POWER WORKERS' UNION

April 3, 2007

Ms. Sheila Birrell
Town Clerk
Town of Markham
101 Town Centre Blvd.
Markham, Ontario
L3R 9W3

Dear Ms Birrell:

Re: Converting Nanticoke Generating Station (GS) to Burn Natural Gas

On March 5th, 2007, a representative of the Ontario Clean Air Alliance (OCAA) appeared before Markham Council requesting support for the following resolution:

> Markham Town Council requests the Government of Ontario to issue a legally binding regulation requiring the phase out of coal burning at the Nanticoke Generating Station by 2009.

I understand that Council requested Town of Markham staff to prepare a report to be presented in four weeks' time.

The Power Workers' Union (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 OCAA 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 since the technology is better suited to meeting base, intermediate and peak electricity 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.

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 cheaply than the OCAA's natural gas conversion proposal. 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 and flour milling waste with the coal and utilizing the waste heat for residential and commercial heating and or industrial processes. European experience shows these approaches are effective ways to reduce greenhouse gas emissions.

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The Power Workers' Union offers the attached information for Council's consideration. It is our hope that Town of Markham staff will find this useful when preparing their report on behalf of your constituents. 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.

Please contact me should you require any additional information.

Yours truly,

Don MacKinnon
President

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.

By comparison, most of the other 470 coal-fuelled units in North America are single-unit plants.

Nanticoke GS's Emissions 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 (NO_x) 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 NO_x emitted ...;
  - Canadian sources in the region emit less than 10 percent of the total sulphur dioxide (SO_2) 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

- According to data from the International Energy Agency, Canada contributes 2 to 2.5 percent of the world's greenhouse gas emissions. By comparison, the United States emits about 24 percent, Europe about 13.6 percent and China about 13.1 percent. According to Environment Canada statistics, Nanticoke GS represents about 2 percent of Canada's total greenhouse gas emissions (2005 data).

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

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

In August 2001, an OCAA press release, "Cheapskate Lakeview Coal conversion sacrifices GTA lungs, new report shows," criticized an Ontario government proposal to allow for Lakeview GS to be converted to burn natural gas. The release describes this approach as a "scotch tape, binder twine and crazy glue approach that will continue spewing smog pollution at twenty times the rate of a high-efficiency natural gas plant". Greenhouse gas emissions were shown to be 600 kg/MW hour for a simple conversion compared to 371 kg/MW hour for a high efficiency natural gas plant.

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 posits 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.

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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

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.

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 overall reduction in emissions and quite likely an increase 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.

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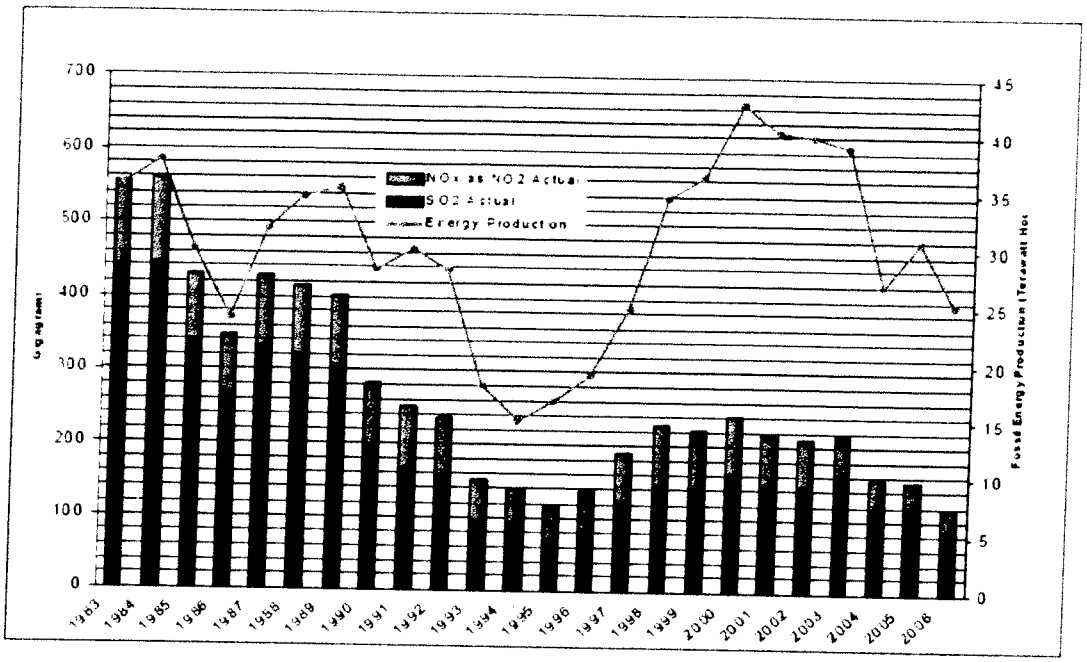
[2] 18 Month Forecast, July 2005, Independent Electricity System Operator

[3] Supply Mix Advice—Compendium of Recommendations, pg. 63, Ontario Power Authority, December 2005

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 (CO_2) 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 "CO_2 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. According to OPG, an estimated 500,000 tonnes of agricultural by-products are available annually in southern Ontario. The Ontario Government is also supporting a bio-energy research center at OPG's Atikokan GS.

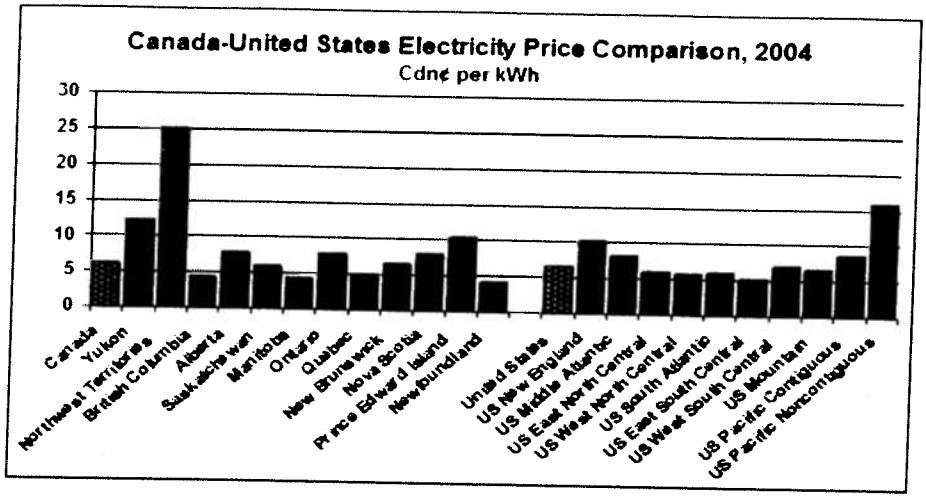
Ontario Needs a Better Energy Plan for a Better Environment

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. Nowhere is this more evident than in Markham, which has seen a 25 percent growth in population since 2001.

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 IPSP 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 CO_2 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
- Ontario Reliability Outlook-Volume 1, Issue 1, February 2006
- Ontario Reliability Outlook-Volume 1, Issue 2, June 2006
- 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 www.ec.gc.ca/pdb/ghg/inventory_report/2004_report/toc_e.cfm

Natural Resources Canada

- Clean Coal Technology Roadmap, www.nrcan.gc.ca/es/etb/cetc/combustion/cctrm

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
  - Can Ontario's Energy Efficiency Goals be Met? Review of OPA and OME 2006-2025 Targets. Dunsky Energy Consulting and Optimal Energy Inc.
- PWU Submission on Supply and Transmission Integration
  - Market Analysis of the Future Supply Mix for Ontario. Global Energy Advisors.
  - Transmission Analysis for Ontario: Transmission Enhancements for Off-Coal Plan. Global Energy Advisors
  - 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
  - Ontario Load Forecast Comments on OPA Discussion Paper 2. Global Energy Advisors.
- PWU Comments on IPSP Discussion Paper 3: Conservation and Demand Management
  - Conservation and Demand Management in Ontario – Comments on OPA Discussion Paper 3. Dunsky Energy Consulting and Optimal Energy Inc.

- PWU Comments On IPSP Discussion Paper 4: Supply Resource
  - Ontario Preliminary Plan: Comments on OPA Discussion Paper 4. Global Energy Advisors.
  - OPA Supply Report – Nuclear Summary. CF International.
  - Comments on GE study and OPA Discussion Paper 4 – Supply Resources. Elsam Engineering A/S c/o Dong.
- PWU Comments on IPSP Discussion Paper 5: Transmission
  - Transmission Analysis for Ontario: Transmission Enhancements for Off-Coal, Nuclear and Renewable Plan. Global Energy Advisors.
- PWU Comments on IPSP Discussion Paper 6: Sustainability
  - Sustainability Assessment within Ontario's Integrated Power System Plan – Review of the Ontario Power Authority's Discussion Paper 6: Sustainability. MK Jaccard and Associates Inc.
- PWU Comments on IPSP Discussion Paper 7: Integrating the Elements – A Preliminary Plan
  - Ontario Preliminary Plan: Comments on OPA Discussion Paper 7. Global Energy Advisors.
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- PWU Comments on IPSP Discussion Paper 8: Procurement Options
  - The Impact of Market Constraints on Electricity Sector Development, Elenchus Research Associates, February 2007

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- Annual Sustainable Development Reports www.opg.com/safety/sustainable/env_reports.asp