recognizes the importance of this station for meeting Ontario’s electricity needs. However, the OCAA’s proposal oversimplifies, misrepresents and omits some key facts.

Coal-fuelled generation is critical to the province’s economy now, and in the future. Coal is substantially cheaper than natural gas and therefore provides lower cost electricity. Coal-fuelled generation provides greater production flexibility as it is better suited to meeting base, intermediate and peak electricity needs compared to natural gas. Coal supplies are abundant in North America, with Canada alone having over 250 years of proven reserves. This offers energy security in a time when oil and gas supplies are heavily influenced by global politics.

Most importantly, technology is making coal generation cleaner. Retrofitting the remaining four plants with proven, readily available clean coal technologies will achieve significant reductions in smog and mercury emissions more at a much lower cost than either the OCAA’s natural gas conversion proposal or the building of new replacement gas plants. Ontario has already seen the results that can be achieved with these kinds of technologies. As well, substantial greenhouse gas emission reductions can be achieved by upgrading equipment, mixing biomass such as corn cobs and wheat shorts with the coal and utilizing the waste heat from the plants for residential and commercial heating and or industrial processes. European experience shows these approaches are effective ways to reduce greenhouse gas emissions.

World-wide billions of dollars are being spend researching and developing the next generation of “zero emission” coal technology, carbon capture and storage. Here in Canada this work is being driven by Natural Resources Canada’s Clean Coal Technology Roadmap. In the future, the Nanticoke site would be best suited to host a coal gasification plant as suggested by the Ontario Power Authority in its preliminary IPSP. All of the infrastructure is in place and the plant has established solid relationships with the host community.
To remain competitive and maintain our current standard of living, Ontario must have a diverse energy mix that includes nuclear and coal-fuelled generation. This means being realistic about the contributions conservation and demand management and renewables can make as well as avoiding the inefficient use of natural gas, a fuel better suited to heating the province’s homes and businesses. It is the only way Ontario consumers and industry will have secure, safe, reliable and reasonably priced electricity and a better environment too.

Please contact me should you require any additional information.

Yours truly,

[Signature]
Don MacKinnon
President
Power Workers’ Union

Telephone  416) 481-4491
E-Mail   dmackinnon@pwu.ca
CANDU Nuclear Technology Provides the Foundation of Ontario’s Electricity Supply

With respect to the Nanticoke Generating Station being used to host a nuclear station, we believe it is likely that only existing nuclear station sites will be considered for new nuclear units in the foreseeable future. We also believe that the Nanticoke Generating Station’s remaining units should be retrofitted with clean coal technologies to reduce smog causing emissions and that biomass, such as wheat shorts and corn cobs should be mixed with the coal to reduce greenhouse gas emissions. Test work on biomass co-firing is already underway at the station.

In the future, the site is best suited to host a coal gasification plant as suggested by the Ontario Power Authority in its preliminary IPSP.

This is not to say, however, that the property at Nanticoke would not be an excellent site for nuclear power production. Quite the contrary, in fact, the Nanticoke site is ideally located on Lake Erie, has ample property and has valuable transmission systems and corridors in place. The sound economic sense of utilizing existing generating station properties to host future power generation, whatever the technology, before the uses of new properties is obvious.

Demonstrating this government’s faith in nuclear technology, Ontario’s Energy Minister has directed the Ontario Power Authority to plan for nuclear capacity to meet the base-load electricity requirements of the province. As a result both Bruce Power and Ontario Power Generation have taken initial steps in the approval processes for the refurbishment of existing reactors and the construction of new units at existing station sites.

Nuclear energy has safely met Ontario’s electricity needs for 40 years. At present, Ontario has 20 reactors, with 16 in-service providing almost 51% of the province’s electricity. Last year, the 17 operating CANDU reactors in Canada averaged 81% in performance capacity. Ontario’s operating units achieved an average 80.9 % capacity. One of the Bruce units achieved 99.4% and two units at the Darlington station averaged more than 96%.

CANDU technology has created a $5B/year industry that provides 21,000 direct and 10,000 indirect jobs, supports 150 firms and generates $1.2 billion in exports. In addition, Canada supplies over half of the world’s radioisotopes for nuclear medicine used in 18 million medical procedures a year and 75% of the world’s cobalt-60 used to sterilize 40% of the world’s medical supplies.

Nuclear waste has been securely stored at the reactor sites for more than four decades. Spent fuel bundles are contained in wet bays and are later placed in dry storage facilities. These facilities are licenced and monitored by the Canadian Nuclear Safety Commission. In 2005, the Nuclear Waste Management Organization (NWMO, established in 2002) submitted a report to the federal government on solutions to managing Canada’s used nuclear fuel for the long-term. These included storage at reactor sites and long-term geological storage. Ontario Power Generation is partnering with the Municipality of Kincardine to develop a Deep Geologic Repository for low and intermediate level waste on the Bruce site. This partnership was endorsed by the community in 2005 and is now entering the environmental assessment stage.

During the past decade, research has continued to make dramatic improvements in the technology that will enhance safety systems, improve quality and reduce material and construction time costs. The environmental and economic benefits and outlook for continued technological improvements make nuclear a very attractive option for meeting the province’s electricity needs well into the future.
Nuclear energy is clean, safe, economical and free of smog and greenhouse gas emissions. According to the Canadian Nuclear Association, the use of CANDU reactors has avoided 1.8 billion tonnes of greenhouse gases since 1972. Refurbishing existing nuclear units and building new plants is the best option for meeting Ontario’s electricity needs. Actions should be taken now to expedite the approvals process for these projects.

**German and Belgian Legislation:**
The moratorium indicates that Germany and Belgium have recently legislated the phasing out of nuclear reactors in favour of green energy options. According to the World Nuclear Association, Germany obtains one third of its electricity from nuclear energy. In 2001 an agreement came into effect to limit the operational lives of nuclear power plants to an average of 32 years, deferring any immediate closures. It is worth noting that Germany has about half of Europe’s installed wind generating capacity, amounting in 2005 to about 22% of its total capacity, providing only 4.8% of its electricity. To back up the intermittent supply of wind power and to supplement nuclear production, Germany primarily uses coal.

Belgium has seven nuclear reactors providing more than half of its electricity. In January of 2003 legislation was passed prohibiting the building of new nuclear power plants and limiting the operating lives of existing ones to 40 years. These requirements can be overridden by a recommendation from the electricity and gas regulator (CREG) if Belgium’s security of supply is threatened.

**Chernobyl:**
The accident at Chernobyl is often presented by critics of nuclear energy as the reason for abandoning this technology. According to the Government of Canada (www.safecanada.ca/faq), there has never been an accident in a CANDU reactor where a worker has received radiation exposure which required medical treatment. They also note that there are major design differences between Chernobyl and western-water-cooled reactor designs. These are:

- A CANDU Reactor is fully enclosed in a strong concrete containment structure;
- CANDU safety shutdown systems are independent of operating systems and are much faster than those at the Chernobyl plant; and
- While the Chernobyl reactor core was filled with very hot, flammable graphite, the CANDU reactor core is filled with heavy water, and can not burn. Its huge volume of water is an excellent medium to absorb excess heat.

**Nanticoke Generating Station is North America’s Largest Coal-Fuelled Generating Station for Some Good Reasons**

The Nanticoke Generating Station (GS) was constructed in the 1970s as a multi-unit plant for three important reasons. Building a multi-unit plant took advantage of economies of scale and provided operating flexibility. Coal plants, given their low fuel cost and operating characteristics are the best form of generation to provide base, intermediate and peak electricity. A multi-unit plant also minimized community and environmental impacts compared to locating eight smaller sized plants throughout the province. The plant’s location on the north shore of Lake Erie provided the capability to meet growing electricity needs in the Golden Horseshoe area. Nanticoke’s annual production is in the range of 20 to 24 billion kilowatt-hours (kWh), enough electricity to run nearly 2.5 million households for a full year.

There are 470 other coal-fuelled units in North America.
Emissions from Nanticoke GS in Perspective

Nanticoke GS is operated in compliance and well within the limits of all environmental regulations set out by Ontario’s regulators. By virtue of the plant’s size, its emissions of smog and greenhouse gases stand out as a point source. However, the following data offer some perspective on the plant’s contribution to emissions of concern, relative to other sources affecting Ontario’s air quality and climate change.

- According to Ontario’s Environment Ministry:
  - more than 50 percent of the smog-causing pollutants, affecting the province’s air quality, come from U.S. sources. During widespread smog episodes, the U.S. contribution can be as high as 90 percent in Ontario communities, along the border in southwestern Ontario and along the shore of Lake Erie;
  - Ontario’s nitrogen oxide (NOx) emissions in the regional air shed which consists of 22 neighbouring mid-western and eastern U.S. states...are about 6 percent of the total NOx emitted....
  - Canadian sources in the region emit less than 10 percent of the total sulphur dioxide (SO2) and NOx emissions;
  - as of 2000, Ontario has reduced its atmospheric mercury emission by 78 percent of 1988 levels.

Source: Transboundary Air Pollution in Ontario, Ontario Ministry of the Environment, June 2005

- Clean Air Hamilton indicates that the City of Hamilton is affected by Nanticoke when the winds come from the south, but notes that other key factors include: transboundary air pollution; commuter and truck traffic on roads in and around the City (the largest source of NOx emissions; and large industries within the City.

Converting Nanticoke to Burn Natural Gas is an Expensive, Sub-Optimal Way to Improve the Environment

The Ontario Clean Air Alliance (OCAA) claims that converting Nanticoke to burn natural gas “will deliver significant air quality benefits today”.

According to the Ontario Power Authority (OPA), the agency responsible for Ontario’s long-term electricity reliability and adequacy, to convert the existing coal-fuelled boilers to gas-fired boilers involves the cost of burner tip replacement, the cost of new or expanded gas pipeline capacity, and the cost of natural gas. Converting the existing boilers is estimated at between $30 to $50 M per unit (times 8 would mean $240 M to $400 M at Nanticoke) based on Ontario Power Generation (OPG) information and would require five years to complete. New gas pipeline infrastructure is expected to cost in the $300 M to $350 M range. Total capital costs would range between $500 M to $750 M.

Operating costs, driven by higher price of natural gas compared to coal, also need to be factored into the OCAA’s conversion cost estimate. The OPA acknowledged in its 2005 Supply Mix Advice Report to the Government that there are considerable risks associated with using natural gas for electricity generation including natural gas price level, price volatility, supply and infrastructure requirements. Over a five-year period, natural gas prices have increased 136 percent. Shifting all of Ontario’s coal generation to natural gas generation would increase natural gas demand by up to 35 percent in a province where 70 percent of the homes are heated by this fuel. Natural gas heating is 95 percent+ efficient. Burning it in a converted
coal unit would only be 32-35 percent efficient. Historically, coal generation has set the price for electricity in Ontario, and given its low operating cost has had a moderating influence on electricity prices. As new gas-fired generation has come on stream in Ontario, electricity prices have increased. According to the IESO, natural gas-fired generation set an hourly average price of $95/MWh in 2005, compared to coal generation at $47/MWh. The OCAA’s proposal suggests a high cost for the mitigation of an environmental impact that can be addressed by a more reasonable, lower cost alternative.

The OCAA also claims that “the current supply of base-load power from Nanticoke will be more than offset by new water power and high efficiency natural gas fired power plants currently under development”.

Ontario’s electricity sector has been in turmoil for the last decade. Since the derailment of the competitive electricity market experiment in 2002, Ontario consumers have faced supply shortages and increased reliance on imported power, a growing infrastructure deficit and rising electricity prices. The current government’s 2003 election promise to close the province’s coal-fuelled generating stations by 2007 has been delayed twice, not due to the lobbying efforts of special interest groups, but rather due to the realities of keeping the lights on in Ontario.

According to the OPA, Ontario has to build almost as much generating capacity over the next 20 years as presently exists in British Columbia and Alberta combined.\(^1\) This means increasing generation capacity by about 15 percent by the year 2025 (assuming conservation and demand management cover two-thirds of the growth in the demand-supply gap), replacing some 20 percent of the capacity now provided by coal, and refurbishing nuclear plants that now provide 40 percent existing capacity.

Ontario’s Independent Electricity System Operator (IESO) describes closing Ontario’s coal plants as: … the largest and most significant electricity system change ever undertaken in Ontario and involves major technical considerations. It also involves significant risks and challenges that need to be addressed.\(^2\)

In its advice to the Government of Ontario, the OPA stated:
“Schedule risks in the replacement of coal-fired generation should continue to be monitored closely… The replacement should be completed in the context of the government’s stated position that reliability is the “first principle of the replacement plan”\(^3\)

Currently, the OPA believes it can achieve this phase-out by 2014 if a number of assumptions and projects fall into place:
- aggressive conservation and demand management programs deliver;
- hydroelectric developments in various parts of the province proceed;
- transmission is upgraded to accommodate refurbished Bruce nuclear units and new wind projects;
- a new interconnection with Quebec is completed;
- new gas-fired capacity for the York and Kitchener-Waterloo areas and transmission reinforcements in the Greater Toronto Area and other parts of southern Ontario are completed.

These requirements suggest that Nanticoke’s base-load output will be required for some time.

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\(^1\) “Recent Progress and Future Directions for Ontario Electricity”, presentation by Jan Carr, Chief Executive Officer, Ontario Power Authority, to the C.D. Howe Institute, February 9th, 2007

\(^2\) 18 Month Forecast, July 2005, Independent Electricity System Operator

\(^3\) Supply Mix Advice—Compendium of Recommendations, pg. 63, Ontario Power Authority, December 2005
If Nanticoke is not operational and these projects don’t come on stream as expected, Ontario will fall back on more expensive imported power from our U.S. neighbours. The majority of this power will be from coal-fuelled plants, most of which are not equipped with the pollution control systems used by Ontario’s coal plants today. The most likely outcome in the short run will be a transfer of production from Ontario’s coal-fuelled plants to Ohio’s coal-fuelled plants, with no reduction in emissions.

**Continuing to Retrofit Nanticoke GS with Clean Coal Technology is a Better Solution**

Since Ontario’s first coal-fuelled generating station was built, major investments in pollution control technologies have been made, in response to public concerns and more stringent environmental regulations. Initially the overriding environmental concern was particulates or smoke emissions. To capture these particulates, Ontario Hydro installed electrostatic precipitators on the generating units. In the 1980s the primary focus shifted to sulphur dioxide (SO$_2$) and acid rain. SO$_2$ emissions are directly related to the sulphur content and heat content of the fuel burned. As a result, Ontario Hydro and its successor, OPG began using primarily higher-cost, low-sulphur fuels to reduce SO$_2$ emissions. Ontario Hydro also installed SO$_2$ scrubbers on two units at the Lambton station in the mid 1990s, at a cost of approximately $500 M, to reduce SO$_2$ emissions.

Since then, nitrogen oxide (NO$_x$) and the relationship to ozone and smog have become the primary concern. As a result, OPG embarked on a program of installing emission control technologies on its fossil-fuel units, including selective catalytic reduction (SCR) technology on two units at the Nanticoke station and on two units at the Lambton station at a cost of approximately $285 M.

The table below, taken from an OPG backgrounder (March 2007), shows the SO$_2$ and NO$_x$ emission reductions that have been achieved through these investments.

**HISTORIC PRODUCTION AND ACID GAS EMISSIONS**
OPG has also been able to capture 95 percent of the mercury in the flue gas from the two units outfitted with both scrubbers and SCRs at the Lambton GS. These two units have been identified as two of the cleanest coal-fuelled units in North America.

An analysis prepared for the Power Workers’ Union by Global Energy Decisions shows that retrofitting Ontario’s four remaining coal-fuelled plants with state-of-the-art emissions technology is a more financially viable option than replacing them with gas-fired generators. Adding the minimum cost of transmission enhancements required to accommodate replacement generation of $3.1 billion, brings the cost of coal replacement to $10.8 billion for a 2009-2010 replacement timeline and $8.7 billion for a 2015 closure timeline over the cost of keeping them operational with emission reduction technology through the period 2007 to 2026.

**Greenhouse Gas Emission Reductions Can Be Achieved Affordably and Quickly**

Global warming and climate change have made carbon dioxide (CO₂) emissions the public’s most prominent environmental concern today. Part of the government’s justification for closing Ontario’s coal-fuelled stations is to reduce the province’s overall greenhouse gas emissions, thereby contributing to Canada meeting its Kyoto commitment.

However, there are readily available approaches that have been used successfully in other jurisdictions, particularly in Europe, to achieve significant reductions in greenhouse gases. These include:

- mixing “CO₂ neutral” biomass such as wood pellets, corn, flour milling waste and municipal waste with coal; and,
- upgrading equipment at the stations to improve fuel efficiencies.

This can achieve emission reductions of up to 30 percent. In addition, utilizing both the power and heat outputs from the plants (for district heating) can improve fuel efficiency up to 80 percent (from current levels of 35 percent or more).

Germany and Denmark, countries both heavily dependent upon coal-fuelled generation, have both achieved significant reductions in greenhouse gas emissions using these approaches, in addition to developing renewable energy, particularly wind power. However, both countries are heavily dependent upon coal-fuelled generation. More than 60 percent of Germany’s electricity is generated from fossil fuels, mostly coal. In Denmark coal generation supplies 46 percent of the country’s electricity.

OPG is currently conducting research into the use of biomass. Test burns of surplus grain screenings were conducted at OPG’s fossil plants in the 1980s. Milling by-products have recently been co-fired at the Nanticoke GS and, last year, Thunder Bay tested pelletized grain screenings. The Ontario Government is also supporting a bio-energy research center at OPG’s Atikokan GS.

**Ontario Needs a Better Energy Plan for a Better Environment**

In late 2004, the Ontario Legislative Assembly passed the *Electricity Restructuring Act* and gave government the discretion to determine the future supply mix for the province as a starting point for the IPSP. As a result, Ontario’s Minister of Energy provided directives to the OPA that fixed the direction of the province’s 25-year electricity plan. One of those directives calls for the earliest timeframe for closing the province’s coal stations, while still ensuring the province has a reliable electricity system. This directive was given in spite of the fact that Ontario needs to refurbish, rebuild, replace or conserve 25,000
MW of generating capacity by the year 2020 to meet growing demand, while replacing coal-fuelled generation. This represents 80 percent of Ontario's current generating capacity and requires an investment of $25 billion to $40 billion.

While Ontario faces this enormous challenge of keeping the lights on and the factories humming, electricity demand keeps rising to meet the needs of a growing population and economy.

Yet there are some troubling signs for the province's economy, such as declining employment in manufacturing, particularly in the automotive sector's traditional "big three" companies, as well as in Northern Ontario's pulp and paper industry. According to the Canadian Manufacturers & Exporters, 130,000 jobs have been lost in Ontario since 2002.

Causes of these job losses include: exchange rate fluctuations; increasing competition; red tape; and, rising and unpredictable energy costs. According to the Federal Standing Committee on Industry, Science and Technology, a significant percentage of the U.S. manufacturing sector has a competitive advantage over Canadian manufacturers with respect to energy costs.

To fuel its economy, Ontario relies on imported gas and oil. The proposed IPS plan shows a growing reliance on imported power from Quebec and Manitoba and increased dependence on natural gas-fired generation. Developing an electricity plan for Ontario is only a part of what should be an integrated economic, social and environmental approach to our future prosperity.

What kind of economy does Ontario need in the future to be competitive in the global marketplace and to accommodate forecast increases in population growth? What kind of energy resources will this economy need if it is to prosper? To use these energy resources wisely, what are the environmental priorities we must have to sustain both our economy and enhance public health and safety? These are but a few examples of the critical questions that need to be answered if Ontario consumers are to have reliable, secure, safe, and reasonably priced affordable electricity.

Ontario's experience clearly demonstrates that coal-fuelled generation provides reliable and affordable electricity. Proven, readily available technologies exist that can quickly achieve significant reductions in smog and mercury emissions. European experience shows that greenhouse gas emissions can be readily reduced by upgrading equipment, mixing biomass with coal and utilizing the waste heat for residential
and commercial buildings and industrial processes. These approaches are less costly than converting the coal stations to burn natural gas or replacing them with combined cycle natural gas plants.

Canada has over a 250-year supply of coal that offers energy security for Ontario. Canada and other countries around the world are investing billions of dollars of R&D money on the next generation of "zero emission" coal generation technologies. Other opportunities exist with respect to coal-to-liquids, coal-to-gas, enhanced oil recovery and carbon sequestration. For example, CANMET Energy Technology Centre has helped fund research into the sequestration of CO₂ emissions from the Nanticoke GS.

The OCAA's conversion proposal ignores these critical issues and complexities and the opportunities presented by keeping coal-fuelled generation in Ontario's energy mix. Finding the right balance between the economy and the environment is the best way to address this collective challenge. Without it, Ontarians in the future will not enjoy a reliable, secure, safe, and reasonably priced electricity supply while mitigating environmental impacts.

References:

Ontario Power Authority
- Supply Mix Advice Report, December 2005
- Discussion Paper 7—Integrating the Elements: A Preliminary Plan, November 2006
- Recent Progress and Future Directions for Ontario Electricity, presentation by Jan Carr, Chief Executive Officer, Ontario Power Authority, to the C.D. Howe Institute, February 9th, 2007

Independent Electricity System Operator
- 18 Month Forecast, July 2005, Independent Electricity System Operator
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- Ontario Reliability Outlook-Volume 2, Issue 1, March 2007
- IESO 2005 – A Year in Review

Ministry of Environment
- Transboundary Air Pollution in Ontario, Ontario Ministry of the Environment, June 2005

Environment Canada
- National Inventory Report, 1990-2004, Greenhouse Gas Sources and Sinks in Canada

Natural Resources Canada

Power Workers’ Union
**PWU Submissions to the Ontario Power Authority:**
- PWU Submission on Long-Term Load Forecast
  - Ontario's Long-Term Load Forecast: A Changing Picture. Global Energy Advisors
- PWU Submission on Conservation and Demand Management
- PWU Submission on Supply and Transmission Integration
• Nuclear Investment in Ontario: Report on the Challenges and Opportunities. ICF International.
• Ontario PWU Study on the Impact of Wind Power. Elsam Engineering A/S.
• Use of Ontario’s Existing Coal-Fuelled Generating Station Sites for New Coal Technologies – High Level Feasibility Study. Vattenfall Europe Powerconsult GMBH.

**PWU Comments on the Ontario Power Authority’s Discussion Papers:**

- PWU Comments on IPSP Discussion Paper 2: Load Forecast

- PWU Comments on IPSP Discussion Paper 3: Conservation and Demand Management

- PWU Comments On IPSP Discussion Paper 4: Supply Resource

- PWU Comments on IPSP Discussion Paper 5: Transmission

- PWU Comments on IPSP Discussion Paper 6: Sustainability

- PWU Comments on IPSP Discussion Paper 7: Integrating the Elements – A Preliminary Plan

- PWU Comments on IPSP Discussion Paper 8: Procurement Options

Ontario Power Generation