

1 **UNDERTAKING J12.10**
2

3 **Undertaking**
4

5 Please expand CCC IR 24 (EX L-TAB 5.1-SCHEDULE 5 CCC 24, ATTACHMENT 1) to
6 include the years 2008 to 2016. Please provide actuals for 2016.
7
8
9

10
11 **Response**
12

13
14 An update to Ex. L-5.1-5 CCC-024, Attachment 1 to include the years 2008 to 2016 and
15 actual for 2016 has been provided in Attachment 1.
16

17 Please note that the formulas used to calculate total production and total revenue
18 impacts for Darlington in 2020 were incorrect in Ex. L-5.1-5 CCC-024 and have been
19 corrected in the updated table, consistent with Undertaking JT2.14 and J15.13. The
20 corrected formulas result in total 2020 production increasing from 14.8TWh to 18.1TWh.
21 To be clear, however, there is no change in total production impact in 2020 as a result
22 of updating the table to include the years 2008 to 2016.
23

Year		Unit Affected	Description	Outage Duration (days)	Production (TWe) Impact Due to Outage	Revenue Impact of Outage (\$M)
2008	Pickering	Unit 1	FEPO	1.1	0.01	0.7
		Unit 8	Planned Outage	60.4	0.75	39.9
		Unit 8	FEPO	13.2	0.16	8.7
		Unit 5	U/B Planned Outage [1]	1.7	0.02	1.1
		Unit 5	FEPO	5.3	0.07	3.5
				81.8	1.0	4.6
	Darlington	Unit 1	Planned Outage	69.1	1.48	78.5
			69.1	1.5	87.8	
Total 2008				150.9	2.5	92.4
2009	Pickering	Unit 4	Planned Outage	74.0	0.92	48.8
		Unit 4	FEPO	32.5	0.40	21.4
		Unit 5	Planned Outage	57.3	0.72	37.9
		Unit 5	FEPO	27.7	0.35	18.3
		Unit 6	Planned Outage	68.2	0.85	45.1
					259.7	3.2
	Darlington	Unit 3	PO and VBO	79.5	1.70	90.3
		Unit 3	FEPO	7.7	0.16	8.7
		Unit 2	VBO	32.0	0.69	36.3
		Unit 2	FEPO	3.2	0.07	3.7
		Unit 4	VBO	28.7	0.62	32.6
		Unit 4	FEPO	1.0	0.02	1.2
		Unit 1	VBO	30.1	0.65	34.2
				182.2	3.9	206.9
Total 2009				441.9	7.1	308.2
2010	Pickering	Unit 1	PO and VBO	98.0	1.22	64.7
		Unit 1	FEPO	12.3	0.15	8.1
		Unit 4	VBO	46.5	0.58	30.7
		Unit 5	VBO	42.0	0.52	27.8
		Unit 6	VBO	39.4	0.49	26.1
		Unit 7	VBO	43.0	0.54	28.4
		Unit 7	FEPO	2.2	0.03	1.5
		Unit 8	PO and VBO	76.4	0.95	50.5
		Unit 8	FEPO	7.0	0.09	4.6
		Unit 7	Planned Outage	74.2	0.93	49.1
				441.0	5.5	105.7
	Darlington	Unit 4	Planned Outage	56.5	1.21	64.2
		Unit 4	FEPO	13.9	0.30	15.8
		Unit 3	U/B Planned Outage [1]	4.9	0.10	5.5
		Unit 2	Planned Outage	61.7	1.32	70.1
			137.0	2.9	314.9	
Total 2010				578.0	8.4	365.4
2011	Pickering	Unit 5	Planned Outage	113.0	1.41	72.7
		Unit 5	FEPO	63.9	0.80	41.1
		Unit 6	Planned Outage	101.0	1.26	64.9
		Unit 4	Planned Outage	80.9	1.01	51.9
		Unit 4	FEPO	6.8	0.08	4.4
				365.6	4.6	121.2
	Darlington	Unit 1	Planned Outage	55.4	1.19	61.2
	Unit 1	U/B Planned Outage [1]	4.9	0.10	5.4	
			60.3	1.3	309.0	
Total 2011				425.9	5.9	350.1
2012	Pickering	Unit 1	Mid- Cycle Planned Outage	20.0	0.25	12.8
		Unit 1	FEPO	0.1	0.00	0.1
		Unit 8	Planned Outage	97.4	1.22	62.6
		Unit 8	FEPO	8.9	0.11	5.7
		Unit 7	Planned Outage	104.4	1.30	67.1
		Unit 1	Planned Outage	86.3	1.07	55.4
		Unit 1	FEPO	9.8	0.12	6.3
		Unit 4	Planned Outage	18.0	0.22	11.6
		Unit 4	FEPO	7.4	0.09	4.7
				352.3	4.4	78.0
	Darlington	Unit 3	Planned Outage	56.2	1.20	62.1
		Unit 3	U/B Planned Outage [1]	0.6	0.01	0.7
		Unit 2	U/B Planned Outage [1]	6.8	0.15	7.6
			63.7	1.4	170.9	
Total 2012				416.0	5.8	226.2
2013	Pickering	Unit 1	FEPO	109.7	1.37	70.4
		Unit 4	Mid- Cycle Planned Outage	20.0	0.25	12.8
		Unit 4	FEPO	4.5	0.06	2.9
		Unit 5	Planned Outage	87.8	1.10	56.5
		Unit 5	FEPO	53.4	0.67	34.3
		Unit 6	Planned Outage	113	1.41	72.7
			388.4	4.8	163.4	

Year		Unit Affected	Description	Outage Duration (days)	Production (TWe) Impact Due to Outage	Revenue Impact of Outage (\$M)
	Darlington	Unit 4	Planned Outage	66.5	1.43	73.4
		Unit 4	FEPO	20.1	0.43	22.2
		Unit 2	Planned Outage	77.9	1.67	86.0
			FEPO	19.7	0.42	21.8
				184.2	3.9	439.5
Total 2013				572.6	8.8	473.9
2014	Pickering	Unit 4	Planned Outage	85.3	1.06	54.7
		Unit 4	FEPO	34.3	0.43	22.0
		Unit 8	Planned Outage	85.7	1.07	55.1
		Unit 8	FEPO	13.6	0.17	8.7
		Unit 7	Planned Outage	113.9	1.42	78.3
		Unit 7	FEPO	7.5	0.09	5.5
			340.3	4.2	83.8	
	Darlington	Unit 1	Planned Outage	75.3	1.61	83.1
		Unit 2	U/B Planned Outage [1]	2.8	0.06	3.1
		Unit 1	U/B Planned Outage [1]	2.1	0.05	2.3
		Unit 4	U/B Planned Outage [1]	11.8	0.25	15.0
		92.0	2.0	192.9		
Total 2014				432.3	6.2	271.2
2015	Pickering	Unit 5	Planned Outage	105.9	1.32	78.4
		Unit 5	FEPO	14.7	0.18	10.9
		Unit 1	Planned Outage	101.7	1.27	75.1
		Unit 1	FEPO	17.3	0.22	12.8
		Unit 6	Planned Outage	102.4	1.28	75.8
		Unit 1	U/B Planned Outage [1]	26.6	0.33	19.6
		Unit 7	FEPO	8.5	0.11	6.3
		Unit 8	U/B Planned Outage [1]	13.4	0.17	9.9
			390.5	4.9	111.6	
	Darlington	Unit 3	Planned Outage	95.8	2.05	121.7
		Unit 3	FEPO	5.8	0.13	7.4
		Unit 3	Planned Outage	48.8	1.05	62.0
		Unit 2	Planned Outage	50.3	1.08	63.9
		Unit 1	Planned Outage	47.5	1.02	60.4
		Unit 1	FEPO	0.6	0.01	0.8
		Unit 1	U/B Planned Outage [1]	24.5	0.53	31.1
Unit 1		FEPO	1.2	0.03	1.6	
		274.6	5.9	227.2		
Total 2015				665.1	10.8	348.9
2016	Pickering	Unit 6	Planned Outage	1.4	0.02	1.0
		Unit 6	FEPO	16.2	0.20	12.0
		Unit 4	Planned Outage	107.8	1.34	79.6
		Unit 4	FEPO	31.9	0.40	23.6
		Unit 8	Planned Outage	142.6	1.78	105.5
		Unit 8	FEPO	41.4	0.52	30.6
		Unit 7	Planned Outage	117.5	1.47	86.9
		Unit 7	FEPO	3.9	0.05	2.9
			462.7	5.8	120.5	
	Darlington	Unit 4	Planned Outage	87.7	1.88	111.4
		Unit 3	Planned Outage	19.6	0.42	24.9
		Unit 2	Refurbishment Outage	78.0	1.67	99.1
Unit 3		U/B Planned Outage [1]	2.8	0.06	3.5	
		188.1	4.0	449.3		
Total 2016				650.8	9.8	569.7
2017	Pickering	Unit 1	Planned Outage	204.9	2.6	168.0
		Unit 4	Mid-Cycle Outage	43.0	0.5	35.2
		Unit 5	Planned Outage	160.7	2.0	132.0
		Unit 6	Planned Outage	133.0	1.7	109.2
			541.6	6.8	444.4	
	Darlington	Unit 1	Planned Outage	108.4	2.3	152.9
		Unit 2	Refurbishment Outage	365.0	7.8	514.8
		Unit 3	Planned Derate	2.5	0.1	3.5
		Unit 3	PHT Pump Motor Outage	20.0	0.4	28.2
		Unit 4	Planned Derate	2.5	0.1	3.5
		Unit 4	PHT Pump Motor Outage	20.0	0.4	28.2
		518.4	11.1	731.2		
Total 2017				1,060.0	17.9	1,175.6
2018	Pickering	Unit 1	Mid-Cycle Outage	43.0	0.5	39.1
		Unit 4	Planned Outage	144.1	1.8	131.2
		Unit 7	Planned Outage	193.5	2.4	176.4
		Unit 8	Planned Outage	150.2	1.9	136.9
			530.8	6.6	483.6	
	Darlington	Unit 1	PHT Pump Motor Outage	20.0	0.4	31.3
		Unit 2	Refurbishment Outage	365.0	7.8	571.4
Unit 3		Planned Outage	103.3	2.2	161.7	

Year		Unit Affected	Description	Outage Duration (days)	Production (TWe) Impact Due to Outage	Revenue Impact of Outage (\$M)
		Unit 4	PHT Pump Motor Outage	20.0	0.4	31.3
		Total		508.3	10.9	795.8
Total 2018				1,039.1	17.5	1,279.4
2019	Pickering	Unit 1	Planned Outage	128.5	1.6	129.8
		Unit 4	Mid-Cycle Outage	43.0	0.5	43.4
		Unit 5	Planned Outage	165.6	2.1	167.6
		Unit 6	Planned Outage	180.1	2.2	182.3
		Total		517.2	6.5	523.1
	Darlington	Unit 1	PHT Pump Motor Outage	20.0	0.4	34.8
		Unit 1	Planned Derate	2.5	0.1	4.3
		Unit 2	Refurbishment Outage	365.0	7.8	634.3
		Unit 3	Planned Derate	2.5	0.1	4.3
		Unit 4	Planned Outage	99.1	2.1	172.2
	Total		489.1	10.5	850.0	
Total 2019				1,006.3	16.9	1,373.1
2020	Pickering	Unit 1	Mid-Cycle Outage	43.0	0.5	48.2
		Unit 4	Planned Outage	164.5	2.0	184.4
		Unit 7	Planned Outage	102.5	1.3	115.1
		Unit 8	Planned Outage	188.9	2.4	212.2
		Total		498.9	6.2	560.0
	Darlington	Unit 1	Planned Outage	108.2	2.3	208.7
		Unit 2	Refurbishment Outage	45.0	1.0	86.8
		Unit 2	Planned Derate	2.5	0.1	4.8
		Unit 2	Post Refurb Mini Outage	55.0	1.2	106.1
		Unit 3	Refurbishment Outage	321.0	6.9	619.2
		Unit 4	Planned Derate	2.5	0.1	4.8
	Unit 4	PHT Pump Motor Outage	20.0	0.4	38.6	
	Total		554.2	11.9	1069.1	
Total 2020				1,053.1	18.1	1,629.1
2021	Pickering	Unit 1	Planned Outage	150.5	1.9	187.3
		Unit 4	Vacuum Building Outage	30.0	0.4	37.3
		Unit 5	Planned Outage	179.7	2.2	224.1
		Unit 6	Planned Outage	112.6	1.4	140.4
		Unit 6	Vacuum Building Outage	30.0	0.4	37.4
		Unit 7	Vacuum Building Outage	30.0	0.4	37.4
	Unit 8	Vacuum Building Outage	30.0	0.4	37.4	
		Total		562.8	7.0	701.3
	Darlington	Unit 1	Refurbishment Outage	200.0	4.3	428.3
		Unit 2	Post Refurb Mini Outage	31.2	0.7	66.8
		Unit 2	Planned Derate	2.5	0.1	5.4
		Unit 3	Refurbishment Outage	365.0	7.8	781.6
Unit 4		Planned Derate	2.5	0.1	5.4	
Unit 4	PHT Pump Motor Outage	20.0	0.4	42.8		
	Total		621.2	13.3	1,330.2	
Total 2021				1,184.0	20.3	2,031.5

[1] U/B Planned Outage is an Unbudgeted Planned Outage representing an emergent outage that was not included in the approved integrated nuclear outage and generation plan that underpins the business plan, but for which OPG had sufficient time to notify the IESO at least 28 days prior to the start date. Although unbudgeted, this allows the outage to be categorized as “planned” for performance reporting purposes as per WANO industry guidelines

1 **UNDERTAKING J12.12**
2

3 **Undertaking**
4

5 Reference to EB-2013-0321, Ex. E2-1-1, mid-cycle outage days for 2014 took 20 days,
6 but now take 43 days. What has led to this change?
7
8
9

10
11 **Response**
12

13
14 The 2014 mid-cycle outage was undertaken to successfully complete key corrective
15 maintenance and improve equipment reliability work including the 3K3 reliability
16 initiative work (see Ex. F2-1-1 Attachment 4, p. 5), as noted at Tr. Vol.12, p.144.
17 Subsequent mid-cycle outages have longer durations to address various inspection and
18 maintenance work such as completing corrective maintenance backlogs that have
19 persisted for a significant period of time. These outages will provide OPG with higher
20 confidence in the reliable operation of the units and reduced potential for forced
21 outages.
22