

# Ontario's Long-Term Energy Plan: A One Year Review

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In December 2013 the Government of Ontario released its updated *Long-Term Energy Plan* to “encourage conservation, and provide the clean, reliable and affordable energy Ontario will need now and into the future.”<sup>1</sup>

The *Plan* laid out the following three-pronged strategy to meet the province's electricity needs.

- 1. Conservation First:** The *Plan* calls for investing in all cost-effective energy conservation and efficiency resources before investing in new electricity generation, transmission and distribution infrastructure.<sup>2</sup>
- 2. Re-Building the Darlington and Bruce B Nuclear Reactors:** According to the *Plan*, re-building these aging reactors “is the most cost-effective generation available to Ontario for meeting baseload requirements.” Furthermore, the *Plan* stated that the re-build process must “Minimize commercial risk on the part of ratepayers and government.”<sup>3</sup>
- 3. Clean Imports:** According to the *Plan*, Ontario will “pursue contractual arrangements for firm imports where cost effective and well matched to Ontario's electricity needs.”<sup>4</sup>

Since the *Plan* was released it has become apparent that the proposed Darlington Re-Build Project is neither a low-cost nor a low-risk option to meet Ontario's base-load electricity needs relative to water power imports from Quebec and energy efficiency investments.

And as the Ontario Power Authority (OPA) is not releasing any details on its negotiations with Bruce Power or committing to a public review of any deal, we remain in the dark as to whether such a deal would actually be in the interest of Ontario's electricity consumers.

## Darlington Re-Build Project

**“This is a project which carries enormous risks” Ed Clark, CEO, TD Bank<sup>5</sup>**

According to Ontario Power Generation's (OPG) “high-confidence” estimate, the cost of power from the Darlington Re-Build will be 8.9 cents per kWh.<sup>6</sup> This estimate is based on the following assumptions:

- The project's capital cost will be \$12.9 billion;
- The project will be financed 100% by the Government of Ontario; and
- The re-built reactors will have an annual capacity factor of 82%.<sup>7</sup>

Furthermore, this cost estimate is based on a re-building strategy that does **not**, contrary to the government's stated conditions, minimize the risk to Ontario's

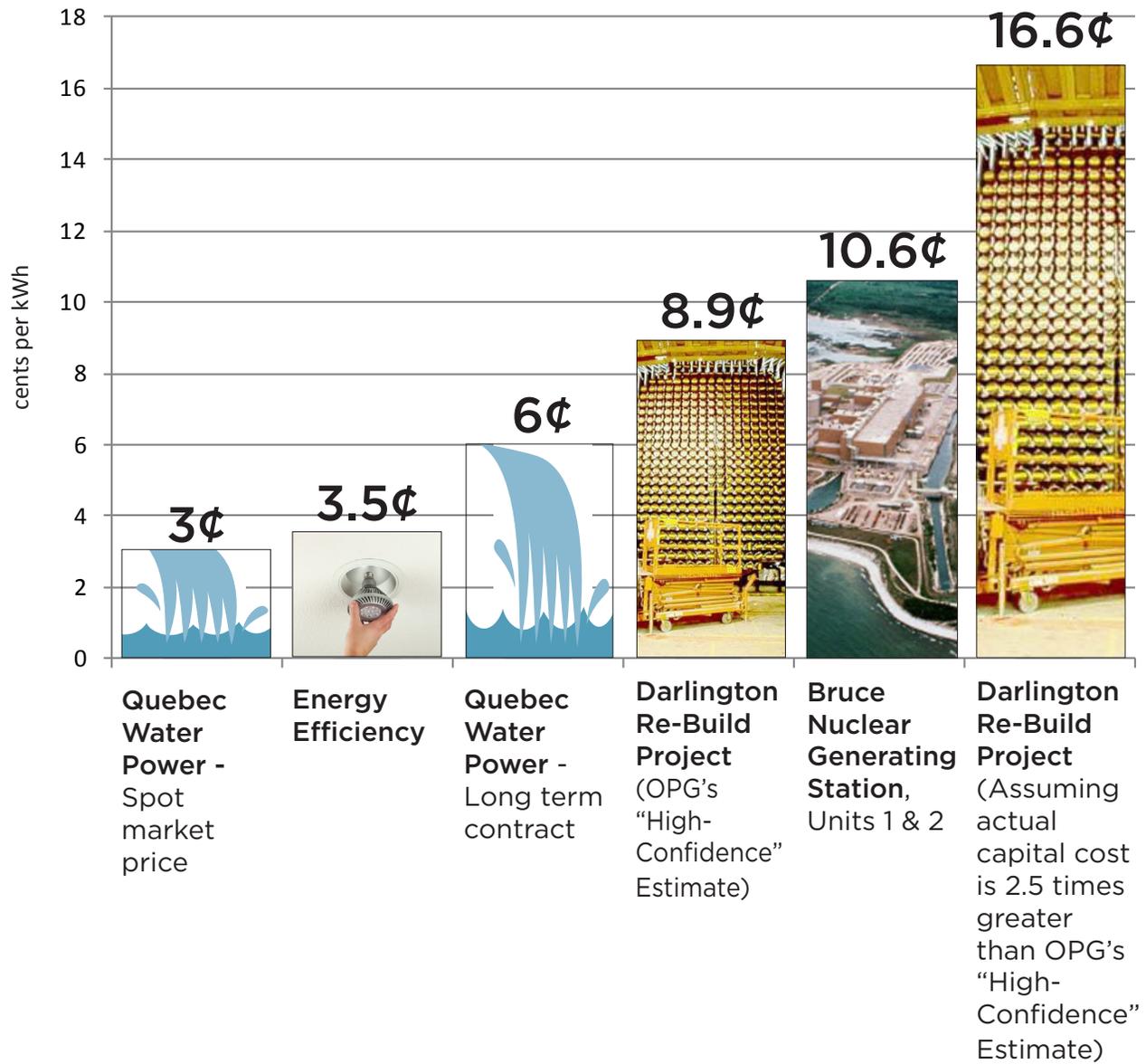
By signing a long-term electricity supply contract with Hydro Quebec and cancelling the Darlington Re-Build Project, Ontario can:

- reduce its electricity costs by at least \$14 billion over 20 years while paying for the necessary incremental transmission upgrades (\$500 million) in less than one year
- free up at least \$12.9 billion of government borrowing room for transportation investments that will create jobs, reduce congestion and raise our GDP

**“This is a project which carries enormous risks”**

**– Ed Clark, CEO, TD Bank on Darlington Re-Build Project**

**Fig. 1: Ontario's Electricity Options**



**Contrary to the government's stated conditions, the Darlington re-build strategy does not minimize the financial risk to Ontario's electricity consumers and taxpayers**

electricity consumers and taxpayers from capital cost overruns. Rather, the cost estimate is based on the assumption that OPG, not private-sector contractors, will bear the primary risk with respect to over 93% of the project's costs. That is, less than 7% of the project will be undertaken by independent third-party contractors pursuant to fixed price contracts.<sup>7b</sup> As a consequence, if the project's actual cost is 2.5 times OPG's "high-confidence" estimate, the project's real cost of power for Ontario's consumers and/or taxpayers will rise to 16.6 cents per kWh.<sup>8</sup>

In this context it is important to note that every nuclear project in Ontario's history has gone massively over budget – on average by 2.5 times.<sup>9</sup> If history repeats itself, the actual capital cost of the Darlington Re-Build Project will be \$32 billion (\$12.9 billion x 2.5).

OPG expects the Government of Ontario to provide all the financing for this project, both through a large equity stake and below-market-rate loans. OPG is offering a best case scenario return on equity of only 9.85%.<sup>10</sup> In contrast, according to CIBC World Markets Inc., the required return on equity for the private sector Bruce A retrofit project was 13.7% to 18.0% assuming that only 20-40% of the project was debt financed, as opposed to the 53% debt financing OPG is requesting for Darlington.<sup>11</sup>

These generous conditions stand in stark contrast to the conditions set for other power generators. The Ontario Power Authority (OPA) has signed more than 21,000 contracts for electricity from renewable and natural gas-fired power plants.<sup>12</sup> Not one of these contracts permits the capital cost overruns from these power plants to be passed on to Ontario's electricity consumers or taxpayers.

**Only nuclear power projects are allowed to pass cost overruns onto consumers and taxpayers**

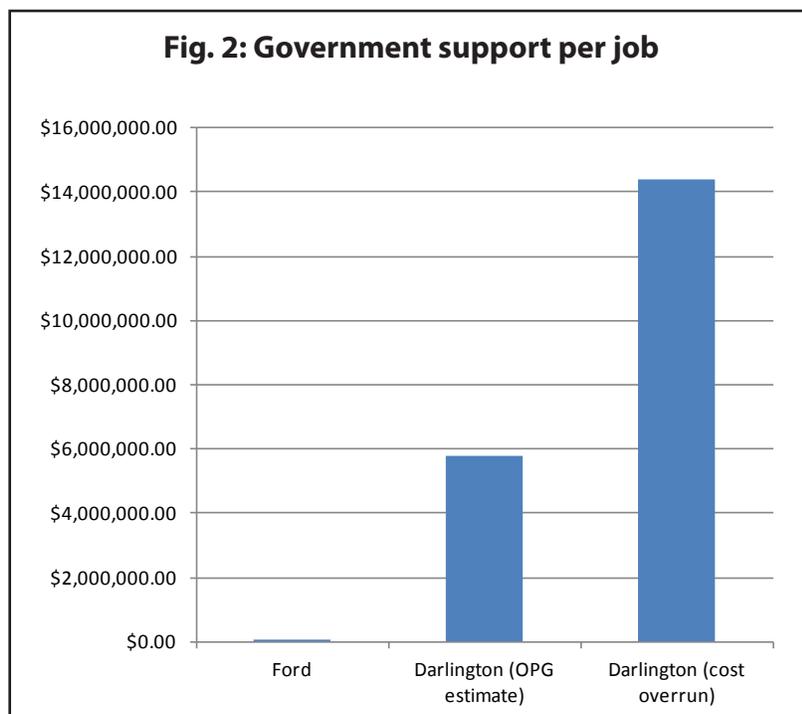
## The Darlington Re-Build Project & Jobs

A traditional argument in favour of re-building our aging nuclear reactors is that it will secure high-paying jobs.

OPG's nuclear operations employ 5,083 people of which approximately 2,224 are directly or indirectly associated with the Darlington Nuclear Station.<sup>13</sup> Therefore if the Darlington Re-Build costs \$12.9 billion, the cost of maintaining these jobs would be \$5.8 million per job.<sup>14</sup> If the Re-Build goes over budget by 2.5 times, the cost to Ontario's taxpayers to maintain these jobs will be \$14.4 million per job.<sup>15</sup>

In contrast, in September 2013, the Ontario government secured 2,800 jobs at the Ford Motor plant in Oakville for a cost of only \$25,000 per job.<sup>16</sup>

Clearly, re-building our aging nuclear reactors is **not** a cost-effective job creation strategy.



## Water Power Imports

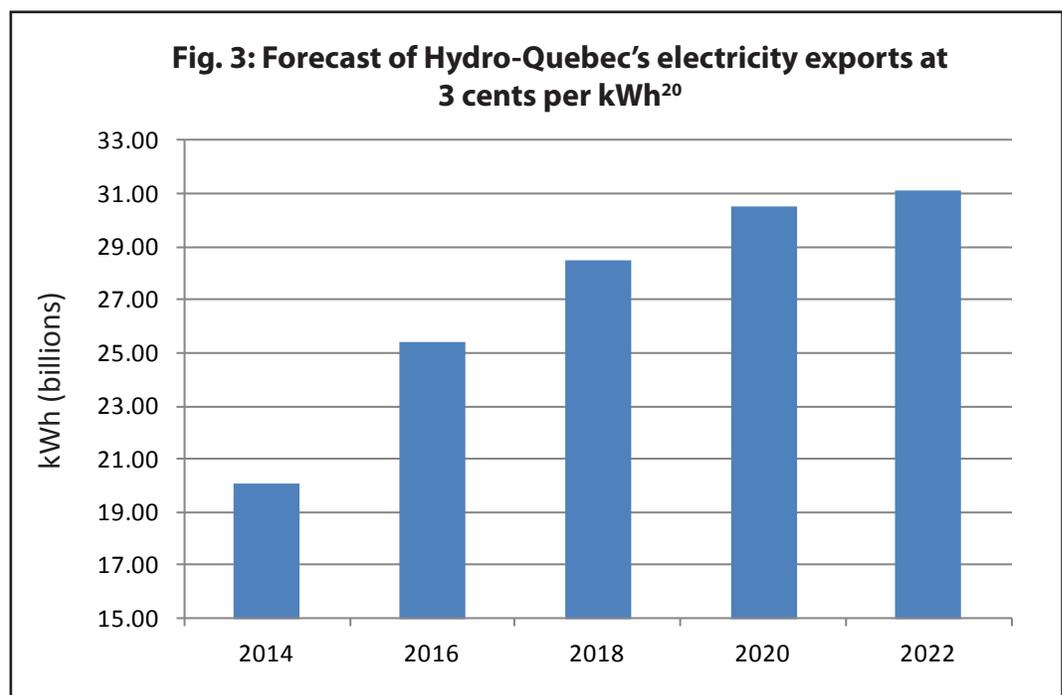
In 2013, Hydro Quebec exported 32 billion kWh of electricity. Most of these export sales were to the U.S., and 92% of these export sales were made under short-term contracts.<sup>17</sup>

As a result of the shale gas revolution, which has dramatically reduced the cost of natural gas-fired electricity generation in the United States, the average price of Hydro Quebec's exports fell by more than 50% between 2008 and 2013.<sup>18</sup>

According to the Quebec Energy Commission, Hydro Quebec can only obtain high prices for its exports during the 300 peak demand hours of each year. And, as a result of transmission constraints, Quebec can only export a maximum of 10 billion kWh per year during this window or less than one-third of its current total export supply. Its remaining export power is sold at an average price of just 3 cents per kWh.<sup>19</sup>

In February 2014 the Quebec Energy Commission forecast that Hydro Quebec's low-price electricity exports will grow by 50% during the next eight years.

Quebec has a growing surplus of low-cost water power



Since the cost of the Darlington Re-Build will be *at least* three times greater than the price of these exports to the U.S., increasing east-west electricity trade could provide huge economic benefits to Ontario and Quebec.

Currently, the electricity transfer capacity between Ontario and Quebec is 2,788 MW.<sup>21</sup> Therefore Quebec can export up to 24.4 billion kWh of electricity per year to Ontario. This is equivalent to 97% of the Darlington Nuclear Station's total output in 2013.<sup>22</sup>

Assuming a re-built Darlington could produce electricity for only 8.9 cents per kWh, the total net benefit to Canada of cancelling the Darlington Re-Build Project and replacing 97% of its generation with Quebec water power imports would be more than \$1.4 billion per year.<sup>23</sup> If this benefit were split equally between Ontario and Quebec, each province would come out ahead by more than \$700 million per year. Over a 20-year contract term this could provide an economic benefit of more than \$14 billion for each province. This sharing of benefits could be achieved by signing a long-term electricity contract at a price of 6 cents per kWh.

According to Premier Philippe Couillard of Quebec, “We have power available, we have surpluses ... we also want to sell it to our neighbours.” Moreover, Premier Couillard is sure that Ontario and Quebec can make a deal.<sup>24</sup>

If we assume that the actual cost of re-building Darlington would be 2.5 times greater than OPG’s “high-confidence” estimate and that the price of water power imports from Quebec is 6 cents per kWh, the annual saving for Ontario’s electricity consumers would be \$2.6 billion per year<sup>25</sup> – or \$52 billion over 20 years.

In addition, cancelling the Darlington Re-Build Project would reduce the provincial debt by \$12.9 billion to \$32 billion (\$12.9 billion x 2.5) or permit Ontario to invest an additional \$12.9 billion to \$32 billion in transportation and other infrastructure.

## Review of Ontario-Quebec Transmission Interties

In October 2014, the OPA and the Independent Electricity System Operator (IESO) released a report, *Review of Ontario Interties*, which concluded that *firm* water power imports from Quebec would require “significant investments in transmission infrastructure.”<sup>26</sup>

A *firm* import is an import that can be made on a *continuous* basis during every hour of the year.

According to the OPA/IESO report, due to transmission constraints in the Ottawa area, Ontario can only import 500 MW of water power from Quebec on a *firm* basis.<sup>27</sup>

However, while the IESO says that increasing imports would require transmission upgrades in the Ottawa area, it also acknowledges that these upgrades must be undertaken in any case to improve local electricity reliability in the region. These local reliability upgrades will permit Ontario to import 1,000 MW of *firm* water power from Quebec.<sup>28</sup>

According to the report, an additional investment of \$500 million will be necessary to allow Ontario to import at least 1,800 MW of *firm* power from Quebec.<sup>29</sup>

However, the OPA and the IESO did not investigate whether the combination of the Ottawa area improvements and this additional investment in a new circuit between Ottawa and Cornwall would be sufficient to allow Ontario to import 2,788 MW of *firm* power per year from Quebec – the full capacity of the interconnections between our two provinces. But in response to our questions, the IESO was unable to identify any additional transmission upgrades that would be necessary to allow Ontario to import 2,788 MW of electricity from Quebec on a *firm* basis.<sup>30</sup>

As we noted above, a long-term *firm* electricity supply contract with Hydro Quebec could lower our electricity costs by \$700 million per year or more. Therefore, it appears that the incremental transmission upgrades necessary to permit such a contract (\$500 million) would have a payback period of less than one year. With cost overruns reported to date on the Darlington project already reaching \$300 million before construction work has even begun, there is no question that this transmission investment is a bargain by comparison.

In addition, the OPA-IESO report found the interconnection capacity between our two provinces could be increased by 50% to 4,288 MW by building a new 1,500 MW intertie with Quebec near Cornwall for a cost of less than \$1.4 billion.<sup>30b</sup>

Finally, it is important to note that the IESO has admitted that they did not undertake a comprehensive analysis of Ontario’s transmission system to discover the optimal or least-cost solutions to facilitating water power imports from Quebec. As a result, further

**The payback period for transmission upgrades needed to take full advantage of Quebec water power will be less than one year**

study may reveal that the actual cost of upgrading the transmission system to permit *firm* imports may be less than the above-noted estimates. For example, the IESO told us that incremental energy conservation and efficiency and distributed generation (e.g., solar, combined heat and power) investments in the west end of Ottawa will *increase* our ability to import power from Quebec. In particular, for every megawatt of conservation or distributed generation secured, our ability to import *firm* power from Quebec will increase by *more than 1 MW*.<sup>31</sup>

## Energy Efficiency

According to the OPA, its average cost of saving a kWh between 2015 and 2020 will be only 3.5 cents per kWh.<sup>32</sup>

That is, the cost of saving a kWh is 60% lower than OPG's "high-confidence" estimate of the cost of re-building Darlington's aging nuclear reactors.

Nevertheless, the OPA's and the IESO's combined energy conservation budget for the next six years – \$2.4 billion<sup>33</sup> – is 80% *lower* than OPG's "high-confidence" estimate of the cost of re-building Darlington (\$12.9 billion).

Clearly, we need to put greater resources into achieving these very low-cost power savings that can help us avoid the need for high-cost new generation.

**Despite commitments to openness, the government has not committed to a public review of any deal reached with privately owned Bruce Power**

## The Bruce B Nuclear Re-Build Project

In October 2005 the OPA signed an electricity supply contract with Bruce Power for the re-start of the Bruce A Units 1 and 2 reactors. According to Bruce Power, the estimated capital cost for the re-start was \$2.75 billion.<sup>34</sup> However, the contract allowed Bruce Power to pass on 25% to 50% of its cost overruns to the OPA.<sup>35</sup>

In July 2009, when George Smitherman was Minister of Energy, the Bruce Power contract was amended to cap the Bruce A Units 1 and 2 cost overruns that could be passed on to the OPA at \$3.4 billion.<sup>36</sup>

The actual cost of the Bruce A Units 1 and 2 re-start was \$4.8 billion.

In 2013 the cost of electricity to Ontario's consumers and taxpayers from Bruce A Units 1 and 2 was 10.6 cents per kWh – more than three times the spot market price of water power imports from Quebec.<sup>37</sup>

In December 2013 the OPA and Bruce Power began secret negotiations with respect to a long-term electricity supply contract which would finance the re-building of the Bruce B Units 5, 6, 7 & 8 reactors.<sup>38</sup>

This contract will cost Ontario's electricity consumers between \$2 billion and \$3.7 billion per year.<sup>39</sup> Over a 30-year contract term, it will cost consumers \$60 billion to \$111 billion.

Moreover, the OPA is planning to sign this long-term multi-billion contract with Bruce Power *before* allowing any public review of its price, terms and conditions.

The OPA's proposed secret, closed door decision-making process is not consistent with Premier Wynne's desire for an open and transparent government that works with the people of Ontario:

"We want to be the most open and transparent government in the country. We want to be a government that works for the people of this province – and with them. It is of the utmost importance that we lead responsibly, act with integrity, manage spending wisely and are accountable for every action we take."<sup>40</sup>

## Recommendations

The Government of Ontario can implement Conservation First, lower our electricity bills and create a more open and transparent energy decision-making process by taking the following actions:

- Pay electricity consumers up to the same price to conserve a kWh that it pays electricity generators to supply a kWh.<sup>41</sup>
- Reduce our electricity bills by \$700 million to \$2.6 billion per year by cancelling the Darlington Re-Build Project and signing a long-term electricity supply contract with Hydro Quebec.
- Direct the OPA that it must **not** negotiate a proposed electricity supply contract that would allow Bruce Power to pass its Bruce B Re-Build Project cost overruns onto Ontario's electricity consumers or taxpayers.
- Direct the OPA that it must **not** sign a long-term electricity supply contract with Bruce Power to finance the Bruce B Re-Build Project *before* it has been publicly reviewed and approved by the Ontario Energy Board.

## Endnotes

- 1 Government of Ontario, *Achieving Balance: Ontario's Long-Term Energy Plan*, (December 2013), page 3.
- 2 *Achieving Balance*, pages 3 and 20.
- 3 *Achieving Balance*, page 29.
- 4 *Achieving Balance*, page 45.
- 5 Ontario Ministry of Finance, *News*, "Remarks delivered by Ed Clark, Chair of the Advisory Council on Government Assets, at the Metro Toronto Convention Centre, October 17, 2014".
- 6 Ontario Energy Board Docket No. EB-2013-0321, Undertaking J14.4.
- 7 Ontario Energy Board Docket No. EB-2013-0321, Exhibit L, Tab 4.7, Schedule 6, ED-005; Undertaking JT2.1 and Undertaking J14.4. Darlington's actual average annual capacity factor since it commenced operation in the 1990s has been 83%. See Undertaking J14.3.
- 7b Ontario Energy Board Docket No. EB-2013-0321, Exhibit L, Tab 4.12, Schedule 6 ED-011; and Transcript Volume 15, Redacted – Public, pages 56, 57 & 58.
- 8 Ontario Energy Board Docket No. EB-2013-0321, Undertaking J14.2.
- 9 Ontario Clean Air Alliance Research Inc., *The Darlington Re-Build Consumer Protection Plan*, (September, 2010), Appendix A.
- 10 Ontario Energy Board EB-2013-0321, Undertaking JT2.1; and Exhibit L, Tab 4.7, Schedule 6 ED-005.
- 11 Letter from CIBC World Markets Inc. to James Gillis, Ontario Deputy Minister of Energy, (October 17, 2005), pages 9 & 10 ; and Ontario Energy Board Docket No. EB-2013-0321, Exhibit L, Tab 4.7, Schedule 6, ED-005.
- 12 OPA, *A Progress Report on Contracted Electricity Supply: 2014 First Quarter*, pages 29 & 30.
- 13 According to OPG, in 2015, its nuclear operations will have 5,083 employees of whom 1,830 and 1,194 will be directly associated with the Pickering and Darlington Nuclear Stations respectively. We have allocated 50% (1,030) of the remaining 2,059 nuclear employees to Darlington. Wayne Robbins, Chief Nuclear Officer, Ontario Power Generation, *2013-2015 Nuclear Business Plan*, (May 16, 2013), page 20.
- 14 \$12.9 billion/2,224 jobs.
- 15 \$32 billion/2,224 jobs.
- 16 The Government of Ontario invested \$70.9 million to secure more than 2,800 jobs at Ford's Oakville Assembly plant. Office of the Premier, *News*, "Ontario Invests with Ford", (September 19, 2013).
- 17 Hydro Quebec, *Annual Report 2013*, page 99.
- 18 Commission sur les enjeux energetiques du Quebec, *Maitriser Notre Avenir Energetique*, (2 fevrier 2014), page 177 and Hydro Quebec, *Annual Report 2013*, page 99.
- 19 *Maitriser Notre Avenir Energetique*, pages 177, 181.
- 20 *Maitriser Notre Avenir Energetique*, page 183.

- 21 Ontario Energy Board Docket No. EB-2008-0272, Exhibit I, Tab 5, Schedule 6.
- 22 In 2013 the total output of the Darlington Nuclear Station was 25.1 billion kWh. See Ontario Energy Board Docket No. EB-2013-0321, Exhibit L, Tab 4.7, Schedule 6 ED-007.
- 23 24.4 billion kWh x (8.9 cents per kWh – 3 cents per kWh).
- 24 Martin Cohn, “Quebec, Ontario tap into shared interests”, *Toronto Star*, (August 30, 2014).
- 25 24.4 billion kWh x (16.6 cents per kWh – 6 cents per kWh).
- 26 IESO, *News Release*, “New Report Examines Opportunities to Expand Electricity Imports into Ontario”, (October 14, 2014).
- 27 OPA and IESO, *Review of Ontario Interties*, (October 14, 2014), page 23.
- 28 OPA and IESO, *Review of Ontario Interties*, (October 14, 2014), page 23.
- 29 OPA and IESO, *Review of Ontario Interties*, (October 14, 2014), page 24.
- 30 Author’s October 28, 2014 meeting with Mark Wilson, Director, Planning & Assessments, IESO; Ahmed Maria, Manager – Market Facilitation, IESO; and Jordan Penic, Senior Strategy Analyst, IESO.
- 30b According to the report, the total cost of this project, which includes the cost of a new 500 kV double circuit line from Bowmanville to Cherrywood, is \$1.4 billion. However, the IESO conceded that this line would not be needed if Darlington is out of service. OPA and IESO, *Review of Ontario Interties*, (October 14, 2014), page 25 and Appendix F; and author’s October 28, 2014 meeting with the IESO.
- 31 Author’s October 28, 2014 meeting with Mark Wilson, Director, Planning & Assessments, IESO; Ahmed Maria, Manager – Market Facilitation, IESO; and Jordan Penic, Senior Strategy Analyst, IESO.
- 32 OPA, *Conservation First Framework Update: Presentation to SAC*, (June 24, 2014), pages 7 & 8.
- 33 OPA, *Conservation First Framework Update: Presentation to SAC*, (June 24, 2014), page 7.
- 34 TransCanada, *Bruce A Restart Program*, (October 17, 2005), page 14.
- 35 TransCanada, *News Release*, “TransCanada to Invest in \$4.25 Billion Bruce Power Restart and Increase Its Interest in Bruce A”, (October 17, 2005).
- 36 Second Amending Agreement to the Bruce Power Refurbishment Implementation Agreement Between Bruce Power L.P. and Bruce Power A L.P. and Ontario Power Authority Dated as of the 6<sup>th</sup> day of July, 2009.
- 37 In 2013 Bruce Power was paid 8.5 cents per kWh by the OPA for the output of the Bruce Nuclear Station’s Units 1 and 2 reactors according to an estimate filed by Ontario Power Generation at an Ontario Energy Board hearing. In addition, the Ontario Electricity Financial Corporation (OEFC) collects nuclear debt retirement charges from electricity consumers and taxpayers to pay off the stranded nuclear debt which was incurred to build Ontario’s nuclear reactors. In 2012 the OEFC collected \$1.814 billion in nuclear debt retirement charges from consumers and taxpayers and the total output of Ontario’s nuclear generating stations was 85.6 billion kWh. Therefore the total nuclear debt retirement charge per kWh of nuclear electricity generated was 2.1 cents per kWh. 8.5 cents per kWh plus 2.1 cents per kWh = 10.6 cents per kWh. Ontario Energy Board Docket No. EB-2013-0321, Exhibit L, Tab 4.7, Schedule 1 Staff-031; Ontario Electricity Financial Corporation, *Annual Report 2012*, page 12; and Independent Electricity System Operator, *News Release*, “Ontario’s Independent Electricity System Operator Releases 2012 Electricity Production, Consumption and Price Data”, (January 11, 2013).
- 38 <http://www.powerauthority.on.ca/nuclear/bruce-restart-and-refurbishment-project-3000-mw-tiverton>
- 39 Our estimates are based on the following assumptions: a) the maximum output of Bruce B Nuclear Station is 3,140 MW; b) there are 8,760 hours in a year; c) Bruce B will have an average annual capacity factor of 82%; and d) the price for Bruce’s output will be between OPG’s “high-confidence” estimate of the cost of the Darlington Re-Build (8.9 cents per kWh) and 16.6 cents per kWh (the cost of Darlington’s output if its actual cost is 2.5 times greater than OPG’s “high-confidence” estimate).
- 40 Mandate letter from Premier Kathleen Wynne to Energy Minister Bob Chiarelli (September 25, 2014).
- 41 The OPA pays business consumers up to 20 cents per kWh for each kWh that their energy conservation and efficiency investments save during the first year of their operation. Assuming these investments actually deliver savings for at least 5 to 10 years, a payment of 20 cents per kWh saved during the first year is equivalent to an average payment of 2 to 4 cents per kWh saved. That is, the OPA’s payments for saving a kWh are 55% to 78% lower than OPG’s “high-confidence” estimate of the cost of re-building Darlington.



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