

February 28, 2014

BY COURIER (2 COPIES) AND EMAIL

Ms. Kirsten Walli

Board Secretary

Ontario Energy Board

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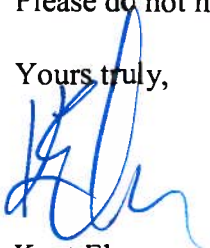
Dear Ms. Walli:

**Re: Environmental Defence Correspondence
EB-2013-0321 – Ontario Power Generation Inc. (“OPG”)
2014-2015 Payment Amounts Application**

Enclosed please find Environmental Defence’s interrogatories to OPG in the above matter.

Please do not hesitate to contact me if anything further is required.

Yours truly,



Kent Elson

cc: Applicant and Intervenors

**Environmental Defence Interrogatories
Ontario Power Generation Inc. (“OPG”)
2014-2015 Payment Amounts
EB-2013-0321**

Filed: February 28, 2014

Issue 1.4: Is the overall increase in 2014 and 2015 revenue requirement reasonable given the overall bill impact on customers?

1.4-ED-1

Reference: Ex. A1-3-1, Page 4

- a) Please state the total nuclear payment amount (including riders and all other charges) in \$ per MWh in 2013.
- b) Please state OPG’s requested total nuclear payment amounts (including riders and all other charges) in \$ per MWh for: (i) 2014; and (ii) 2015.

Issue 2.1: Are the amounts proposed for rate base appropriate?

2.1-ED-2

Reference: Exhibit B1, Tab 1, Schedule 1, Table 1

- a) Please expand Table 1 to show for the “Newly Regulated Hydroelectric” its gross plant at cost, accumulated depreciation and amortization, net plant, cash working capital, and materials and supplies for each year from 1999 to 2013 inclusive. Please also provide these values as of April 1, 1999.
- b) Please provide Ontario Hydro’s March 31, 1999 values for the “Newly Regulated Hydroelectric” facilities’ gross plant at cost, accumulated depreciation and amortization, net plant, cash working capital, and materials and supplies.

2.1-ED-3

Reference: Exhibit B1, Tab 1, Schedule 1, Table 1

- a) Please provide a copy of OPG’s most recent audited financial statements that were approved by its board of directors;
- b) Please provide a table listing the annual values for the assets and liabilities of the Newly Regulated Hydroelectric facilities as set out in OPG’s Inc.’s audited financial statements that were approved by the board of directors since OPG was established; and
- c) Please indicate the values for the assets and liabilities of the Newly Regulated Hydroelectric facilities as set out in Ontario Hydro’s audited financial statements that were approved by its board of directors prior to those assets being transferred to OPG.

2.1-ED-4

Reference: Exhibit B1, Tab 1, Schedule 1, Table 1

- a) Please estimate the following figures for the “Newly Regulated Hydroelectric” facilities based on the actual cost of those facilities, not the fair market values: (i) its gross plant at cost, (ii) accumulated depreciation and amortization, (iii) net plant, (iv) cash working capital, and (v) materials and supplies.

Issue 4.7: Are the proposed nuclear capital expenditures and/or financial commitments reasonable?

4.7-ED-5

Reference: Ex. D2-2-1, Attachment 5, Updated 2014-02-06

According to OPG: “Management continues to communicate, with high confidence, that the cost of DRP will be less than \$10 billion in 2013\$, excluding capitalized interest and escalation.” (Page 2)

- a) Please state management’s “high confidence” estimate of the total cost of the DRP, including capitalized interest, escalation and all other costs, in 2013\$ and 2014\$;
- b) Please state management’s estimate of the probability that the total cost of the DRP will exceed management’s “high confidence estimate”.
- c) Please state the LUEC of the DRP in 2013\$ and 2014\$ based on management’s “high confidence” estimate of its total cost.
- d) Please state and justify the reasonableness of the assumed debt-equity ratio, cost of debt, and cost of equity that were used to calculate the LUEC of the DRP.
- e) Please state the assumed annual capacity utilization factor that was used to calculate the LUEC of the DRP.
- f) Please provide a break-out of the LUEC of the DRP in 2013\$ and 2014\$ according to the following categories: (i) capital costs; (ii) fuel costs; and (iii) non-fuel operating costs.

4.7-ED-6

Reference: Ex. D2-2-1, Attachment 5, Updated 2014-02-06

- a) Please state management’s “99% probability” estimate of the maximum total cost of the DRP, including capitalized interest, escalation and all other costs, in 2013\$ and 2014\$.
- b) Please state the LUEC of the DRP in 2013\$ and 2014\$ based on management’s 99% probability estimate of its maximum total cost.
- c) Please state the assumed debt-equity ratio, cost of debt, and cost of equity that were used to calculate the LUEC of the DRP.

- d) Please state the assumed annual capacity utilization rate that was used to calculate the LUEC of the DRP.
- e) Please provide a break-out of the LUEC of the DRP in 2013\$ and 2014\$ according to the following categories: (i) capital costs; (ii) fuel costs; and (iii) non-fuel operating costs.

4.7-ED-7

Reference: Ex. D2-2-1, Attachment 5, Updated 2014-02-06

Please provide the actual capacity (MW), output (GWh) and annual capacity utilization factor of the Darlington Nuclear Station for each year of its operating life.

4.7-ED-8

Reference: Ex. D2-2-1, Attachment 5, Updated 2014-02-06, pages 18 and 45.

OPG has compared the LUECs of the DRP with the LUECs of new natural gas-fired combined-cycle turbines. Has OPG also compared the DRP's LUECs with the LUECs of other alternative options such as increased energy efficiency, increased use of Ontario's existing generating facilities, increased water power imports from Quebec and new combined heat and power plants? If "yes", please provide copies of all these studies. If "no", please explain why not.

4.7-ED-9

Reference: Ex. D2-2-1, Attachment 5, Updated 2014-02-06, pages 18 and 45.

- a) Please provide an estimate of the incremental cost (\$ per MWh) of: (i) increased use of Ontario's existing generating facilities (broken out into gas-fired and renewable generation), (ii) increased water power imports from Quebec, (iii) new combined heat and power plants, and (iv) increased energy efficiency?
- b) Please provide an estimate of the potential additional capacity (MW) and output (GWh) available from: (i) increased use of Ontario's existing generating facilities, (ii) increased water power imports from Quebec, (iii) new combined heat and power plants, and (iv) increased energy efficiency by (A) 2016, (B) 2020, (C) 2025, (D) 2030, and (E) 2035?

4.7-ED-10

Reference: Ex. D2-2-1, Attachment 5, Updated 2014-02-06, page 27.

- a) If the Darlington refurbishment goes ahead, at least one unit will be taken out of service starting in 2016. Please provide an excel spreadsheet with estimates for each month from 2016 to 2026 (inclusive) of the capacity (MW) and output (GWh) that will be lost due to unit(s) being taken out of service in the course of the refurbishment.
- b) Please estimate the net cost to ratepayers in each year from 2016 to 2026 resulting from the need to generate or purchase electricity from other sources

to replace the electricity that would have been produced by the unit(s) taken out of services in the course of the refurbishment.

Issue 4.12: Does OPG's nuclear refurbishment process align appropriately with the principles stated in the Government of Ontario's Long Term Energy Plan issued on December 2, 2013?

4.12-ED-11

Reference: Ex. D2-2-1, Attachment 5, Updated 2014-02-06, page 2; and Ex. D2-2-1, pages 15 – 22.

- a) Please provide a break-out of management's "high confidence" estimate of the total cost of the DRP, including capitalized interest, escalation and all other costs, in 2013\$ and 2014\$, according to the following categories: (i) RFR; (ii) Fuel Handling; (iii) Turbine-Generator; (iv) Steam Generators; and (v) Balance of Plant.
- b) Please provide a breakout of the: (i) RFR; (ii) Fuel Handling; (iii) Turbine-Generator; (iv) Steam Generators; and (v) Balance of Plan costs according to: (A) contractor costs; and (B) non-contractor costs.
- c) Please state the total cost of the DRP to OPG in 2013\$ and 2014\$ assuming the RFR, Fuel Handling, Turbine Generator; Steam Generators and Balance of Plan costs exceed budget by: (i) 50%; (ii) 100%; (iii) 150%; (iv) 200%; and (v) 250%. In each scenario, please also state: (i) the percentage of the contractors' cost overruns that are passed on to OPG; and (ii) the DRP's LUEC in 2013\$ and 2014\$.

4.12-ED-12

Reference: Ex. D2-2-1, Attachment 5, Updated 2014-02-06, page 2

- a) Please provide a break-out of management's "high confidence" estimate of the total cost of the DRP in 2013\$ and 2014\$ according to: (i) Unit 2; and (ii) Units 1, 3 & 4.
- b) Please provide management's "high confidence" estimate of the total cost of the DRP to OPG in 2013\$ and 2014\$ assuming: (i) the Darlington Unit 2 refurbishment is completed in Q3 2019; and (ii) the remainder of the DRP is cancelled in Q3 2019. Please state the LUEC of the DRP in 2013\$ and 2014\$ under this scenario.

4.12-ED-13

Reference: "The nuclear refurbishment process will adhere to the following principles....Mitigate reliability risks by developing contingency plans that include alternative supply options if contract and other objectives are at risk of non-fulfillment". Long Term Energy Plan, page 29

Please fully describe OPG's alternative supply options (e.g., increased renewable and gas-fired generation from Ontario's existing generating facilities, reduced electricity

exports, increased electricity imports from Quebec, increased electricity imports from the U.S. [broken-out by fuel type]) and their forecast incremental costs if Darlington Unit 2 does not return to service on schedule. Please fully describe your input assumptions and justify your analysis.

4.12-ED-14

Reference: Appendix A of *The Darlington Re-Build Consumer Protection Plan* (attached)

Appendix A of *The Darlington Re-Build Consumer Protection Plan* (attached) provides the original cost forecasts and the actual costs of Ontario's nuclear projects. Does OPG dispute the accuracy of any of the facts provided in this Appendix? If "yes", please state the facts that OPG disputes and provide OPG's opinion as to the correct value(s).

Issue 6.3: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities appropriate?

6.3-ED-15

Reference: Exhibits F2, F3 and F4

- a) Please provide the total operating, maintenance and administration costs for the Pickering Nuclear Station (\$ per MWh) for each of the following years: 2010, 2011, 2012 and 2013.
- b) Please provide OPG's forecast total operating, maintenance and administration costs for the Pickering Nuclear Station (\$ per MWh) for: (i) 2014; and (ii) 2015. Please provide a break-out of these costs according to: (i) operating; (ii) maintenance; and (iii) administration costs.
- c) Please provide a comparison of Pickering's forecast total operating, maintenance and administration costs (\$ per MWh) for 2014 and 2015 to the incremental cost of meeting Ontario's electricity needs by (i) increased energy efficiency, (ii) increased output of Ontario's existing generating facilities, (iii) reduced electricity exports and (iv) increased water power imports from Quebec. Please show your calculations. Please compare each of the alternatives separately.

6.3-ED-16

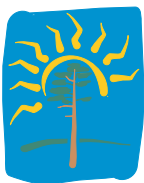
Reference: Exhibits F2, F3 and F4

- a) Please provide the total operating, maintenance and administration costs for the Darlington Nuclear Station (\$ per MWh) for each of the following years: 2010, 2011, 2012 and 2013.
- b) Please provide OPG's forecast total operating, maintenance and administration costs for the Darlington Nuclear Station (\$ per MWh) for: (i) 2014; and (ii) 2015. Please provide a break-out of these costs according to: (i) operating; (ii) maintenance; and (iii) administration costs.

The Darlington Re-Build Consumer Protection Plan



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Ontario Clean Air Alliance Research Inc.

SEPTEMBER 23, 2010

Darlington Re-Build Proposal

The purpose of Ontario Power Generation's (OPG's) proposed Darlington Re-Build project is to extend the operating life of the Darlington Nuclear Generating Station by 30 years.¹

OPG is seeking permission from the Ontario Energy Board (OEB) to raise its rates commencing March 2011 to finance the Darlington Re-Build "Definition Phase" and the "Darlington Site Campus Master Plan". The expenditures for the Definition Phase include: "the establishment of the project organization, scope finalization, engineering, planning and estimating, procurement of long lead time items and contract establishment. Additionally, all regulatory work will be completed in this phase including the EA [Environmental Assessment], ISR [Integrated Safety Review], Global Assessment and the IIP [Integrated Improvement Plan]." The Campus Master Plan includes facilities and infrastructure upgrades to support the Darlington Re-Build.²

OPG is planning to spend \$1.1 billion on the Definition Phase and Campus Master Plan between 2011 and 2014.³

In 2014, OPG's management will "revise its feasibility assessment, establish the project scope, cost and schedule" and seek approval from its Board of Directors to proceed with the Darlington Re-Build "assuming that the economics of the project remain favourable."⁴

The Economics of the Darlington Re-Build Proposal

According to OPG's preliminary economic analysis, the Darlington Re-Build will have a capital cost of \$8.5 to \$14 billion⁵ and will provide electricity at a cost of 6 to 8 cents (2009\$) per kWh.⁶ OPG's economic analysis is problematic for at least four reasons.

1. According to OPG, its input variables (e.g., re-build costs, post re-build costs, performance and post re-build station life) for the Darlington Re-Build are "fairly uncertain at this early stage".⁷
2. OPG's 6 to 8 cents per kWh estimate is based on the assumption that a re-built Darlington will have an average annual capacity utilization rate of 82 to 92%⁸ despite the fact that Ontario's fleet of nuclear reactors has never achieved an average annual capacity utilization rate of 82% or better during the last 25 years.⁹

To-date, OPG has re-built two nuclear reactors, namely Pickering A Unit 4 which was returned to service in 2003 and Pickering A Unit 1 which was returned to service in 2005. The average annual capacity utilization rate of Unit 4 during the last four years (2006 to 2009) was 59%.¹⁰ In 2004 the OPG Review Committee, which was chaired by John Manley, recommended that OPG continue with the Pickering A Unit 1 Re-Start based on the assumption that it would have an average annual capacity utilization rate of 85%.¹¹ However, its actual average annual capacity utilization rate during the last four years has been only 69%.¹² Therefore the average annual capacity utilization rate of the Pickering A Units 1 & 4 nuclear reactors during the past four years was only 64%.

To-date Bruce Power has re-built two of its nuclear reactors, namely, Bruce A Units 3 and 4. Their average annual capacity utilization rate during the last four years was 75%.¹³

According to OPG, assuming a 64% annual average capacity utilization rate, the Darlington Re-Build Proposal's cost of electricity would rise to 8 to 10 cents per kWh (2009\$).¹⁴

While the current Darlington reactors have performed better than the fleet average, the established pattern is for a large drop off in performance as CANDU units age and there is no precedent for re-built reactors achieving capacity factors of 82% or better.

3. OPG has underestimated the required commercial risk-adjusted rate of return on capital for this high-risk project. Specifically, OPG assumes the project can be 53% debt financed and its required rate of return on equity would be only 9.85%.¹⁵ On the other hand, according to CIBC World Markets, only 20 to 40% of Bruce Power's Bruce A Units 1 and 2 Re-Start project could be debt financed and its required return on equity could be up to 18%.¹⁶ According to OPG, assuming 30% debt financing and a 18% return on equity, the cost of the Darlington Re-Build rises to 10 to 14 cents per kWh (assuming an 82% average annual capacity utilization rate) or 12 to 18 cents per kWh (assuming a 64% average annual capacity utilization rate).¹⁷
4. OPG's analysis assumes that the Darlington Re-Build project will be completed on budget despite the fact that every nuclear project in Ontario's history has experienced huge capital cost overruns (see Appendix A). Similarly, the retrofit of the Point Lepreau reactors in New Brunswick is reported to be massively over budget despite assurances at the outset of the project that the pattern of massive cost overruns would not be repeated.⁶⁶

On average, the actual costs of Ontario's nuclear projects have been 2.5 times greater than their original cost estimates. If the Darlington Re-Build's actual cost exceeds OPG's original cost estimate range by 2.5 times then its final cost will be \$21.25 to \$35 billion. As a consequence, it will produce electricity at a cost of 19 to 27 cents per kWh (assuming an 82% average annual capacity utilization rate) or 24 to 37 cents per kWh (assuming a 64% average annual capacity utilization rate).¹⁸

Lower Cost and Lower Risk Options

Fortunately Ontario has numerous lower cost and lower risk options to meet its electricity needs. Specifically, improving energy efficiency; reducing wasteful natural gas usage; and water power imports from Quebec.

Energy Efficiency

Energy efficiency is the lowest cost option to meet our electricity needs. However, as the following facts reveal the Ontario Power Authority (OPA) is not aggressively pursuing the province's low cost energy efficiency investment opportunities.

1. As of December 31, 2009, the OPA's total spending on energy conservation and demand management was \$541.6 million; whereas it has contracted for electricity supply projects with a total capital cost of \$23.622 billion.¹⁹ That is, for every dollar that it has spent on energy conservation and demand management, it has contracted for \$44 of new supply.
2. The OPA's *Industrial Accelerator Program* pays large industrial customers up to 23 cents for each kWh that their energy efficiency investments save *during the first year* of their operation.²⁰ Assuming these investments actually deliver savings for at least 5 to 10 years, a payment of 23 cents per kWh saved *during the first year* is equivalent to an average annual payment of only 2.3 to 4.6 cents per kWh. That is, OPA's payments for saving a kWh are therefore 76 to 94% less than the cost of producing a kWh by re-building Darlington.

Ending Wasteful Natural Gas Use

Most buildings and factories in Ontario use natural gas to produce just one service, namely heat. It is much more efficient to use these same molecules of natural gas to simultaneously produce heat and electricity. This is what combined heat and power (CHP) plants do. They can have energy efficiencies of 80 to 90% compared to the 33% energy efficiency of a nuclear reactor.²¹

CHP plants can be installed in apartment buildings, condominiums, shopping centres, hospitals, schools, airports and factories.

According to the OPA, CHP plants can supply electricity at a total cost of 5.7 to 6.0 cents per kWh assuming a natural gas cost of \$8 per

MMBTU.²² [On August 27, 2010 the spot price of natural gas was \$3.74 (U.S.\$) per MMBTU at Henry Hub].

Ontario’s existing CHP capacity is 1,281 megawatts (MW).²³ There are three available estimates of Ontario’s total CHP potential capacity:

- 1. According to industry expert Tom Casten, it is 11,400 MW.²⁴
- 2. According to a report prepared for Natural Resources Canada, it is 13,735 MW.²⁵
- 3. According to a report prepared for the Ontario Ministry of Energy, it is 16,514 MW.²⁶

This means that Ontario’s incremental CHP supply potential is at least 2.8 times greater than the size of the Darlington Nuclear Generating Station (3,512 MW).²⁷

Water Power Imports from Quebec

Currently, Ontario’s net electricity imports from Quebec are negligible. However, with the completion of a new 1,250 MW interconnection between Quebec and Ontario earlier this year, the total transfer capacity between the two provinces is now 2,788 MW.²⁸ As a consequence, water power imports from Quebec could displace more than 75% of Darlington’s generation capacity without the need for new transmission capacity between Ontario and Quebec.

In 2009 Hydro Quebec exported 23 billion kWh of electricity (mostly to the U.S.) at an average price of 6.5 cents per kWh.²⁹

Pursuant to the *National Energy Board Act*, Hydro Quebec must give Ontario an opportunity to purchase electricity on terms and conditions

(including price) as favourable as the terms and conditions of its export sales to the U.S. Therefore the latest market data indicates that Ontario could purchase electricity from Quebec at a cost of approximately 6.5 cents per kWh.

Protecting Electricity Consumers from Capital Cost Overruns

In 2004, the Province of Ontario created the Ontario Power Authority (OPA) to promote energy conservation and demand management and to contract for new electricity supplies. To-date the OPA has signed only one contract that allows a power producer to pass its capital cost overruns on to the province’s electricity consumers or taxpayers. That contract was a nuclear re-build project.

Renewable and Natural Gas-Fired Electricity Generating Facilities

The OPA has entered into over 400 contracts with individuals, co-ops, First Nations communities, municipal electric utilities and private sector corporations for electricity from wind, water, bio-energy, solar and natural gas-fired power plants.³⁰ None of these contracts permit the suppliers to pass their capital cost overruns on to Ontario’s electricity consumers or taxpayers.

Bruce A Units 1 & 2 Re-Start Project

On October 17, 2005 the OPA signed a contract with Bruce Power for the re-start of the Bruce A Nuclear Generating Station’s Units 1 & 2 reactors at a forecast cost of \$2.75 billion. According to the October 2005 contract, if Bruce Power has capital cost overruns, it can pass 25-50% of these extra costs on to the OPA.³¹

Approximate Costs of Ontario’s Electricity Resource Options

Energy Efficiency	Combined Heat and Power	Water Power Imports from Quebec	Darlington Re-Build
2.3 to 4.6 cents per kWh	5.7 to 6.0 cents per kWh	6.5 cents per kWh	19 to 37 cents per kWh

On April 18, 2008 the *Toronto Star* reported that the Bruce A Units 1 & 2 re-start was \$300 to \$650 million over budget.³²

On July 6, 2009 when George Smitherman was Minister of Energy & Infrastructure, the Bruce Power contract was amended to cap the cost overruns that can be passed on to Ontario's electricity consumers at \$3.4 billion.³³

Darlington New Build Competitive Procurement Process

On March 7, 2008, Ontario's then Minister of Energy, Gerry Phillips, announced that Ontario was proceeding with a competitive procurement process for the construction of two new nuclear reactors at the Darlington Nuclear Generating Station. Minister Phillips invited four companies to submit bids: Areva, Atomic Energy of Canada Limited (AECL), GE Hitachi Nuclear Energy and Westinghouse Electric Company.³⁴

As of June 16, 2008, according to the Government's proposed procurement process, the successful bidder would **not** be required to submit a fixed price bid for building the two new nuclear reactors. That is, the winning bidder would be allowed to pass on at least some of its capital cost overruns to Ontario's electricity consumers.³⁵

On June 20, 2008, George Smitherman became Ontario's Minister of Energy and Infrastructure. Minister Smitherman amended the procurement process to require the bidders to submit a fixed price bid. AECL was the only bidder that "met the province's demand that the vendor assume all the risk for cost overruns."³⁶ However, AECL's price for building new nuclear reactors, \$10,800 per kW, was 3.7 times higher than the Ontario Power Authority forecast of \$2,900 per kW.³⁷ As a consequence, Minister Smitherman suspended the nuclear procurement process and said that Ontario will only proceed with the construction of new nuclear reactors if the Government of Canada will subsidize their cost.³⁸ To-date Prime Minister Stephen Harper has not responded positively to this request.

Recommendations

1. To protect Ontario's electricity consumers and taxpayers from a capital cost overrun of up to \$21 billion or more the Government of Ontario should subject the Darlington Re-Build proposal to the *Level Playing Field Rule* first espoused by George Smitherman. That is, the Government of Ontario should tell Ontario Power Generation (OPG) that it will not be allowed to pass on any capital cost overruns associated with re-building the Darlington Nuclear Generating Station to Ontario's electricity consumers or taxpayers. To proceed with the Darlington Re-Build proposal and to comply with the *Level Playing Field Rule*, OPG must find a third party (e.g., Areva, Atomic Energy of Canada, Bruce Power, General Electric) that will agree to re-build Darlington under a fixed price contract.
2. The Government of Ontario should direct the Ontario Power Authority to aggressively pursue the lower cost and lower risk options to meet our electricity needs. That is, energy efficiency investments, combined heat and power and water power imports from Quebec.

Appendix A: Ontario's History of Nuclear Cost Overruns and Ontario Hydro's Stranded Nuclear Debt

Ontario's History of Nuclear Cost Overruns

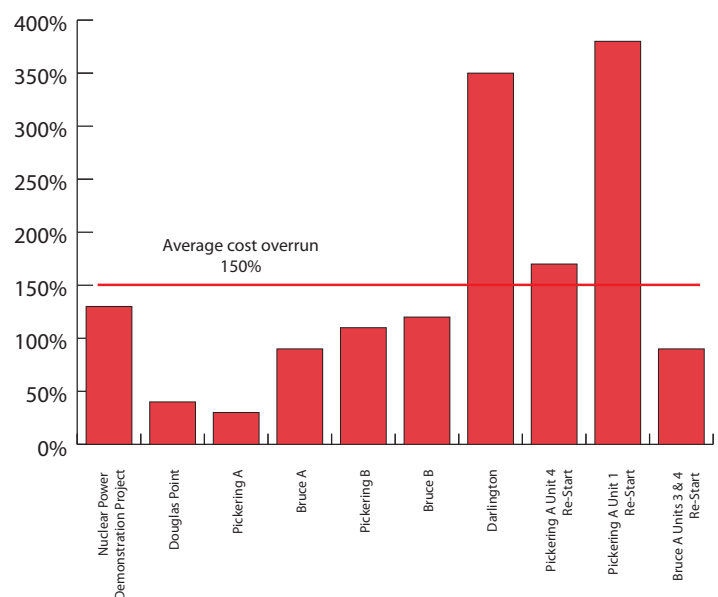
Every nuclear project in Ontario's history has gone over budget.

- The original cost estimate for the 20 megawatt (MW) Nuclear Power Demonstration Project on the Ottawa River was \$14.5 million.³⁹ The actual cost was 2.3 times higher at \$33 million.⁴⁰
- The original cost estimate for the 200 MW Douglas Point Nuclear Power Station on Lake Huron was \$60 million.⁴¹ The actual cost was 1.4 times higher at \$85 million.⁴²
- In 1967 Ontario Hydro estimated that the 2,160 MW Pickering A Nuclear Generating Station would cost \$527.65 million.⁴³ The actual cost was 1.3 times higher at \$700 million.⁴⁴
- In 1969 Ontario Hydro estimated that the 3,200 MW Bruce A Nuclear Generating Station would cost \$944 million.⁴⁵ The actual cost was 1.9 times higher at \$1.8 billion.⁴⁶
- In 1975 Ontario Hydro estimated that the 2,160 MW Pickering B Nuclear Generating Station would cost \$1.8 billion.⁴⁷ The actual cost was 2.1 times higher at \$3.8 billion.⁴⁸
- In 1975 Ontario Hydro estimated that the cost of the 3,200 MW Bruce B Nuclear Generating Station would be \$2.7 billion.⁴⁹ The actual cost was 2.2 times higher at \$5.9 billion.⁵⁰
- In 1975 Ontario Hydro estimated that the cost of the 3,400 MW Darlington Nuclear Generating Station would be \$3.2 billion.⁵¹ The actual cost was 4.5 times higher at \$14.319 billion.⁵²
- In 1999 Ontario Power Generation (OPG) estimated that the total cost of returning the shutdown Pickering A Unit 4 to service would be \$457 million.⁵³ The actual cost was 2.7 times higher at \$1.25 billion.⁵⁴

- In 1999 OPG estimated that the total cost of returning the shutdown Pickering A Unit 1 to service would be \$213 million.⁵⁵ The actual cost was 4.8 times higher at \$1.016 billion.⁵⁶ Nevertheless, a February 2010 OPG news release asserted that the project was completed "on budget".⁵⁷
- Bruce Power estimated that the total cost of returning the shutdown Bruce A Units 3 and 4 to service would be \$375 million. The actual cost was 1.9 times higher at \$725 million.⁵⁸
- In 2005 the Ontario Power Authority signed a contract with Bruce Power for the return to service of the shutdown Bruce A Units 1 and 2. In 2005 the estimated capital cost was \$2.75 billion. The units have still not been returned to service, but in February 2010 TransCanada Corp. (a major shareholder of Bruce Power) estimated that the project will cost \$3.8 billion.⁵⁹

On average, the actual costs of the Ontario nuclear projects that have been completed to-date have exceeded their original cost estimates by 2.5 times.

Ontario's History of Nuclear Cost Overruns



Fool me once, shame on you. Fool me twice, shame on me. Fool me 11 times...

Ontario Hydro’s Stranded Nuclear Debt

In 1999, as a result of the cost overruns and the poor performance of its nuclear reactors, Ontario Hydro was broken up into five companies. All of its generation assets were transferred to Ontario Power Generation (OPG). In order to keep OPG solvent, \$19.4 billion of Ontario Hydro’s debt or unfunded liabilities associated with electricity generation facilities was transferred to the Ontario Electricity Financial Corporation (an agency of the Government of Ontario) as “stranded debt” or “unfunded liability”.⁶⁰

The Ontario Electricity Financial Corporation (OEFC) collects revenues from the following sources to help pay off the nuclear stranded debt.

- A debt retirement charge of 0.7 cents per kWh which is levied on all Ontario electricity consumers.
- All of the provincial income tax payments from OPG, Hydro One and Ontario’s municipal electric utilities (e.g., Toronto Hydro).

- All of the dividend payments from OPG and Hydro One to their sole shareholder, the Government of Ontario.

In 2009, the sum of the above-noted nuclear debt retirement payments was \$1.8 billion.⁶¹ This is equivalent to an annual nuclear debt retirement charge of \$137.73 per person in Ontario or \$551 for a family of four.⁶²

The defunct Ontario Hydro’s nuclear debt costs Ontario’s consumers and taxpayers \$1.8 billion per year.

In 2001 the OEFC forecast that the nuclear debt would be fully paid off “in the years ranging from 2010 to 2017”.⁶³ However, as of 2009, the debt has only been reduced by \$3.2 billion to \$16.2 billion.⁶⁴ The OEFC is now forecasting that the debt will be eliminated between 2014 and 2018.⁶⁵

Endnotes

- 1 Ontario Energy Board Docket No. EB-2010-0008, Exhibit D2, Tab 2, Schedule 1, Page 6.
- 2 Ontario Energy Board Docket No. EB-2010-0008, Exhibit D2, Tab 2, Schedule 1, Page 11.
- 3 Ontario Energy Board Docket No. EB-2010-0008, Exhibit L, Tab 10, Schedule 014.
- 4 Ontario Energy Board Docket No. EB-2010-0008, Exhibit D2, Tab 2, Schedule 1, Page 10.
- 5 Ontario Energy Board Docket No. EB-2010-0008, Exhibit JT1.2.
- 6 Ontario Energy Board Docket No. EB-2010-0008, Exhibit D2, Tab 2, Schedule 1, Pages 4 & 5.
- 7 Ontario Energy Board Docket No. EB-2010-0008, Undertaking JT1.3.
- 8 Ontario Energy Board Docket No. EB-2010-0008, Exhibit L, Tab 10, Schedule 002.
- 9 Ontario Ministry of Energy, Science and Technology, *Direction for Change: Charting a Course for Competitive Electricity and Jobs in Ontario*, (November 1997), page 7. The Ontario nuclear industry often claims higher average capacity utilization rates by ignoring the performance of reactors that are temporarily or permanently and pre-maturely shutdown.
- 10 Email from Carrie Reid, Customer Relations, Independent Electricity System Operator to Jack Gibbons, Ontario Clean Air Alliance, June 24, 2010.
- 11 OPG Review Committee, *Transforming Ontario's Power Generation Company*, (March 15, 2004), Page 50.
- 12 Email from Carrie Reid, Customer Relations, Independent Electricity System Operator to Jack Gibbons, Ontario Clean Air Alliance, June 24, 2010.
- 13 Emails from Carrie Reid and Rebecca Short, Customer Relations, Independent Electricity System Operator to Jack Gibbons, Ontario Clean Air Alliance, July 21, 2010 and September 14, 2010.
- 14 Ontario Energy Board Docket No. EB-2010-0008, Exhibit L, Tab 10, Schedule 004.
- 15 Ontario Energy Board Docket No. EB-2010-0008, Exhibit L, Tab 6, Schedule 002 and Tab 10, Schedule 002.
- 16 Letter from CIBC World Markets Inc. to James Gillis, Ontario Deputy Minister of Energy, October 17, 2005.
- 17 Ontario Energy Board Docket No. EB-2010-0008, Exhibit L, Tab 10, Schedule 006.
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