



CANADIAN
NUCLEAR
WORKERS' COUNCIL

CANADIAN NUCLEAR WORKERS' COUNCIL

**SUBMISSION
TO**

THE LONG TERM ENERGY PLAN REVIEW

SEPTEMBER 2013

WHO WE ARE

The Canadian Nuclear Workers Council (CNWC) was founded in 1993 as an umbrella organization of Unions that represent workers in all sectors of the Canadian Nuclear Industry. A list of the member Unions and the purpose and objectives of the council are attached as Appendix A & B.

Several of our member unions represent members in electrical utilities. The following comments on Ontario's Long-term Energy Plan are based on the knowledge, expertise and experience of our membership.

OVERVIEW

Consumers expect to have reliable and affordable electricity. They also expect that it will be produced and delivered to them in accordance with environmental regulations and be available to them today, tomorrow and in the future.

The CNWC believes that striking the right balance among a range of electricity supply sources can fulfill these expectations. This means decision-makers must be realistic about the trade-offs among the various supply opportunities. Each supply option must be considered on the basis of: its environmental impacts; cost; contribution to meeting identified electricity system needs (baseload, intermediate and peak demands); job creation and other economic benefits; safety; and, the willingness of the community to host the facility that is being sited.

Ontario's challenge is finding the best way to add new generation technology while building on its existing low carbon base to ensure a clean, affordable, secure energy supply for the long-term. The CNWC submits that nuclear energy should continue to play its current role in Ontario's supply mix—providing over fifty percent of the province's electricity—in the future. The environmental and economic benefits are too compelling to do otherwise.

Ontario's Electricity System Today:

Ontario's long-term planning process has effectively been underway since 2003. The review of the current version of the province's Long-Term Energy Plan is timely in that subsequent versions of the plan can be informed by the results of the investments made to date.

Historically, Ontario's supply mix has benefitted environmentally and economically from the province's hydroelectric and nuclear generation. Together these supply sources have delivered low-cost, low-carbon electricity that has helped make Ontario Canada's industrial heartland.

Ontario's closure of its demand-following coal generating stations and transition to wind and solar and backup natural gas generation has resulted in a number of conspicuous impacts.

Greenhouse Gas Emissions:

With over seventy percent of the province's electricity supply coming from hydroelectric and nuclear generation, Ontario has had one of the lowest carbon electricity system footprints in the world. CANDU reactors provide over 50 percent of this electricity.

Each year CANDU reactors help avoid about 90 million tonnes of greenhouse gas (GHG) emissions, about the same amount as taking 81 percent of Canada's cars off the road.

The closure of Ontario's coal stations was positioned as making this footprint even better. Based on commentary by Ontario's Environment Commissioner, even with the closure of the coal stations, the province's increased reliance on natural gas generation will compromise its ability to achieve Ontario's GHG targets. Part of this can be attributed to the role natural gas generation plays backing up wind and solar, as more than seventy percent of the time these latter forms of generation are not running. Building more wind and solar generation will require more natural gas generation, which results in more GHG emissions.

Electricity Prices:

Several independent analyses, including one from Ontario's Auditor General show that Ontario's electricity prices have been rising rapidly due to the investments made in wind and solar and backup natural gas generation. The current trend suggests Ontario's electricity prices are on a trajectory to being among the highest in North America. Residential, commercial and industrial consumers have reacted negatively to these rising prices and are now receiving subsidies. Residential consumers receive the Clean Energy Benefit funded by taxpayer borrowings. Industrial customers are receiving a special rate to ensure their competitiveness in global markets. High electricity prices and subsidies are not conducive to sustaining existing jobs and or creating new ones.

Energy Security:

As the Ministry of Energy's Discussion Paper noted, the province's daily natural gas demand is about 2.8 billion cubic feet per day while the province's domestic production is less than one percent of this. Currently about 30% of this supply comes from U.S. shale gas sources and this could increase to 80 percent in the future. Ontario will compete in the North American marketplace for this gas supply to meet its electricity, heating and

industrial needs. This exposes Ontarians to unnecessary price volatility risks as well as compromising the province's long-term energy security. Again neither situation is a solution for achieving affordability, sustaining existing jobs and or creating new ones. Ontario has already lost over 200,000 manufacturing jobs in the last decade due to the global recession.

Reliability:

The renewal of Ontario's electricity system is intended to replace ageing equipment and assets and to take advantage of new technologies that will modernize the system at the same time. Adding new intermittent wind and solar generation, embedded generation and micro-grids and providing consumers with smart meters have precipitated the need for more "smart" control technologies to maintain reliability. Besides adding undefined costs to the investments required to renew Ontario's electricity system, new operating rules and regulations have had to be developed. All of this makes it more challenging and expensive to maintain the future reliability of Ontario's electricity system.

Economic Growth

Ontario's *Green Energy and Green Economy Act* came with the promise that it would create 50,000 new jobs based on "green" manufacturing that would make wind and solar power components. The Act provided subsidies to incent the establishment of this manufacturing in Ontario. The job numbers realized to date are difficult to validate. Recent job creation numbers for Ontario suggest the province is doing well creating new employment however most of the new jobs were part-time.¹ Ontario continues to face a difficult challenge replacing the over 200,000 high value manufacturing jobs that disappeared in the last decade. Experience in jurisdictions like Denmark and Germany clearly shows that subsidizing green manufacturing jobs is expensive and difficult to sustain.²

Public Acceptance:

Ontario's nuclear stations are situated in supportive communities. Ontario Power Generation (OPG) and Bruce Power have invested significant time and resources to establish solid relationships with the communities. Local support is evident for the refurbishment of the reactors at the Bruce and

¹ Statistics Canada, Labour Force Survey, September 2013

² Institute for Energy Research www.instituteforenergyresearch.org and Center for Politiske Sudier www.cepos.dk

Darlington nuclear stations sites. As well, OPG enjoys solid community support for the building of two new nuclear reactors at the Darlington site. By comparison, public opposition to new wind power developments has been evident across rural Ontario. As well, new natural gas plant projects in Mississauga and Oakville were ultimately cancelled at great cost to Ontario ratepayers. Ironically, both plants have been relocated to willing host communities where OPG facilities already exist. Similar goodwill exists in the communities around Nanticoke, Lambton and Thunder Bay for the conversion of existing coal generating stations to renewable, carbon-neutral biomass and natural gas.

The CNWC submits that investments in the renewal and expansion of Ontario's nuclear generating capacity should be the first priority of the province's Long-Term Energy Plan. These investments are the best way to lower greenhouse gas emissions, provide stable electricity and energy security for the long-term and create jobs and economic prosperity.

Specifically, Ontario should refurbish all of the nuclear reactors at the Bruce and Darlington Nuclear Stations and build two new CANDU nuclear reactors at the Darlington site. CANDU nuclear reactors have been safely providing affordable, low-carbon electricity to meet Ontario's needs for over fifty years.

Cost:

Nuclear generation is the best way to provide low cost electricity to Ontario's homes and businesses over the coming decades. With a U.S. \$30/tonne carbon price, the cost of nuclear generated electricity would be significantly less than for most low-carbon alternatives. Low and high cost price estimates in the Organization for Economic Cooperation and Development (OECD) were based on average Canadian and U.S. data. The low cost estimate for nuclear was 4.87 cents/kWh compared to 7.39 cents/kWh for on-shore wind and 21.93 cents for solar. The high cost estimate for nuclear was 7.74 cents, on shore wind at 10.49 and solar at 33.27 cents.³

³ *Organization for Economic Cooperation and Development (OECD). Projected Costs of Generating Electricity: 2010 Edition. Issy-les-Moulineaux; 2010.*

Greenhouse Gas Emissions

Nuclear generation is Ontario's best way to lower greenhouse gas emissions in the future. Nuclear compares well to other low-carbon generation sources such as wind, solar and hydro. For example, on a full life cycle basis nuclear (CO₂ generated for each unit of electricity produced) nuclear emits 16 grams of carbon dioxide equivalent per kilowatt hour (gCO₂eq/kWh) compared to hydroelectric at 4 gCO₂eq/kWh, renewables (wind, solar and bio-energy) at 12-46 gCO₂eq/kWh and natural gas at 469 gCO₂eq/kWh⁴

Refurbishing all of Ontario's reactors would help replace the 3,200 megawatts of GHG emission-free electricity that will be lost with the closure of the Pickering Nuclear Generating Station in 2020.

As well, a recent study by Strategic Policy Economics (Strapolec) showed that refurbishing Ontario's nuclear fleet and building two new reactors is a better way to reduce GHG emissions compared to building more wind generation. The Strapolec analysis found that making the nuclear investments would reduce incremental GHG emissions after 2023 by 108 million tonnes more than continuing to build more intermittent wind generation along with backup natural gas generation. This would mean 80 percent less GHG emissions.⁵

Ensuring Ontario continues to have reliable low-carbon supply nuclear generation positions our province to benefit in other ways. Transportation is Ontario's biggest source of GHG emissions. The base load GHG emission-free electricity provided by CANDU reactors aligns well with the overnight off-peak charging of electric vehicles. Ontario's CANDU reactors could also play a role backstopping hydroelectric generation in other provinces as well as helping our fossil-fuel dependent neighbours.

⁴ CNA Presentation to the Ontario Power Summit, May 29, 2013

⁵ Ontario Electricity Options Comparison, Strategy Policy Economics Inc., June 2013

Economic Benefits

The economic benefits of refurbishing all of Ontario's nuclear reactors and building two new CANDU reactors are equally clear.

Analyses show that these investments would be good for Ontario's economy as this province hosts the majority of Canada's \$6 billion-a-year industry and its 160 supply chain companies and 60,000 direct and indirect jobs. Additional benefits would flow to Ontario's colleges and universities that are involved in nuclear research and development.

The Strapolec analysis indicates that refurbishing Ontario's reactors along with the construction of two new nuclear reactors at Darlington are estimated to provide a \$60 billion dollar net incremental benefit to Ontario's economy compared to building more wind generation. The impact of carbon pricing was not included in the study. Such pricing would be expected to further favour nuclear generation.

This \$60 billion net incremental benefit includes \$27 billion in savings to ratepayers and \$29 billion in direct investment in Ontario, including the creation of 100,000 more person years of employment in high-value jobs many of which would be in the advanced manufacturing sector.

Supporting this unique reactor design could also better position Canada's competitive position in the estimated \$1 trillion global nuclear market. CANDU's distinctive design uses natural rather than enriched uranium, has the unique ability to reuse fuel from other reactor technologies, can use thorium unlike other reactor types (a big advantage in the Asian market) and is suitable for small electricity grid systems.

CANDU reactors, 29 of which have been constructed in seven countries, are one of Canada's few high-tech exports. Worldwide, Canada's CANDU have an outstanding safety record spanning over 1000 reactor years.⁶ A 2012 Canadian Manufacturers and Exporters study showed that building two Enhanced CANDU 6 reactors outside of Canada supports over 2,200 person-years of work and over \$2.5 billion in economic activity here in

⁶ [New Opportunities for Oshawa", Glenna Carr, Chair, Atomic Energy of Canada Ltd, speech to the Greater Oshawa Chamber of Commerce. March 19, 2009].

Canada.⁷ A CANDU reactor built outside of Canada delivers major economic benefits here at home. The proportion of Canadian content is estimated at 69 percent in equipment, and 76 percent in engineering and procurement.⁸

Other Aspects of the LTEP

The CNWC further submits that Ontario's Long-Term Energy Plan should focus on investments that:

- Maximize the value of Ontario's existing generation, transmission and distribution assets;
- Spur manufacturing and expedite economic recovery and growth;
- Ensure sound planning that is based on rigorous analyses that accounts for the costs of GHG emissions, prices carbon and provides for comprehensive, transparent public consultation.
- Renew and modernize the transmission and distribution network and smart grid technology deployment that facilitates electric vehicles and electric powered public transit systems.
- Add renewable, carbon-neutral biomass as an energy resource by converting Ontario's Nanticoke, Lambton and Thunder Bay coal-fuelled generating stations to use biomass along with natural gas;
- Develop Ontario's remaining cost-effective hydroelectric potential;
- Deliver conservation programs that are based on realistic targets and cost benefit-analyses; and,
- Ensure Ontario has the skilled workforce it will need to operate and maintain its electricity system in the future.

Furthermore, the CNWC calls for a moratorium on any additional wind and solar generation development until cost/benefit analyses that include; the full costs (including backup generation); impact on system reliability; GHG emissions; realistic job creation numbers; and realistic economic-spin off impacts.

⁷ Nuclear-A Canadian Strategy for Energy, Jobs and Innovation, Canadian Manufacturers and Exporters, November 2012

⁸ Ibid