A Better Energy Plan for Ontario

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Chalk River Branch

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Power Workers’ Union

- Over 15,000 members serving Ontario’s electricity production and delivery industry
- Representing workers in coal, nuclear, hydroelectric and natural gas generation, transmission and distribution, IESO, ESA, AECL
- 60 years of participation in electricity policy discussions
PWU Goals

- Raise level of public awareness and knowledge of energy policy implications
- Encourage informed debate and development of responsible policies and plans
PWU Activities

- Past 2 years – extensive participation in the Ontario Power Authority (OPA) consultations for the development of the Integrated Power System Plan (IPSP)
- Engaged energy experts from Canada, the U. S. and Europe to provide input to OPA consultation on IPSP
- Preparing now for Ontario Energy Board (OEB) consultations and hearings for IPSP review and approval
PWU Activities

- Development of a Better Energy Plan [www.abetterenergyplan.ca](http://www.abetterenergyplan.ca) for reliable, secure, safe and reasonably priced electricity supply and service and a better environment.
- Essential for continued prosperity and social welfare of the people of Ontario.
- A stable business environment, skilled labour force and fair regulatory framework will promote investment in technical innovation that produces efficiency gains.
Provincial Government Direction

- Close the coal generating stations by 2007 first, then 2012 and now 2014?
- Replace 80% (about 23,000 MW) of Ontario’s existing generating capacity in the next 15 years
- Satisfy 1/3 of all new demand requirements through conservation
- Cap nuclear capacity at 14,000 MW
- The PWU believes this is not achievable
Supply Mix

- The PWU believes a diversity of supply from hydroelectric, nuclear, coal, natural gas and renewables is required in Ontario.
Current Electricity Supply Mix

- 55% Nuclear
- 20% Hydroelectric
- 20% Coal
- 10% Other (including natural gas and renewables such as wind)
Current Electricity Supply Mix

- Base load is supplied largely by nuclear power along with some hydroelectric and some coal.
- Peak power is supplied largely by coal, smaller hydroelectric and some natural gas generation.
- Wind power is not suited for true base load or peak because it is intermittent.
Nuclear

- Nuclear is the ideal, proven source for production of large amounts of base load generation — refurbishments and new build should be expedited and the cap lifted
- It produces no pollutant emissions and no greenhouse gases
- Spent fuel is safely stored and will be used to fuel the next generation of nuclear plants – much of the technical work is already done
- Climate change is driving nuclear resurgence worldwide
Hydroelectric

- Hydroelectric is used for some base load production at sites with sufficient, year round water availability
- Some seasonal ability at small plants for short term peaking needs, to the extent water is available
- Clean and affordable
- Potential for new development in Ontario is small – transmission from Manitoba difficult and expensive
Natural Gas

- Natural gas is used primarily for peak power
- High quality fossil fuel
- Limited supply in North America dwindling – 4% of world supply
- Strategically important for home heating, commercial and industrial operations
Natural Gas

- Most of the world’s supply is in the Middle East and Russia and is subject to very unstable geo-politics
- Must be processed to be imported in liquid form by ship – then processed to gas form for distribution by pipeline
- Pricing – very high and volatile
Natural Gas

- As existing gas fired generation has come on stream in Ontario electricity prices have increased
- Natural gas – $97/MWh in 2005 compared to $47 for coal
- Replacing coal with natural gas will cost over $7 Billion more than retrofitting coal stations with state of the art emission controls
- Replacing coal with natural gas in Ontario would increase demand for natural gas by 35% placing even further pressure on pricing
Location of the World’s Main Fossil Fuel Reserves
(Gigatonnes of oil equivalent)

Source: BP and World Energy Council
Renewables

- Wind is intermittent – Germany has approximately ½ of Europe’s wind capacity making up about 22% of Germany’s capacity but only supplies 4.8% of its electricity
- Wind potential in Ontario is best in locations far from urban areas — transmission is a big problem
- Wind power is expensive
- Europeans have had to use more coal generation to back up intermittent wind power
- Wind power is running into more and more opponents to the industrialization of rural areas
Wind Integration Challenge: Supply/Demand Coincidence

Daily Average Temperature and Wind Productivity - January '07

[Graph showing temperature and wind productivity over the days of January '07]
Wind Integration Challenge: Variability

March 07 Ontario Large Wind Farm Hourly Output

- Installed capacity: 395.1 MW
- Average Production: 129 MW
- Actual Output

Capacity Factor

Time (hours in March)
Renewables

- Solar power is also intermittent and very expensive – currently over $400 a MWh
- Clean
- Much R&D to be done to gain efficiency and reliability
- Biomass can be used to the extent it is available – supply is limited
- Can be carbon neutral if gathered, processed and transported efficiently
Conservation and Demand Management

- CDM has value
- Targets must be realistic and costs affordable
- Results monitoring and verification are key to quantifying true effects and costs
- Current Ontario targets equate to removing the City of Toronto from the grid
Coal Facts

- Currently provides approximately 20% of Ontario’s electricity from 4 generating stations
- Over 250 years of proven coal reserves in Canada
- Low cost
- Best technology available for base, intermediate and peak supply
Coal Facts

- Nanticoke is critical to voltage synchronization in Ontario
- Most rapidly growing power supply fuel worldwide – particularly in U.S., China and Europe, largely because of cost and domestic reserves
- Many plants in the U.S. and China have little to no emission controls
- Over 50% of the pollution in the air of southern Ontario comes from the U.S.
U.S. Coal Utilization Outlook

Coal dominates electricity generation

Upper figure: DOE EIA, AEO 2006, Figure 5
Lower figure: Energy & Electricity per DOE EIA, AER 2004
GDP per U.S. DOC, Bureau of Economic Analysis

2007 Overview, Brazil 4-25-07
Energy Price Trends

US$ per tonne of oil equivalent

Source: BP 2005, NYMEX-IEA 2006a, MCR 2005
Coal’s Resurgence in Electric Power Generation

Equivalent Power for 96 Million Homes

Proposed New Plants

159 Plants
96GW
$141 Billion

Legend
Capacity (GW)
Investment (B - Billion $)
Proposed Plants

NETL
January 24, 2007
www.netl.doe.gov
China

- Coal accounts for two-thirds of China’s primary energy supply
- Output rose from 1.3 billion tonnes in 2000 to 2.23 billion tonnes in 2005 (nearly one-third of world coal output)
- Over half of this coal is used to generate electricity, and 80% of China’s electricity comes from coal – about 70,000 MW of new generating capacity was brought on line in 2005
- Nearly 50% of China’s railway capacity is dedicated to moving coal
Retrofitting Coal

- Ontario started the job of installing emission controls in the 1980s with significant results but stopped before completion.

According to the Ontario Power Authority assessment, adding 4 scrubbers and 2 selective catalytic reduction units at Nanticoke can reduce:

- mercury by 86%,
- nitrogen oxides by 80% and
- sulphur dioxide by 86%
Retrofitting Coal

- Substantial greenhouse gas reductions can be achieved by turbine upgrades and mixing biomass with the coal
- Proven effective in Europe
- Test burns have been successfully conducted at Ontario’s coal stations
- An estimated 500,000 tonnes of agricultural waste by-products is available annually in Ontario
3. Impacts of Lambton & Nanticoke on Ontario Air

Figure A-4: Sulphur dioxide emissions from power plants shown as dots that vary in size according to their emission inventories
U.S. 1995 (with 2001 updates) and Canada 1999 Emission Inventories
(source: Ontario Ministry of the Environment)
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Coal

- Worldwide, and in the U.S., coal will continue to be the fastest growing electricity production fuel no matter what Ontario does.
- The true challenge is to dramatically reduce harmful emissions and promote these technologies worldwide.
Coal Strategy

- Apply existing, proven technology such as Selective Catalytic Reduction and Flue Gas Desulphurization (Scrubbers) to remaining Ontario units _now_
- This will improve our environment while helping to secure our power supply at a reasonable price
Coal Strategy

- Join the R&D efforts going on worldwide to develop the next generation “near Zero” emission technologies including carbon capture and sequestration, coal gasification and bio-fuel mix
- Ontario should host demonstration sites in partnership with the U.S. and the 4 western provinces who are already participating
- Take advantage of these emerging technological business opportunities in the U.S., China and Europe