

OPG
EB-2016-0152
OEB Staff Compendium
Panel 3A

COMPARISON OF PRODUCTION FORECAST ESTIMATES USED IN PCO ANALYSIS, PEO ANALYSIS AND OPG'S CURRENT APPLICATION													TOTAL (TWH) 2016-2021
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
1													
2	OPG PCO Production Forecast (TWH)							N/A	N/A	N/A	N/A		
3	IESO PEO Assumptions Production Forecast (TWH)			21.3	19.2	19.3	19.6	20.9	19.7	21.3	14.8	16.7	120.0
4	OEB Staff Estimate (based on Staff IR 125 and 126)			21.3	19.2	19.3	19.8	20.5	18.8				118.9
5	IESO Analysis PEO Production Forecast (TWH)							18.8	20.2	13.8	16.1		
6	OPG Current Application - Production Forecast (TWH)	20.1	21.2	20.8	19.1	19.2	19.4	19.6	18.8	N/A	N/A	N/A	116.9
7													

- 8
- 9 Notes:
- 10 N/A - Not applicable
- 11 PCO - Pickering Continued Operations
- 12 PEO - Pickering Extended Operations
- 13 OEB Staff Estimate is calculated using production estimates in Staff IR 125 and adjusted for revisions noted in Chart 2 of Staff IR 126.

Numbers may not add due to rounding.

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 Exhibit E2
 Tab 1
 Schedule 1
 Table 1

Table 1
Production Forecast Trend - Nuclear (TWh)

Line No.	Prescribed Facility	2013 Actual	2014 Actual	2015 Actual	2016 Budget	2017 Plan	2018 Plan	2019 Plan	2020 Plan	2021 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1	Darlington NGS	25.1	28.0	23.3	26.0	19.0	19.3	19.7	17.7	16.6
2	Pickering NGS	19.6	20.1	21.2	20.8	19.1	19.2	19.4	19.6	18.8
3	Total	44.7	48.1	44.5	46.8	38.1	38.5	39.0	37.4	35.4

Board Staff Interrogatory #126

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO's analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:

Ref: Exh F2-2-3 Attachment 1 page 3

At the above reference the IESO states in part: "Potential for cost savings although these depend on the outlook for Pickering production and operating costs (which have a lower degree of uncertainty and can be controlled to some degree)...."

- a) Please provide the production and operating costs assumptions for Pickering for the period 2021-2024 that were used in the March 2015 study and the October 2015 update. Please provide this information in table format and by year. Please provide OPG's views on the appropriateness of the two assumptions including the rate of growth.
- b) For comparison purposes please provide the production and operating costs for Pickering, for the period 2016-2020. Please provide this information in the same format and on the same basis as in part (a).
- c) Does the IESO study also take into account capital expenditures that will be required during the 2021-2024 period? What were the assumptions in the study?

Response

- a) & b) The production and cost data provided to the IESO that was used in the March 2015 and October 2015 studies are provided below in Chart 1 and Chart 2:

Chart 1

PICKERING EXTENDED OPERATIONS Assessment Data (Scenario ~ 73 TWh)
 (March 2015)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Incremental Production (TWh)	0.0	0.0	-0.5	-0.2	-2.6	22.1	22.6	15.1	16.5	72.9

Incremental Operating Costs (\$2015M)

Total OM&A	0	0	48	35	133	927	901	643	567	3,254
Total Capital	0	0	19	19	14	24	11	7	7	102
Total Operating Costs	0	0	67	55	147	951	911	650	574	3,356
Fuel	0	0	-3	-1	-14	119	122	85	93	401

Chart 2

PICKERING EXTENDED OPERATIONS Assessment Data (BCS Option 1 ~ 65 TWh)
 (October 2015)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Incremental Production (TWh)	0.0	-0.9	-1.2	-1.8	-3.4	19.6	21.2	14.6	16.5	64.5

Incremental Operating Costs (\$2015M)

Total OM&A	7	35	64	129	207	965	891	623	487	3,408
Total Capital	0	0	15	16	11	22	10	7	7	89
Total Operating Costs	7	35	79	145	218	987	902	631	494	3,497
Fuel	0	-5	-6	-9	-18	105	113	79	89	347

PICKERING EXTENDED OPERATIONS Assessment Data (BCS Option 2 ~ 62 TWh)
 (October 2015)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Incremental Production (TWh)	0.0	-0.9	-1.2	-1.6	-3.8	18.8	20.2	13.8	16.1	61.5

Incremental Operating Costs (\$2015M)

Total OM&A	7	35	64	129	207	965	891	623	487	3,408
Total Capital	0	0	15	16	11	22	10	7	7	89
Total Operating Costs	7	35	79	145	218	987	902	631	494	3,497
Fuel	0	-5	-6	-8	-19	101	108	74	87	331

1 The March 2015 data was provided to the IESO in December 2014 and was
2 expressed in 2014\$. The March table referenced above was converted to 2015\$
3 consistent with the October data for comparison purposes.
4

5 Total OM&A includes base, outage, projects, the station's portion of incremental
6 allocated nuclear and corporate support costs and estimated costs to enable
7 extended operations.
8

9 Total Capital costs include Minor Fixed Asset expenditures.
10

11 OPG believes the production data reflecting approximately 62 TWh of incremental
12 production estimated in October 2015 is achievable and most accurately reflects
13 the planned outage activities required to extend Pickering operations. The cost
14 data also estimated in October 2015 accurately reflects the forecast incremental
15 costs required to execute the work program to extend Pickering operations as
16 described in Ex. F2-2-3 Attachment 2.
17

- 18 c) Yes, the study includes capital expenditures. These amounts are reflected in the
19 Total Capital rows in the Charts in parts a) and b) above.

Board Staff Interrogatory #125

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO's analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:

Ref: Exh F2-2-3 page 7

- a) It is indicated that OPG conducted its own internal economic evaluation of PEO. Please provide the study.
- b) Please compare the assumptions relied on in both studies, particularly with respect to assumptions related to load growth, price of gas-fired generation, Pickering production forecast, and Pickering operating and capital costs.

Response

- a) The results of OPG's internal economic evaluation are documented in the Pickering Extended Operations Technical and Economic Assessment at Ex. F2-2-3 Attachment 2.
- b) A comparison of the major assumptions used in the development of the economic assessments conducted by OPG and the IESO are documented below. Chart 1 has been prepared by OPG and Chart 2 has been prepared by the IESO:

Chart 1: OPG Assumptions

OPG Assumptions (Pickering Extended Operations - Economic Assessment)

Line No.		2016	2017	2018	2019	2020	2021	2022	2023	2024
1	System Demand (TWh)	143	143	144	146	147	148	149	150	152
2	Gas Prices (Dawn, 2015C\$/mmBtu)	3.9	4.2	4.3	4.2	4.3	4.4	4.5	4.6	4.7
3	CO2 Credit (2015C\$/Mg CO2e)	20.3	23.1	24.7	26.2	27.7	29.3	30.8	32.4	34.0
4	Pickering Production Forecast (TWh)	Refer to L-1-6.5 Staff 126 for Cost and Production Data								
5	Pickering Operating Costs (\$M)									
6	Pickering Capital Costs (\$M)									

	Cost of New Gas Capacity (2015 US\$)	Heat Rate (MMBtu/kWh)	Capital Cost (US\$/kW)	Fixed Cost (US\$/kW-yr)	Variable Non-fuel (US\$/MWh)
7	Combined Cycle Gas Turbine (CCGT)	6,800	\$1,100	\$26	\$3
8	Single Cycle Gas Tubine (SCGT)	9,500	\$800	\$21	\$5

Chart 2: IESO Assumptions

Line No.		2016	2017	2018	2019	2020	2021	2022	2023	2024
1	System Demand (TWh) (a range of demands were considered, this is the medium demand)	146	146	147	147	148	150	151	153	155
2	Gas Prices (Dawn, 2015C\$/mmBtu)	4.7	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
3	CO2 Credit (2015C\$/Mg CO2e)	0	0	0	0	0	0	0	0	0
4	Pickering Production Forecast (TWh) (This corresponds to the Pickering extended operations, 65 TWh scenario)	21.3	19.2	19.3	19.6	20.9	19.7	21.3	14.8	16.7
5	Total OM&A & Capital (\$M)	1,055	987	1,038	1,054	977	987	902	631	494
6	Fuel & Fuel Related Costs (\$M)	126	121	118	125	115	119	122	85	93

	Cost of New Gas Capacity (2015 US\$)	Heat Rate (MMBtu/kWh)	Capital Cost (US\$/kW)	Fixed Cost (US\$/kW-yr)	Variable Non-fuel (US\$/MWh)
7	Combined Cycle Gas Turbine (CCGT)	NA (No new CCGTs were assumed. Instead, capacity (MW) was addressed by peaking facilities at the net revenue requirement below, energy (TWh) was made up from the existing Ontario system)			
8	Single Cycle Gas Tubine (SCGT)	~10,500	NA	130 (Net Revenue Requirement for a capacity)	NA