

1 Q. Consumer Question: What is the incremental stand alone kwh cost of Muskrat falls power
2 delivered to Soldiers Pond?

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5 A. The requested analysis does not assist consideration of the Reference Question. Consistent
6 with the Terms of Reference and the Reference Question, Nalcor's analysis of the costs of
7 the Interconnected and Isolated Island alternatives is undertaken on a total power system
8 basis, and is based on an evaluation of all costs incurred to meet the Island's forecasted
9 electricity requirements for each alternative. This evaluation compares the Cumulative
10 Present Worth (CPW) of all costs in each alternative. The alternative with the lowest CPW
11 over the study period is the preferred one, and Nalcor's analysis indicates the
12 Interconnected Island alternative has a \$2.2 billion (2010\$) cumulative present worth
13 preference over the Isolated Island alternative.

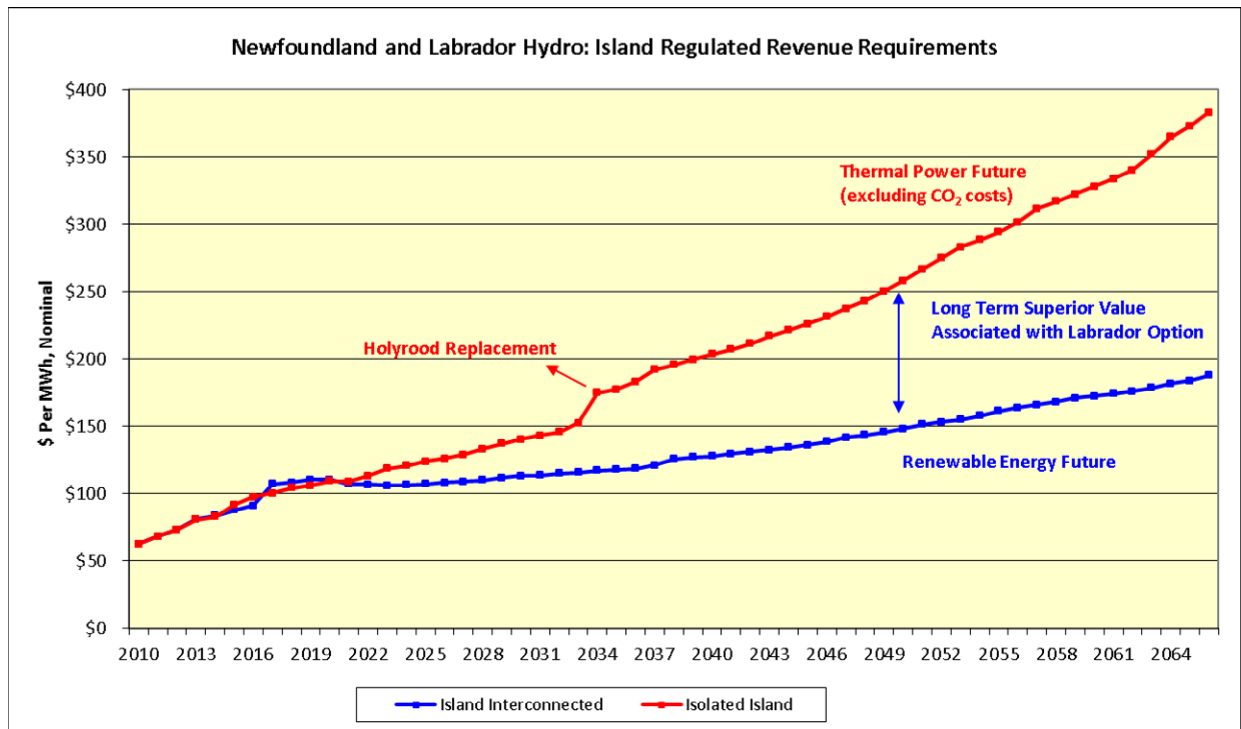
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15 Nalcor's analyses of the Interconnected Island and Isolated Island alternatives include the
16 costs associated with each generation expansion plan, and an analysis of rates associated
17 with an individual asset is not required as part of this analysis.

18

19 The expenditures for each expansion plan are ultimately recovered through the rates NLH
20 charges for electricity once the costs of each expansion plan are translated into annual
21 revenue requirements and combined with existing regulated costs for the power system.
22 The graph on the following page¹ shows the projected overall NLH wholesale electricity
23 rates for both the Interconnected and Isolated Island alternatives. These projections
24 include the existing and incremental regulated operating and capital related costs for the
25 island power system under each alternative over the study period.

¹<http://www.pub.nl.ca/applications/MuskratFalls2011/files/presentation/Nalcor-ProjectOverview-July18-11.pdf> , page 26



1 Given that the incremental stand-alone kWh cost of Muskrat Falls power delivered to
 2 Soldier’s Pond (MF plus LIL) comprises only one component of the overall total system cost,
 3 it is necessary to present the incremental costs for both generation expansion alternatives
 4 across the full analysis period to ensure proper context and comparisons.

5
 6 To assist with these comparisons, annual incremental costs can be expressed in three
 7 equivalent ways with respect to the economic message they convey, and there are
 8 different uses for each type of representation.

- 9
 10 (1) Incremental annual nominal costs represent the costs added to annual revenue
 11 requirements, on an incremental basis, for both alternatives. For the
 12 Interconnected Island alternative, all costs for both Muskrat Falls and the Labrador-
 13 Island Transmission Link are included. For the Isolated Island alternative,
 14 incremental fuel, operating, and capital costs associated with thermal capital

1 serving base load are included. With respect to incremental capital, all capital and
2 operating costs related to reliability (i.e., combustion turbines) are excluded. For
3 the thermal alternative, all capital relates to base load CCCT plant and all capital
4 necessary to sustain Holyrood operations. To state annual nominal costs on a unit
5 cost basis, incremental annual nominal costs are divided by incremental annual
6 energy for each alternative. The nominal delivered cost of power for the
7 incremental components of each alternative will be different each year to reflect
8 constantly changing inputs such as inflation and changes in rate base, which does
9 not facilitate longer-term economic comparison between alternatives.

10 (2) Nominal Levelized Unit Energy Cost (LUEC) which re-states incremental annual
11 nominal costs into a single rate. This rate, when multiplied by annual energy each
12 year and discounted to present value, yields the same cumulative present worth as
13 the cumulative present worth of the annual nominal costs; and

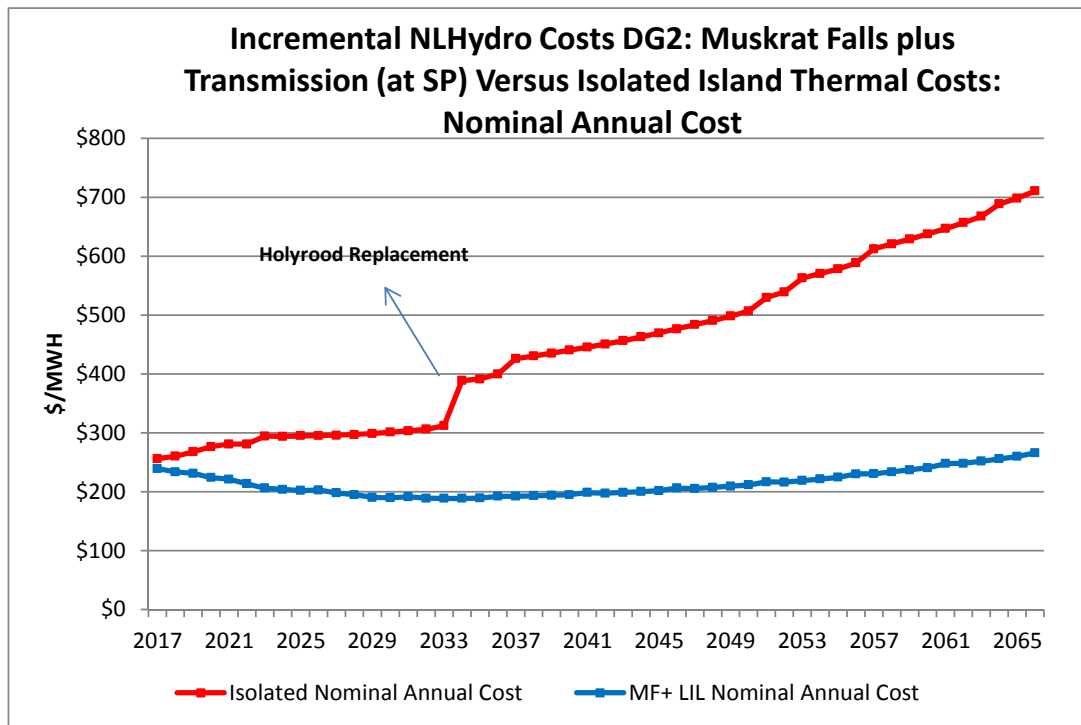
14 (3) Escalating Real LUEC (also referred to as an escalating supply price) re-states the
15 nominal LUEC to escalate from a 2010 \$ base at the rate of inflation of 2% per year,
16 still yielding the same cumulative present worth. This representation of economic
17 cost is most closely aligned with fuel price escalation, and is appropriate when
18 comparing Muskrat Falls plus the Labrador-Island Transmission Link to the Isolated
19 Island Thermal including Holyrood.

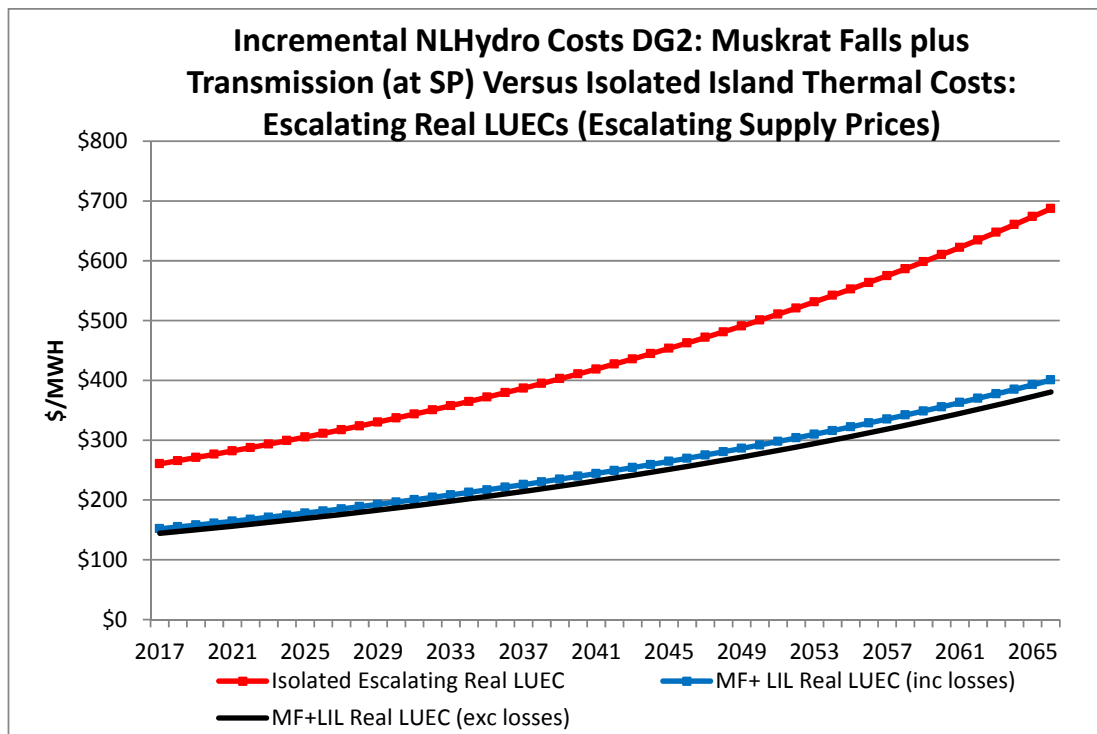
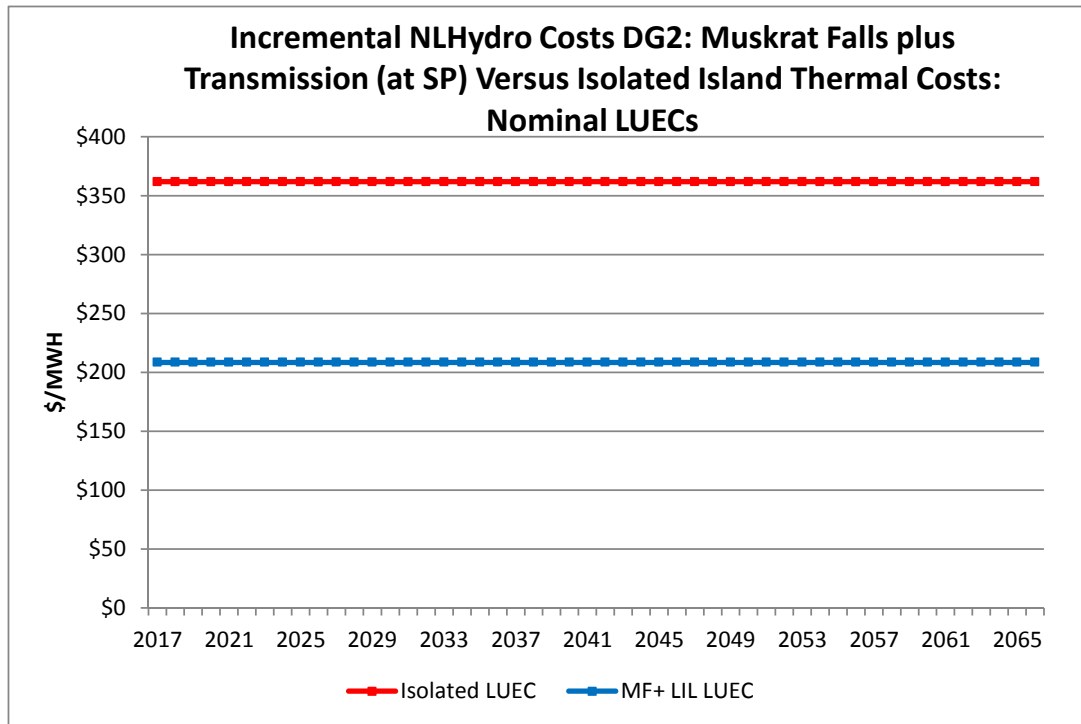
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21 The following three charts provide comparisons for each of the above cost rates. Data
22 tables used to generate the charts for each alternative are also included on pages 6 and 7
23 of this response. Source RFI data references and/or calculations are provided for all data
24 columns.

25
26 All costs for all three representations are generated from a common database, and the
27 various representations have no impact on the final CPW analysis which demonstrates the
28 Interconnected Island alternative is preferred by a \$2.2 billion present value.

29

1 As indicated above, these incremental rates are sub-components of the full Strategist
2 generation expansion analysis and CPW results. These economic incremental evaluation
3 rates are not rates that will directly be paid by consumers, but rather these incremental
4 costs are blended with Hydro's total system costs to arrive at a total revenue requirement
5 which is what customers ultimately pay through their monthly bills. Ratepayers should
6 consider rate trends associated with both alternatives which stem from Hydro's overall
7 revenue requirements on which their monthly rates and bill will be based.





Discount Rate 8%
 Real Discount Rate 5.88%

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Incremental Costs: Muskrat Falls (MF) + Labrador-Island Transmission Link (LIL)										
	Energy at Soldier's Pd GWh	MF Purchases \$000	LIL \$000	Total Incremental \$000	Nominal Annual Cost \$/MWh	Nominal LUEC \$/MWh	Escalating Real LUEC \$/MWh (including losses)	Escalating Real LUEC \$/MWh (excluding losses)	Nominal LUEC Check \$000	Esc Real LUEC Check \$000
Reference	(MHI-49.2)	(MHI-49.2)	(Note 1)	(2+3)	(4) / (1)	(Note 2)	(Note 3)	(7) x .95	(6) x (1)	(7) x (1)
CPW	21,303	2,682,308	1,758,655	4,440,963		208			4,440,963	4,440,963
Real CPW	33,608						132			
2010	0	0	0	0	0		132		-	-
2011	0	0	0	0	0		135		-	-
2012	0	0	0	0	0		137		-	-
2013	0	0	0	0	0		140		-	-
2014	0	0	0	0	0		143		-	-
2015	0	0	0	0	0		146		-	-
2016	0	0	0	0	0		149		-	-
2017	1,811	166,064	267,033	433,097	239	208	152	144	377,615	274,944
2018	1,878	175,566	263,292	438,858	234	208	155	147	391,395	290,677
2019	1,953	186,252	265,058	451,310	231	208	158	150	407,074	308,368
2020	2,019	196,415	255,835	452,251	224	208	161	153	420,871	325,195
2021	2,115	209,849	258,160	468,009	221	208	164	156	440,839	347,437
2022	2,212	223,883	248,415	472,298	214	208	168	159	461,098	370,672
2023	2,378	245,531	244,719	490,250	206	208	171	162	495,769	406,514
2024	2,447	257,705	241,032	498,737	204	208	174	166	510,148	426,670
2025	2,505	269,099	237,356	506,455	202	208	178	169	522,257	445,534
2026	2,587	283,493	241,393	524,887	203	208	181	172	539,405	469,366
2027	2,676	299,074	231,230	530,304	198	208	185	176	557,893	495,163
2028	2,809	320,236	227,615	547,851	195	208	189	179	585,655	530,199
2029	3,025	351,695	224,011	575,706	190	208	193	183	630,577	582,284
2030	3,103	367,950	220,420	588,370	190	208	196	187	646,785	609,196
2031	3,181	384,734	224,237	608,970	191	208	200	190	663,027	636,984
2032	3,258	402,008	213,274	615,282	189	208	204	194	679,212	665,584
2033	3,336	419,822	209,721	629,543	189	208	208	198	695,403	695,079
2034	3,414	438,197	206,181	644,378	189	208	213	202	711,607	725,501
2035	3,483	456,106	202,654	658,760	189	208	217	206	726,167	755,152
2036	3,545	473,458	207,510	680,968	192	208	221	210	739,013	783,881
2037	3,482	474,395	195,644	670,039	192	208	226	214	725,956	785,432
2038	3,548	493,064	192,160	685,225	193	208	230	219	739,731	816,342
2039	3,618	512,787	188,692	701,478	194	208	235	223	754,235	848,995
2040	3,680	532,031	185,239	717,270	195	208	239	227	767,196	880,857
2041	3,742	551,758	191,269	743,027	199	208	244	232	780,042	913,518
2042	3,804	572,087	178,380	750,468	197	208	249	237	792,924	947,176
2043	3,865	592,988	175,426	768,414	199	208	254	241	805,777	981,780
2044	3,927	614,549	171,588	786,137	200	208	259	246	818,701	1,017,478
2045	3,989	636,677	168,218	804,896	202	208	264	251	831,550	1,054,115
2046	4,051	659,468	175,578	835,046	206	208	270	256	844,428	1,091,848
2047	4,112	682,807	161,533	844,340	205	208	275	261	857,169	1,130,490
2048	4,174	706,915	158,218	865,133	207	208	280	266	870,033	1,170,404
2049	4,235	731,704	154,922	886,625	209	208	286	272	882,883	1,211,445
2050	4,289	755,830	151,646	907,475	212	208	292	277	894,112	1,251,389
2051	4,343	780,595	160,509	941,104	217	208	298	283	905,302	1,292,393
2052	4,396	806,039	145,155	951,194	216	208	304	288	916,482	1,334,519
2053	4,450	832,197	141,941	974,138	219	208	310	294	927,670	1,377,827
2054	4,500	858,354	138,749	997,103	222	208	316	300	938,066	1,421,133
2055	4,550	885,209	135,579	1,020,789	224	208	322	306	948,447	1,465,597
2056	4,600	912,830	146,144	1,058,974	230	208	329	312	958,863	1,511,326
2057	4,629	937,105	129,309	1,066,414	230	208	335	318	965,062	1,551,518
2058	4,629	955,847	126,210	1,082,057	234	208	342	325	965,062	1,582,548
2059	4,629	974,964	123,135	1,098,099	237	208	349	331	965,062	1,614,199
2060	4,629	994,463	120,086	1,114,549	241	208	356	338	965,062	1,646,483
2061	4,629	1,014,353	132,576	1,146,928	248	208	363	345	965,062	1,679,413
2062	4,629	1,034,640	114,066	1,148,705	248	208	370	352	965,062	1,713,001
2063	4,629	1,055,332	111,096	1,166,428	252	208	377	359	965,062	1,747,261
2064	4,629	1,076,439	108,154	1,184,593	256	208	385	366	965,062	1,782,206
2065	4,629	1,097,968	105,241	1,203,209	260	208	393	373	965,062	1,817,851
2066	4,629	1,119,927	111,025	1,230,953	266	208	401	381	965,062	1,854,208
2067	4,629	1,142,326	59,364	1,201,689	260	208	409	388	965,062	1,891,292

Notes:

- LIL fixed costs per MHI-Nalcor-1, plus LIL operating costs per MHI-Nalcor-49.2
- Column 6: Nominal LUEC calculation: CPW of total incremental costs (Column 4) divided by CPW of energy (Column 1).
- Column 7: Escalating Real LUEC calculation: CPW of total Costs (Column 5) divided by Real CPW of energy (Column 1).

Discount Rate 8%
 Real Discount Rate 5.88%

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Incremental Costs: Thermal Isolated Island <small>(Note 1)</small>										
Reference	Thermal Energy GWH MHI-49.2	Fuel MHI-49.2	Thermal Capital MHI-1	Thermal Operating Cost \$000 MHI-49.2	Total Incremental Cost \$000 (2+3+4)	Nominal Annual Cost \$/MWh (5) / (1)	Nominal LUEC \$/MWh (Note 2)	Escalating Real LUEC \$/MWh (Note 3)	Nominal LUEC Check \$000 (7) x (1)	Esc Real LUEC Check \$000 (8) x (1)
CPW	17,101	4,921,393	853,840	411,948	6,187,181		362	227	6,187,181	6,187,181
Real CPW	27,298									
2010	0	0	0	0	0	0		227	-	-
2011	0	0	0	0	0	0		231	-	-
2012	0	0	0	0	0	0		236	-	-
2013	0	0	0	0	0	0		241	-	-
2014	0	0	0	0	0	0		245	-	-
2015	0	0	0	0	0	0		250	-	-
2016	0	0	0	0	0	0		255	-	-
2017	1,524	269,937	83,677	36,689	390,303	256	362	260	551,426	396,812
2018	1,583	290,425	83,444	38,249	412,118	260	362	266	572,869	420,487
2019	1,522	286,441	82,153	38,774	407,368	268	362	271	550,594	412,220
2020	1,574	300,528	94,656	40,171	435,354	277	362	276	569,637	435,007
2021	1,543	301,294	91,386	40,966	433,646	281	362	282	558,366	434,928
2022	1,639	326,864	90,802	43,075	460,741	281	362	287	593,098	471,221
2023	1,822	371,487	116,671	47,869	536,026	294	362	293	659,057	534,099
2024	1,890	393,041	112,767	49,731	555,539	294	362	299	683,769	565,208
2025	1,947	413,365	110,003	51,545	574,913	295	362	305	704,546	594,030
2026	2,028	439,740	105,925	53,639	599,304	295	362	311	733,878	631,136
2027	2,116	468,239	101,848	55,859	625,946	296	362	317	765,421	671,429
2028	2,195	496,080	97,770	58,089	651,939	297	362	324	794,290	710,687
2029	2,274	525,380	93,760	60,383	679,523	299	362	330	822,846	750,963
2030	2,351	554,636	90,400	62,721	707,756	301	362	337	850,565	791,785
2031	2,427	584,733	86,281	65,121	736,135	303	362	344	878,067	833,734
2032	2,503	616,174	82,162	67,608	765,944	306	362	350	905,686	877,158
2033	2,581	649,155	85,782	70,731	805,668	312	362	357	933,978	922,650
2034	2,667	819,546	165,614	51,634	1,036,794	389	362	365	965,046	972,408
2035	2,737	858,148	159,332	53,741	1,071,221	391	362	372	990,098	1,017,605
2036	2,802	928,729	142,899	47,848	1,119,476	400	362	379	1,013,715	1,062,715
2037	2,880	1,017,949	162,110	46,418	1,226,476	426	362	387	1,041,928	1,114,137
2038	2,949	1,063,001	157,884	48,519	1,269,404	430	362	395	1,067,081	1,163,854
2039	3,019	1,109,376	153,658	50,700	1,313,734	435	362	403	1,092,198	1,215,074
2040	3,081	1,154,403	149,432	52,872	1,356,707	440	362	411	1,114,547	1,264,736
2041	3,141	1,198,330	145,207	55,115	1,398,651	445	362	419	1,136,571	1,315,523
2042	3,202	1,244,658	140,981	57,438	1,443,077	451	362	427	1,158,496	1,367,718
2043	3,262	1,291,655	136,755	59,835	1,488,245	456	362	436	1,180,057	1,421,035
2044	3,323	1,343,035	132,529	62,346	1,537,910	463	362	444	1,202,281	1,476,755
2045	3,381	1,394,320	128,303	64,898	1,587,522	470	362	453	1,223,154	1,532,440
2046	3,439	1,447,040	124,078	67,560	1,638,677	476	362	462	1,244,397	1,590,236
2047	3,498	1,501,181	119,852	70,312	1,691,345	484	362	472	1,265,458	1,649,493
2048	3,557	1,556,241	115,626	73,182	1,745,049	491	362	481	1,286,928	1,711,028
2049	3,614	1,612,205	111,400	76,122	1,799,727	498	362	491	1,307,556	1,773,224
2050	3,672	1,669,573	111,724	79,583	1,860,880	507	362	500	1,328,472	1,837,620
2051	3,756	1,744,918	156,855	87,656	1,989,429	530	362	510	1,359,004	1,917,451
2052	3,811	1,805,898	156,918	91,091	2,053,907	539	362	521	1,378,680	1,984,116
2053	3,865	1,867,867	211,695	95,229	2,174,790	563	362	531	1,398,213	2,052,471
2054	3,919	1,931,436	205,175	98,863	2,235,475	570	362	542	1,417,753	2,122,777
2055	3,972	1,995,122	198,656	102,626	2,296,403	578	362	553	1,437,263	2,195,030
2056	4,028	2,066,360	197,230	107,029	2,370,619	589	362	564	1,457,421	2,270,333
2057	4,089	2,141,148	245,968	116,459	2,503,574	612	362	575	1,479,316	2,350,527
2058	4,143	2,212,557	238,024	120,812	2,571,393	621	362	586	1,499,052	2,429,525
2059	4,198	2,284,510	230,081	125,318	2,639,909	629	362	598	1,518,786	2,510,739
2060	4,252	2,359,492	222,138	129,981	2,711,611	638	362	610	1,538,532	2,594,249
2061	4,307	2,437,135	214,195	134,807	2,786,137	647	362	622	1,558,261	2,680,065
2062	4,361	2,517,755	206,251	139,799	2,863,806	657	362	635	1,577,958	2,768,221
2063	4,413	2,597,852	203,860	144,326	2,946,039	668	362	647	1,596,654	2,857,040
2064	4,453	2,667,416	255,990	142,939	3,066,345	689	362	660	1,611,133	2,940,608
2065	4,503	2,748,889	248,030	148,161	3,145,080	698	362	674	1,629,303	3,033,246
2066	4,555	2,837,713	244,855	153,508	3,236,076	710	362	687	1,647,908	3,129,241
2067	4,610	2,930,426	297,122	159,009	3,386,557	735	362	701	1,667,930	3,230,606

Notes:

- Comparative incremental thermal data includes the following:
 Fixed annual charges for all CCCT plant (added for base load purposes) and Holyrood ESPs/Scrubbers and Upgrades;
 Operating costs for Holyrood (existing thermal base load plant) and new base load CCCT plant, including operating costs for ESPs and Scrubbers; and
 Fuel costs for Holyrood and all CCCT plant.
- Column 7: Nominal LUEC calculation: CPW of total Costs (Column 5) divided by CPW of energy (Column 1).
- Column 8: Escalating Real LUEC calculation: CPW of total Costs (Column 5) divided by Real CPW of energy (Column 1).