

Board Staff Interrogatory #067

Ref: Ex. F2-T2-S3, Attachment 1, Attachment 2

Issue Number: 6.7

Issue: Are the proposed expenditures related to continued operations at Pickering B appropriate?

Interrogatory

There appear to be a variety of cost estimates provided by OPG that range significantly (\$184M - \$300M) for the full Pickering B Continued Operations project.

- The initial [OPG news release](#) on Feb. 16, 2010 notes “OPG will also invest \$300 million to ensure the continued safe and reliable performance of its Pickering B station”.
 - In this subsequent OPG application the following is found:
 - In the Business Case (Attachment 1), the table on page 2 shows a total estimated cost of \$190.2M.
 - The estimate provided to the OPA is \$184M as shown in the letter received from the OPA in the table under “INFORMATION PROVIDED BY OPG...” (Attachment 2).
 - In OPG’s [“2009 Sustainable Development Report”](#) subsequently issued on June 8, 2010, it states on page 42 that the cost estimate is \$300M. The report specifically notes “Pickering B Nuclear Refurbishment: Refurbishment of Pickering B will not be pursued. OPG will invest approximately \$300 million to continue the safe and reliable performance of the plant for about the next ten years”.
- a) Please explain this substantial range in cost estimates provided by OPG over a relatively short period of time (about 5 months) for the same project.
- b) Please also identify the estimated cost the Board should consider to be the most accurate estimate and explain why. Please also explain the level of confidence OPG has in that estimated cost in quantitative terms (e.g., +/-15%, +/-30%, etc).

Response

- a) The \$184M estimate provided to the OPA and the \$190.2M in the business case are equivalent. The \$184M represents the cost in 2010 dollars (unescalated) of the Continued Operations initiative during the business planning period (2010 – 2014). The \$190.2M is the same number expressed in dollars of the year (escalated).

1
2 The \$300 million was announced in the context of incremental investments in Pickering
3 *"to continue the safe and reliable performance of the plant for about the next 10 years"*
4 and is a conservative estimate. Pickering A and B are expected to operate until
5 2018/2020 under continued operations.
6

- 7 b) The estimated cost that the OEB should consider in this rate application is \$190.2M, as
8 shown in OPG's Pickering B Continued Operations BCS and the 2010 – 2014 Nuclear
9 Business Plan. The associated test period OM&A amounts are \$92.9M plus \$11.7M for
10 the Fuel Channel Life Cycle Management project, as found at Ex. F2-T2-S3, Chart 2.
11 OPG considers the estimate to be a budgetary estimate, with a plus 30 per cent to minus
12 15 per cent range.

Board Staff Interrogatory #068

Ref: Ex. F2-T2-S3, pages 11-12

Issue Number: 6.7

Issue: Are the proposed expenditures related to continued operations at Pickering B appropriate?

Interrogatory

The application notes that OPG is seeking recovery of the variance between actual and forecast 2008 and 2009 costs for the Pickering B Refurbishment and the Pickering B Continued Operations initiative through the Capacity Refurbishment Variance Account as detailed in Ex. H1-T2-S1. OPG also seeks to recover the forecast difference between 2010 expenditures and amounts underpinning current payment amounts, consistent with the methodology approved in EB-2009-0174.

- a) Please clarify what the above means given there were no forecast expenditures for Pickering B Continued Operations for 2008 through 2009.
- b) OPG submitted an application in June 2009 and that process was not completed until October 2009 (EB-2009-0174). Please also explain why OPG proceeded to make expenditures on Pickering B Continued Operations in 2009 and 2010 before issuing a news release and bringing it to the attention of the Board.

Response

- a) The forecast expenditures for Pickering B Continued Operations in EB-2007-0905 were nil. The variance recorded in the Capacity Refurbishment Variance Account would therefore be the difference between nil and the actual level of expenditures in 2008 and 2009.
- b) EB-2009-0174 was an application for an accounting order which dealt with the mechanics of amortization and entries into the deferral and variance accounts during 2010 and was not a proceeding to examine any particular expenditure. OPG filed an application in May 2010 which included a significant amount of information on the Pickering B Continued Operations project. OPG issued a press release on February 16, 2010 that discussed this project. Expenditures prior to these two communications were modest, particularly in the context of OPG's total revenue requirement.

Board Staff Interrogatory #069

Ref: Ex. F2-T2-S3, pages 2 and 7

Issue Number: 6.7

Issue: Are the proposed expenditures related to continued operations at Pickering B appropriate?

Interrogatory

The application notes on page 2 that *"The economic assessment of Pickering B Continued Operations contained in the attached business case (Attachment 1) shows that the initiative has substantial value to the Ontario electricity system. OPG estimates the net present value of this initiative to be approximately \$1.1B (2010 dollars). This net present value is based on the difference between the estimated cost of Pickering B's output and the estimated cost of replacement generation"*. It also notes on page 7, *"The calculated benefit to the system includes the value of being able to operate the two units at Pickering A to 2020, estimated at approximately \$400M"*.

- a) For each year over the applicable period, please identify and explain all of the assumptions underlying this estimate of \$1.1B including:
- A breakdown of the replacement generation (by technology type) and the associated price paid to each;
 - Total electricity demand;
 - Spot market price;
 - Capability factors and total generating cost per MWh for both Pickering B and Pickering A;
 - Natural gas prices;
 - etc.
- b) Further to the above, it appears the current payment amounts have been used to make the Business Case (p.18), with about \$53 / MWh continuing to be unchanged for the next 10 years.
- i) Is that understanding correct?
- ii) If so, does OPG believe that is a realistic assumption given the trend in payment amounts since OPG's assets became regulated in 2005 and OPG's request in this application that the OEB establish payment amounts of \$55.34 per MWh for the nuclear facilities exclusive of riders (A1-T3-S1, p.2)? If not, please identify the assumed payment amounts to make the Business Case and to estimate the benefits.

Response

a) Replacement generation:

The referenced economic assessment results assume that, were Pickering Continued Operations not to be achieved, the replacement generation for the Pickering A and B units over the period 2015 to 2020 would be, on average, greater than 85 per cent Ontario-based,

1 natural gas-fired, combined cycle generation. The remainder of the generation displaced is
2 from a diverse set of fuel types, including other natural gas-fired and oil-fired generation.

3
4 Total electricity demand:

5 Table 1 attached shows the forecast of total electricity demand OPG used in its base case
6 analysis of Pickering Continued Operations.

7
8 Market price:

9 Table 1 shows OPG's assessment of the impact of Pickering A and B units being in service
10 during the period 2015 to 2020 on the market price of electricity in Ontario. These
11 differences in market price are based on OPG's median assumptions.

12
13 Natural Gas prices:

14 OPG's median assumptions of natural gas prices are also shown in Table 1.

15
16 Capability Factor, Operating Costs and Generation Output:

17 Table 2 shows OPG's assumptions regarding the capacity factors, incremental operating
18 costs and generation output from the Pickering A and B units used in the evaluation of
19 Pickering Continued Operations. Incremental costs are best understood as those costs OPG
20 expects would be avoided if the units were to be shutdown.

- 21
22 b) (i) OPG did not use the current payment amounts of \$53/MWh unchanged to make the
23 business case for Pickering Continued Operations. OPG included this test because it
24 provides a high-level indication that the incremental cost of Pickering Continued
25 Operations is less than the current nuclear regulated rate of \$53/MWh. OPG also
26 showed a sensitivity test against the current nuclear rate escalated at the rate of
27 inflation, nominally 2 per cent over the period.

28
29 The Business Case for Pickering Continued Operations is that the initiative has
30 substantial value (NPV of \$1.1B, 2010 dollars) to the Ontario electricity system.

- 31
32 (ii) Not applicable.

Table 1
OPG Median Assumptions on Ontario Primary Demand, Natural Gas Prices (2010 – 2020) and the Impact of Pickering
Continued Operations on the Ontario Market Price

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
OPG Ontario Primary Demand Forecast (TWh)	144	146	147	148	149	150	151	151	152	152	153
OPG Natural Gas Price Forecast (2009 US\$/mmBTU – Henry Hub)	5.7	6.6	6.7	6.7	6.6	6.7	6.8	6.8	6.9	7.0	7.0
Impact on Ontario Energy price (2010 C\$/MWh)	0.2	0.9	0.1	0.2	(1.6)	(5.6)	(4.6)	(4.8)	(4.7)	(4.3)	(1.6)

Table 1 Notes

1. Negative numbers in the “Impact on Ontario Energy Price” data, indicate that OPG is forecasting a reduction in Ontario market price in those years.

Table 2
Operating Costs, Energy Production Capacity Factors Used in the Pickering Continued Operations Analysis
PICKERING A & B: Base Case and Continued Operations Data

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Base Case (No Continued Operations)												
Pickering A	Incremental Operating Costs (M2010\$)	399	382	405	401	365	0	0	0	0	0	0
	Energy (TWh)	6.7	7.4	7.7	7.7	7.3	0.0	0.0	0.0	0.0	0.0	0.0
	Annual Capacity Factor (%)	73.7	82.6	85.3	84.8	91.5	n/a	n/a	n/a	n/a	n/a	n/a
Pickering B	Total OM&A (M2010\$)	617	600	673	673	533	312	42	0	0	0	0
	Energy (TWh)	14.1	15.8	16.0	16.3	10.5	4.3	0.6	0.0	0.0	0.0	0.0
	Annual Capacity Factor (%)	77.9	87.7	88.4	90.4	89.4	96.0	96.0	n/a	n/a	n/a	n/a
Continued Operations												
Pickering A	Operating Costs (M2010\$)	399	382	405	401	413	410	409	409	409	410	167
	Energy (TWh)	6.7	7.4	7.7	7.7	7.8	7.8	7.8	7.7	7.8	8.0	3.3
	Annual Capacity Factor (%)	73.7	82.6	85.3	84.8	86.8	86.8	86.4	85.9	86.3	88.7	90.5
Pickering B	Operating Costs (M2010\$)	629	644	710	703	710	649	655	651	573	449	182
	Energy (TWh)	13.8	14.6	15.4	15.3	14.5	13.8	15.0	14.2	11.3	8.4	3.4
	Annual Capacity Factor (%)	76.1	81.0	84.7	84.4	80.4	76.3	82.8	78.6	80.1	93.3	91.5

Table 2 Notes

1. Operating costs include direct station operations, fuel and incremental nuclear support and corporate support costs.
2. In the years when units transition to out-of-service, the station annual OM&A was adjusted depending on the number of units in-service.
3. This analysis does not show the impact of extending the unit lives on OPG's Decommissioning, Low & Intermediate Level Waste and Used Fuel management provisions.
4. Shaded cells indicate partial year operation of 1 or 2 units depending on the case.

Board Staff Interrogatory #070

Ref: Ex. F2-T2-S3, page 4

Issue Number: 6.7

Issue: Are the proposed expenditures related to continued operations at Pickering B appropriate?

Interrogatory

The application notes on page 4 that OPG has decided to pursue the continued operation work program on Pickering B rather than refurbish Pickering B and the major factors in this decision included "the economics of the Pickering B refurbishment". Please elaborate on the reasons for the decision against refurbishment of Pickering B, particularly the factor noted above.

Response

The refurbishment scope associated with Pickering B Generating Station included replacement of fuel channels, feeders, and steam generators. A decision to refurbish Pickering B Generating Station in the mid-2010 timeframe would have resulted in an overlap with the Darlington Generating Station refurbishment and other potential nuclear refurbishments in the province. Significant risks to the success of these projects were foreseen if multiple refurbishments were pursued, including project management and overall resource availability. These risks, as well as the factors listed below, all contributed to the decision not to refurbish Pickering B Generating Station.

Other factors included:

- the economic benefit of the Continued Operations of Pickering B Generating Station.
- the lead time required to procure steam generators for Pickering B Generating Station.
- the need to manage the overall availability of OPG's nuclear fleet during the period following the shutdown of OPG's coal-fired units and during the period when major nuclear refurbishments are expected to be executed in the province.
- uncertainty that Pickering B Generating Station would be able to achieve an additional 25 to 30 years operation (Pickering B Generating Station is approximately a decade older than the Darlington Generating Station units)

Given these significant risks (which, if realized, could affect the economics of Pickering B Refurbishment), and the fact that another feasible option (Continued Operations) was available for Pickering B Generating Station, the decision was made not to pursue Pickering B Refurbishment.

Board Staff Interrogatory #071

Ref: Ex. F2-T2-S3, pages 5-6

Issue Number: 6.7

Issue: Are the proposed expenditures related to continued operations at Pickering B appropriate?

Interrogatory

The application notes that Pickering A's operation is linked to Pickering B through shared common systems and a number of interdependent systems at the Pickering site. It further states that, while it would be possible to operate Pickering A after end of life of Pickering B, OPG is not planning to operate the two units at Pickering A with Pickering B shut down and therefore extending the service lives of Units 7 and 8 at Pickering B until 2020 will allow the two Pickering A units to operate until at least 2020.

- a) Please explain what the estimated cost would be to operate Pickering A without Pickering B.
- b) Please also explain how Pickering B operated when the Pickering A units were not in service (i.e., before refurbishment) given the shared common and number of interdependent systems.
- c) Please also identify the expected service lives of the Pickering A units that were identified in the Business Case that was made for refurbishment of the two units. Given OPG's statement in this application referenced above, please also explain how that Business Case for Pickering A was made given that the assessment of the feasibility of refurbishing Pickering B began after those Pickering A units were refurbished and returned to service.

Response

The interrogatory incorrectly refers to the "refurbishment" of Units 4 and 1. The Pickering A Generating Station Unit 1 and Unit 4 return to service project was not a refurbishment.

- a) A detailed cost estimate for the independent operation of Pickering A Generating Station was not developed. As indicated in the Pickering B Continued Operations business case (Ex. F2-T2-S3, Attachment 1, page 7, "Impact on Pickering A Operation"), while it would not be impossible to operate the Pickering A Generating Station after end of life of Pickering B Generating Station, OPG at this time would not attempt to operate Pickering A Generating Station with Pickering B Generating Station shutdown. Based on the number of complex technical licensing issues that would need to be resolved and approved by the Canadian Nuclear Safety Commission ("CNSC"), the costs to operate

Pickering A Generating Station independent of Pickering B Generating Station would likely equal or exceed the system value.

b) During the lay-up of the Pickering A Generating Station units, the shared and common systems required to operate Pickering B Generating Station remained in-service and were maintained (e.g., the Vacuum Building). The dependency of Pickering B Generating Station on Pickering A Generating Station is less complex than the dependency of Pickering A Generating Station on Pickering B Generating Station.

c) The original business case assessment for restart of Pickering A Generating Station Units 1 – 4 was based on the units achieving their “nominal” lives of 40 years, (i.e., 2011 – 2013 for Pickering A Generating Station). Since the life of Pickering A Generating Station was within the nominal life of the pressure tubes of Pickering B Generating Station units (i.e., 2014 – 2016 for Pickering B Generating Station), an assessment of the business case for refurbishing Pickering B Generating Station was not required in the assessment of the restart of Pickering A Generating Station Units 1 – 4.

Board Staff Interrogatory #072

Ref: Ex. F2-T2-S3, pages 6-10

Issue Number: 6.7

Issue: Are the proposed expenditures related to continued operations at Pickering B appropriate?

Interrogatory

It notes on page 6 *"If OPG attempted to delay this incremental maintenance and inspection work effort until later, i.e., closer to 2014, the Pickering B Continued Operations option would no longer be available to OPG."* It also discusses the primary risks on page 9 and notes the two primary risks will be addressed by 2012 (i.e., CNSC approval, Fuel Channel Life Cycle Management project). Page 2 of the attached Business Case also identifies the risk to be "medium" as opposed to "low" at this time. The forecast costs from 2010-2012 are over \$106M (chart 2 on p. 10) and, if one of those risks is realized, the benefit to ratepayers would be \$0.

- a) Please explain, on what basis, OPG has reached the conclusion the option would no longer be available.
- b) Please also explain why it cannot be delayed until 2012 (i.e., next application) when the primary risks will have been addressed (i.e., risks are "low") and the Board can make a much more informed decision that could avoid further stranded costs associated with the nuclear facilities?

Response

- a) OPG concluded that a delay in the execution of the Continued Operations work program would render the option no longer available primarily on the basis of failure to achieve the additional maintenance and Life Cycle Management requirements noted at Ex. F2-T2-S3, page 6. An expanded explanation is provided here.
 - A delay would mean that the requirements of the Life Cycle Management program would not be met. The associated work is tied to unit outage cycles and, if deferred, would increase the risk to, and potentially preclude, the achievement of extended operations. For example:
 - Boiler cleaning, which removes the scale from the boiler tubes. Failure to remove this scale can result in premature aging of the boiler material and, once this occurs, the aging process cannot be reversed and Continued Operations may be precluded.

- 1 ○ Spacer Location and Relocation Program (“SLAR”) campaigns, which physically
2 move garter springs to address pressure tube sagging. Delay increases the risk of
3 not being able to perform those activities due to aging-related material changes.
4
- 5 • Completion of additional maintenance activities and overall schedule requirements
6 would not be met. Additional maintenance activities require planning for procurement
7 of long lead items and improving the material condition of critical systems (e.g., fuel
8 handling equipment, to enable the execution of long reactor face inspections). OPG
9 would not be able to appropriately staff the organization with critical resources to
10 allow the SLAR outages to be completed at the required time (e.g., fuel handling
11 panel operators, where training can take four to six years).
12
- 13 • Fuel channel inspection data that is critical to support the Fuel Channel Life
14 Management (“FCLM”) Project would not be available. This would delay the FCLM
15 Project and impact the confidence required to support the Pickering B Generating
16 Station Continued Operations decision.
17
- 18 b) OPG does not understand the premise of this question. The primary risks are addressed
19 through the Continued Operations Initiative so if the initiative is delayed, the risks are not
20 addressed by 2012. As indicated in part a), delay of the planned maintenance, life cycle
21 management and other schedule-critical work could make the Continued Operations
22 initiative non-viable. In addition, as indicated at Ex. F2-T2-S2, page 9, key risk mitigation
23 (i.e., obtaining CNSC concurrence and completion of the FCLM Project by 2012) is
24 contingent on obtaining critical fuel channel inspection information that will be obtained as
25 a result of work that is currently planned for the test period. Deferral of this work therefore
26 precludes the risk mitigation that the interrogatory seeks.

Board Staff Interrogatory #073

Ref: Ex. F2-T2-S3, pages 7 and 9

Issue Number: 6.7

Issue: Are the proposed expenditures related to continued operations at Pickering B appropriate?

Interrogatory

Page 7 identifies other benefits such as the deferral of adding new transmission infrastructure in the Oshawa area that would be required with the shut-down of the Pickering stations. The [IESO's Reliability Outlook: December 2009](#) (p.7) notes "*Pickering Generating Station: While two units at Pickering A were restarted and another two retired, the four Pickering B units will reach their end of service life within the next decade. **The IESO has identified transmission requirements in the area regardless of whether these units continue to operate or are shut down.***" (emphasis added). Hydro One's current transmission rate application (EB-2010-0002) notes projects scheduled to be in-service within 2010 to 2011 include [Cherrywood TS x Claireville TS](#) and Hydro One is also proposing to add transformation capacity in the Oshawa area ([Enfield TS - formally Oshawa Area TS](#)) with an in-service date of 2014.

- a) Please clarify the new transmission investment that OPG believes would be deferred due to Pickering Continued Operations.
- b) On page 9, OPG discusses the risks in relation to the Pickering B Continued Operations initiative (i.e., the risk that a major component does not continue to meet fitness-for-service requirements, and the risk that OPG is unable to obtain CNSC approval of OPG's fitness-for-service assessment criteria for continued service life of the pressure tubes). It notes that OPG believes these risks are "manageable".
 - i) Given the application also notes OPG will not have a high level of confidence regarding Continued Operations until late-2012, if one of the above risks is realized (i.e., Pickering cannot be continued) and the "required" new transmission is then also not available because it was deferred, where would this leave the supply situation in the Oshawa area?
 - ii) Has OPG consulted with Hydro One Networks and the OPA, specifically, regarding the potential for this outcome (i.e., learning Pickering is not viable in 2013 or 2014 and no work done on the required new transmission due to the plan for Pickering)? If so, please elaborate.
- c) In regard to the risk associated with CNSC approval, it notes in OPG's "[2009 Annual Information Form](#)" (page 13), under Pickering B Continued Operations, that "*OPG anticipates the CNSC will complete its review of this report by mid-2010*". As it is now

1 mid-2010, has the CNSC completed its review? If not, when does OPG now anticipate it
2 will be completed?
3
4

5 **Response**
6

- 7 a) The investment required to address the retirement of Pickering B Generating Station is
8 the advancement of the Oshawa Area TS project.
9
10 b) i) Through discussions with OPG, the OPA is aware that Pickering could be retired as
11 early as 2016. OPG is not in a position to comment on the impact of the postulated
12 scenario on the supply situation in the Oshawa area.
13
14 ii) Identification of the transmission elements that can be delayed as a result of the
15 achievement of Pickering B Continued Operations is the responsibility of the OPA
16 and Hydro One. OPG has consulted with the OPA on this topic and understands that
17 both the IESO and Hydro One are aware of this potential outcome.
18
19 c) The report referenced in OPG's Annual Information Form is the Integrated Safety
20 Review, which was to be completed primarily in support of the evaluation of the
21 refurbishment of Pickering B Generating Station. As a result of the decision not to pursue
22 the refurbishment of Pickering B Generating Station, OPG suspended the ISR review
23 process with the CNSC (see Ex. L-7-021).