2012 Integrated Resource Plan

BC hydro

Appendix

3A-34

2010 Resource Options Report
Firm Energy Cost Adjustments

2010 Resource Options Report

Firm Energy Cost Adjustments
May 2011

BC hydro
FOR GENERATIONS

Firm Energy Cost Adjustments

In the Resource Options Report (ROR), BC Hydro presented base unit energy costs (UECs) for each resource option at the point of interconnection (POI). These base UECs at the POI represent the estimated overall cost of both non-firm and firm energy, and are based on the sum of three component-costs: costs within plant gate, road costs, and transmission interconnection costs. BC Hydro has also calculated an adjusted firm energy cost for the resource options. This calculation was done in order to facilitate a high level comparison of resource option costs that reflect the value of the resource option in meeting BC Hydro system needs and the cost of delivering firm energy to the Lower Mainland (load centre of the BC Hydro system). This process is similar to the approach taken in bid evaluation during acquisition call processes.

The adjustments applied to each resource option are as follows[1]:

- **Freshet Firm Energy Adjustment:** Additional energy in the freshet period (May through July) has limited value to the BC Hydro system. This is a result of high freshet inflows into BC Hydro reservoirs which limit the capability of the system to absorb additional energy combined with depressed prices in the Pacific North West electricity markets. The amount of firm energy for each resource option during the freshet was thus limited to 25% of the total firm energy for the year. Any excess energy was deemed to be non-firm.

- **3 x 12 Time of Delivery Price Adjustment:** The firm energy price (at POI) was calculated for each resource option such that the total revenue of the resource option under a firm price for the firm energy and a non-firm price[2] for the non-firm energy would equal the total project cost[3]. The non-firm energy was valued at the market price used in the Clean Power Call process with 25 Electricity Purchases Agreements (EPAs) awarded by August 2010. To do this calculation the firm and non-firm energy was distributed throughout the year according to each resource option's monthly profile[4]. In valuing the energy, a time of delivery factor applicable to the time of energy delivery was used. This time of delivery adjustment accounts for the value of electricity delivered to BC Hydro at different time periods in a month and at different months in the year. The time of delivery factors used are the same factors used in the Clean Power Call[5].

[1] A 2% annual inflationary factor was used in instances where it was necessary to inflate constant dollar values to $F2011.

[2] The non-firm energy prices were the market prices used in the Clean Power Call bid evaluation.

[3] Equivalent to the UEC at the POI multiplied by the project's total energy.

[4] Within month profile was assumed to be flat except in instances where more detailed data was available.

[5] Please refer to Table 5-3: Time of Delivery Factors of the "Clean Power Call Request for Proposals - Report on the RFP Process" available at

- **Cost of Incremental Firm Transmission (CIFT):** The CIFT provides a general indication of the long-term unit cost of bulk transmission system reinforcement from one transmission region to the next. CIFT is expressed as a region-to-region bulk transmission capacity cost. A CIFT for energy delivery to the Lower Mainland load centre was calculated for each resource option. The CIFT adjustment was based on a BC Transmission Corporation (BCTC) report titled: *Bulk Transmission System Cost of Incremental Firm Transmission for BC Hydro's 2008 LTAP Base Plan and Contingency Resource Plans CRP1 and CRP2* (January 15, 2009).

- **Line Losses Adjustment:** A calculation was carried out to determine the losses associated with delivering energy from each project location to the Lower Mainland. Losses were calculated based on a BCTC report titled: *Peak Load Incremental Losses for the Bulk Transmission System* (January 2010).

- **Greenhouse Gas (GHG) Offset Costs:** Offset costs were calculated for coal, cogeneration (cogen) and combined cycle gas turbine (CCGT) resources and added to the UEC. GHG offset cost was assumed to be $42/tonne of CO2 equivalents.

- **Capacity Credit:** A capacity credit was applied to projects with an hourly firm product. This credit of $34/kW-year (as used in the Clean Power Call) was applied to wood-based biomass, biogas, municipal solid waste (MSW), natural gas, coal, cogen, large hydro and geothermal resources.

- **Wind Integration Cost:** Due to the intermittent and variable nature of wind energy output, a $10/MWh adjustment was added to the wind project UECs to account for the incremental cost of integrating wind projects into the BC Hydro generation system.

Table 1 and Figure 1 present UECs that have been adjusted as described above.

A more detailed overview of the adjusters applied to the resource options with adjusted firm UECs under $200/MWh is presented in Table 2.

It must be noted that these cost adjusters do not reflect the resource option risks and uncertainties (e.g., level of study, resource type uncertainty, earliest in service date, cost uncertainties) or the resource option network upgrade costs (i.e., the cost of interconnecting resource options to the bulk transmission system).

http://www.bchydro.com/etc/medialib/internet/documents/planning_regulatory/acquiring_power/2010q3/cpc_rfp_process_report.Par.0001.File.CPC_RFP_Process_Report_August_3_2010.pdf

Table 1: Summary of Resource Potential – UEC at POI and Adjusted Firm UEC Values

Energy Resource	Total Annual Energy (GWh/yr)	Total Dependable Generation Capacity (MW)	UEC at POI @ 6% Real ($F2011/MWh)	Adjusted Firm UEC @ 6% Real ($F2011/MWh)
Biomass – Wood Based	11,946	1,499	112 – 855	107 – 911
Biomass – Biogas	134	16	54 – 140	49 – 135
Biomass – MSW	499	58	81 – 211	77 – 225
Wind – Onshore	38,885	3,942	95 – 303	114 – 340
Wind – Offshore	50,261	3,681	159 - 600	165 – 638
Geothermal	5,992	780	71 – 454	67 – 446
Run-of-River	44,703	1,074	71 – 590	86 – 1,327
Site C	5,100	1,100	95	104
CCGT and Cogeneration	6,290	964	77 – 107	84 – 109
Coal-fired generation with CCS	3,896	556	81	93
Wave	2,506	259	388 – 679	373 – 673
Tidal	1,426	247	224 – 491	222 – 488
Solar	57	12	310 – 721	376 – 884

Note: The Site C values presented in this table are based on information filed in May 2011 as part of the Site C Project Description Report.

Figure 1: Resource Potential Supply Curve Summary – Adjusted Firm UEC Values

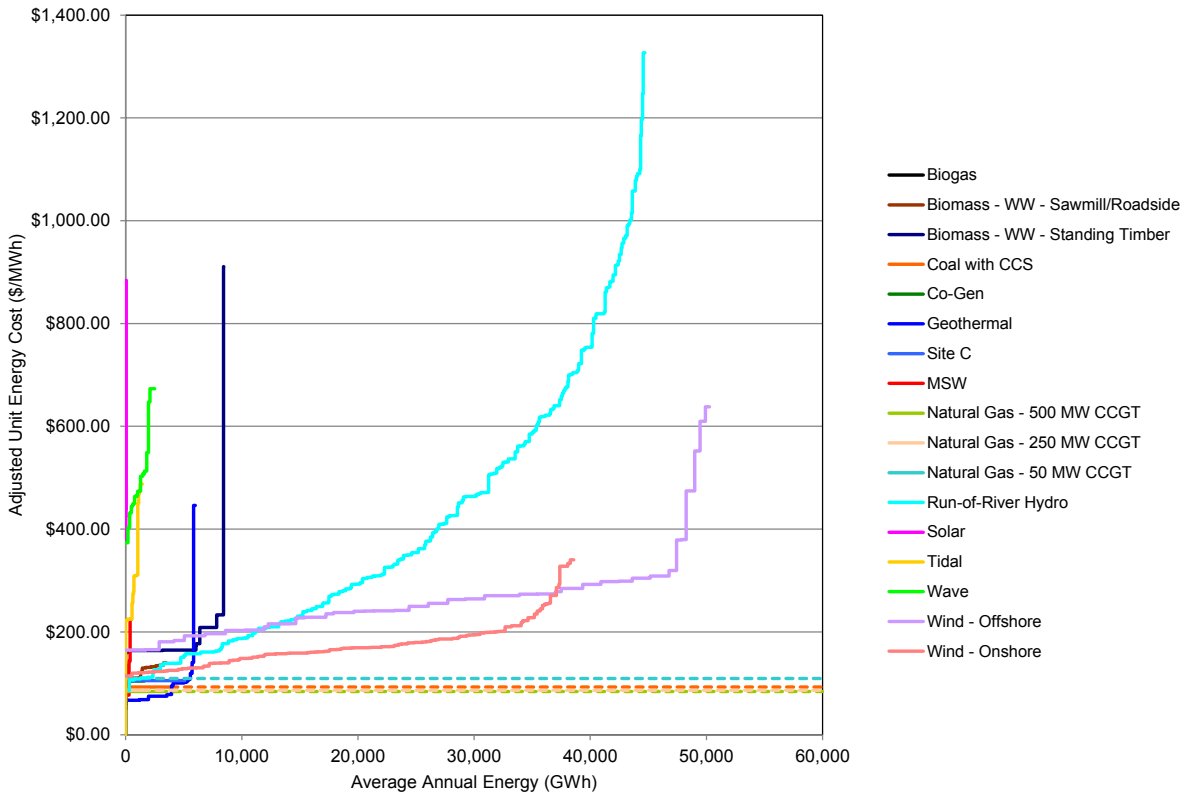

Table 2: Generation Resource Potential – Adjusted Firm UEC below $200/MWh[6]

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Biogas	Bailey	LM	12	$54	$0	$0	$0	$0	-$4	$0	$49
Biogas	Comox Valley	VI	8	$63	$0	$0	$0	$0	-$4	$0	$59
Biogas	Minnie's Pit	LM	7	$64	$0	$0	$0	$0	-$4	$0	$60
Biogas	Alberni valley	VI	7	$69	$0	$0	$0	$0	-$4	$0	$64
Biogas	Cache Creek	KL	27	$66	$0	$2	$3	$0	-$4	$0	$66
Biogas	Foothills Blvd	CI	17	$64	$0	$2	$4	$0	-$4	$0	$66
Biogas	Glenmore	SL	18	$66	$0	$2	$5	$0	-$4	$0	$69
Biogas	Ecowaste	LM	13	$86	$0	$0	$0	$0	-$4	$0	$82
Biogas	Greater Vernon	SL	7	$82	$0	$2	$6	$0	-$4	$0	$87
Biogas	Campbell Mtn	SL	7	$86	$0	$2	$6	$0	-$4	$0	$90
Biogas	Mission Flats	KL	6	$95	$0	$2	$4	$0	-$4	$0	$97
Biogas	Campbell River	VI	4	$140	$0	$0	-$1	$0	-$4	$0	$135
Biomass WW - RSD/SMW[9]	WBBio_VI	VI	641	$112	$0	$0	-$1	$0	-$5	$0	$107
Biomass WW - RSD/SMW	WBBio_LM	LM	641	$115	$0	$0	$0	$0	-$5	$0	$110

[6] Resource options presented alphabetically and values rounded to the nearest integer

[7] Transmission Regions: CI = Central Interior, EK = East Kootenay, KL = Kelly Nicola, LM = Lower Mainland, MCA = Mica, NC = North Coast, PR = Peace River, REV = Revelstoke Ashton Creek, SL = Selkirk, VI = Vancouver Island

[8] Firm Energy Adjusters = Freshet Firm Energy Adjustment and 3x12 Time of Delivery Price Adjustment

[9] Biomass Wood Waste - Road Side Debris / Sawmill Waste (WW – RSD/SMW)

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Biomass WW - RSD/SMW	WBBio_WPR	NC	139	$116	$0	$2	$8	$0	-$5	$0	$121
Biomass WW - RSD/SMW	WBBio_WK	SL	312	$123	$0	$3	$9	$0	-$5	$0	$130
Biomass WW - RSD/SMW	WBBio_EPR	NC	206	$125	$0	$2	$8	$0	-$5	$0	$131
Biomass WW - RSD/SMW	WBBio_CO	CI	244	$125	$0	$2	$9	$0	-$5	$0	$131
Biomass WW - RSD/SMW	WBBio_KM	KL	408	$130	$0	$2	$5	$0	-$5	$0	$132
Biomass WW - RSD/SMW	WBBio_EK	EK	298	$127	$0	$3	$10	$0	-$5	$0	$134
Biomass WW - RSD/SMW	WBBio_PG	NC	362	$129	$0	$2	$9	$0	-$5	$0	$135
Biomass WW - RSD/SMW	WBBio_SP	PR	248	$127	$0	$3	$14	$0	-$5	$0	$140
Biomass WW - ST[10]	WBBio_ST_LT_EPR	NC	14	$150	$0	$2	$10	$0	-$5	$0	$158
Biomass WW - ST	WBBio_ST_LT_KM	KL	201	$157	$0	$2	$6	$0	-$5	$0	$160

[10] Biomass Wood Waste - Standing Timber (WW – ST)

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Biomass WW - ST	WBBio_ST_LT_EK	EK	23	$151	$0	$3	$11	$0	-$5	$0	$161
Biomass WW - ST	WBBio_ST_LT_PG	NC	103	$153	$0	$2	$10	$0	-$5	$0	$161
Biomass WW - ST	WBBio_ST_LT_VI	VI	2,850	$169	$0	$0	-$1	$0	-$5	$0	$164
Biomass WW - ST	WBBio_ST_LT_LM	LM	2,850	$169	$0	$0	$0	$0	-$5	$0	$165
Biomass WW - ST	WBBio_ST_LT_WK	SL	29	$164	$0	$3	$12	$0	-$5	$0	$174
Biomass WW - ST	WBBio_ST_LT_SP	PR	308	$160	$0	$3	$18	$0	-$5	$0	$177
Coal-fired generation with CCS	750 MW Integrated Gasification Combined Cycle	PR	3,896	$81	$0	$4	$9	$4	-$5	$0	$93
Cogen	Small Cogeneration projects	LM	1,600	$99	$0	$0	$0	$10	-$5	$0	$105
Geothermal	Mt. Garibaldi	LM	394	$71	$0	$0	$0	$0	-$5	$0	$67
Geothermal	Pebble Creek	LM	788	$72	$0	$0	$0	$0	-$5	$0	$67
Geothermal	South Meager Creek	LM	788	$73	$0	$0	$0	$0	-$5	$0	$68
Geothermal	Mt. Edziza	NC	1,577	$72	$0	$2	$5	$0	-$5	$0	$75
Geothermal	Mt. Cayley	LM	394	$83	$0	$0	$0	$0	-$5	$0	$78
Geothermal	Harrison Hot Springs	LM	140	$101	$0	$0	$0	$0	-$5	$0	$95
Geothermal	Kootenay Lake	SL	140	$96	$0	$3	$7	$0	-$5	$0	$101
Geothermal	Mt. Silverthrone	VI	394	$106	$0	$0	$0	$0	-$5	$0	$101
Geothermal	Hoodoo Mountain	NC	394	$97	$0	$2	$7	$0	-$5	$0	$101

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Geothermal	Lakelse Lake	NC	140	$98	$0	$3	$7	$0	-$5	$0	$102
Geothermal	Canoe Creek / Valemont	KL	140	$102	$0	$2	$4	$0	-$5	$0	$103
Geothermal	Hudson's Hope	PR	140	$96	$0	$4	$11	$0	-$5	$0	$106
Geothermal	Upper Arrow Lake	REV	140	$103	$0	$3	$8	$0	-$5	$0	$108
Geothermal	Lower Arrow Lake	SL	140	$113	$0	$3	$8	$0	-$5	$0	$119
Geothermal	Okanagan Valley	SL	140	$133	$0	$3	$10	$0	-$5	$0	$140
MSW	MSW 2	LM	285	$81	$0	$0	$0	$0	-$4	$0	$77
MSW	MSW 1	VI	101	$148	$0	$0	-$1	$0	-$4	$0	$143
Natural Gas	500 MW Combined Cycle Gas Turbine	KL	2,940	$77	-$8	$3	$3	$15	-$6	$0	$84
Natural Gas	250 MW Combined Cycle Gas Turbine	KL	1,450	$80	-$9	$3	$3	$15	-$6	$0	$87
Natural Gas	50 MW Combined Cycle Gas Turbine	KL	300	$107	-$16	$3	$4	$17	-$6	$0	$109
Run-of-River Hydro	ROR_T1R1_60-80_LM	LM	301	$71	$15	$0	$0	$0	$0	$0	$86
Run-of-River Hydro	ROR_T1R1_80-90_VI	VI	435	$83	$24	$0	$0	$0	$0	$0	$106
Run-of-River Hydro	ROR_T1R1_80-90_LM	LM	545	$84	$24	$0	$0	$0	$0	$0	$108
Run-of-River Hydro	ROR_T1R1_70-80_KN	KL	588	$78	$29	$0	$3	$0	$0	$0	$111

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Run-of-River Hydro	ROR_T1R1_90-110_VI	VI	488	$95	$17	$0	$0	$0	$0	$0	$112
Run-of-River Hydro	ROR_T1R1_70-100_NC	NC	153	$89	$29	$0	$6	$0	$0	$0	$124
Run-of-River Hydro	ROR_T1R1_90-100_LM	LM	482	$95	$31	$0	$0	$0	$0	$0	$126
Run-of-River Hydro	ROR_T1R1_80-100_KN	KL	285	$92	$40	$0	$4	$0	$0	$0	$136
Run-of-River Hydro	ROR_T1R1_100-110_LM	LM	1,215	$104	$35	$0	$0	$0	$0	$0	$139
Run-of-River Hydro	ROR_T1R1_80-100_EK	EK	255	$94	$38	$0	$7	$0	$0	$0	$139
Run-of-River Hydro	ROR_T1R1_90-110_REV	REV	243	$102	$41	$0	$7	$0	$0	$0	$151
Run-of-River Hydro	ROR_T1R1_100-110_KN	KL	150	$102	$48	$0	$4	$0	$0	$0	$154
Run-of-River Hydro	ROR_T1R1_110-120_VI	VI	1,314	$115	$43	$0	-$1	$0	$0	$0	$158
Run-of-River Hydro	ROR_T1R1_110-120_LM	LM	1,167	$115	$46	$0	$0	$0	$0	$0	$161

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Run-of-River Hydro	ROR_T1R1_100-110_BQL	NC	171	$106	$49	$0	$7	$0	$0	$0	$162
Run-of-River Hydro	ROR_T1R1_100-110_SE	SL	278	$106	$49	$0	$8	$0	$0	$0	$163
Run-of-River Hydro	ROR_T1R1_100-120_NC	NC	159	$112	$46	$0	$8	$0	$0	$0	$166
Run-of-River Hydro	ROR_T1R1_110-120_MCA	MCA	85	$113	$47	$0	$9	$0	$0	$0	$169
Run-of-River Hydro	ROR_T1R1_110-120_REV	REV	332	$116	$52	$0	$8	$0	$0	$0	$177
Run-of-River Hydro	ROR_T1R1_120-130_NC	NC	205	$125	$44	$1	$9	$0	$0	$0	$178
Run-of-River Hydro	ROR_T1R1_120-140_VI	VI	399	$133	$50	$0	-$1	$0	$0	$0	$182
Run-of-River Hydro	ROR_T1R1_110-130_KN	KL	321	$121	$59	$0	$5	$0	$0	$0	$185
Run-of-River Hydro	ROR_T1R1_120-140_LM	LM	451	$131	$56	$0	$0	$0	$0	$0	$187
Run-of-River Hydro	ROR_T1R1_120-140_CI	CI	288	$123	$56	$0	$9	$0	$0	$0	$188

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Run-of-River Hydro	ROR_T1R1_110-130_SE	SL	214	$120	$59	$0	$9	$0	$0	$0	$188
Run-of-River Hydro	ROR_T1R1_120-140_REV	REV	397	$127	$56	$0	$9	$0	$0	$0	$193
Run-of-River Hydro	ROR_T1R1_110-130_EK	EK	243	$121	$67	$0	$9	$0	$0	$0	$198
Site C	Site C Clean Energy Project	PR	5,100	$95	$1	$5	$11	$0	-$8	$0	$104
Wind - Offshore	OBC24-1	VI	1,685	$159	-$4	$0	-$1	$0	$0	$10	$165
Wind - Offshore	OBC25-1	VI	1,200	$160	-$4	$0	-$1	$0	$0	$10	$165
Wind - Offshore	OBC28	VI	1,265	$176	-$5	$0	-$1	$0	$0	$10	$181
Wind - Offshore	OBC29	VI	905	$178	-$4	$0	-$1	$0	$0	$10	$183
Wind - Offshore	OBC8-1	NC	1,772	$174	-$4	$1	$12	$0	$0	$10	$193
Wind - Offshore	OBC24-2	VI	1,769	$192	-$5	$0	-$1	$0	$0	$10	$197
Wind - Onshore	PC28	PR	536	$95	-$3	$2	$11	$0	$0	$10	$114
Wind - Onshore	PC20	PR	574	$99	-$2	$2	$11	$0	$0	$10	$120
Wind - Onshore	PC13	PR	465	$101	-$3	$2	$11	$0	$0	$10	$121

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Wind - Onshore	PC19	PR	381	$100	-$2	$2	$11	$0	$0	$10	$121
Wind - Onshore	PC18	PR	467	$101	-$2	$2	$11	$0	$0	$10	$122
Wind - Onshore	VI14	VI	103	$117	-$4	$0	-$1	$0	$0	$10	$122
Wind - Onshore	PC14	PR	463	$103	-$3	$2	$12	$0	$0	$10	$123
Wind - Onshore	PC21	PR	311	$102	-$2	$2	$12	$0	$0	$10	$123
Wind - Onshore	PC16	PR	323	$104	-$4	$2	$12	$0	$0	$10	$124
Wind - Onshore	PC10	PR	901	$104	-$3	$2	$12	$0	$0	$10	$125
Wind - Onshore	PC15	PR	329	$107	-$4	$2	$12	$0	$0	$10	$127
Wind - Onshore	PC48	PR	481	$107	-$3	$2	$12	$0	$0	$10	$128
Wind - Onshore	PC42	PR	194	$108	-$3	$2	$12	$0	$0	$10	$129
Wind - Onshore	PC11	PR	409	$109	-$3	$2	$12	$0	$0	$10	$130
Wind - Onshore	VI12	VI	127	$126	-$6	$0	-$1	$0	$0	$10	$130
Wind - Onshore	PC09	PR	619	$109	-$3	$2	$12	$0	$0	$10	$130
Wind - Onshore	PC41	PR	131	$112	-$4	$2	$13	$0	$0	$10	$133

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Wind - Onshore	PC26	PR	372	$112	-$3	$2	$13	$0	$0	$10	$133
Wind - Onshore	VI15	VI	106	$134	-$5	$0	-$1	$0	$0	$10	$139
Wind - Onshore	PC40	PR	334	$116	-$2	$2	$13	$0	$0	$10	$139
Wind - Onshore	SI23	KL	522	$127	-$4	$1	$5	$0	$0	$10	$139
Wind - Onshore	PC06	PR	674	$117	-$3	$2	$13	$0	$0	$10	$140
Wind - Onshore	VI13	VI	85	$135	-$4	$0	-$1	$0	$0	$10	$140
Wind - Onshore	PC05	PR	333	$122	-$3	$2	$14	$0	$0	$10	$144
Wind - Onshore	VI07	VI	447	$139	-$3	$0	-$1	$0	$0	$10	$145
Wind - Onshore	PC43	PR	134	$123	-$3	$2	$14	$0	$0	$10	$146
Wind - Onshore	NC09	NC	807	$134	-$7	$2	$9	$0	$0	$10	$148
Wind - Onshore	PC12	PR	285	$126	-$4	$2	$14	$0	$0	$10	$149
Wind - Onshore	SI12	REV	455	$134	-$5	$2	$10	$0	$0	$10	$151
Wind - Onshore	PC47	PR	99	$129	-$4	$2	$15	$0	$0	$10	$152
Wind - Onshore	PC04	PR	325	$130	-$4	$2	$15	$0	$0	$10	$153

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Wind - Onshore	SI20	KL	100	$141	-$6	$2	$5	$0	$0	$10	$153
Wind - Onshore	VI08	VI	91	$149	-$4	$0	-$1	$0	$0	$10	$154
Wind - Onshore	PC27	PR	268	$133	-$4	$2	$15	$0	$0	$10	$157
Wind - Onshore	SI15	KL	665	$145	-$6	$2	$6	$0	$0	$10	$157
Wind - Onshore	VI05	VI	577	$153	-$5	$0	-$1	$0	$0	$10	$158
Wind - Onshore	PC25	CI	373	$140	-$4	$2	$10	$0	$0	$10	$158
Wind - Onshore	SI10	KL	264	$146	-$5	$2	$6	$0	$0	$10	$158
Wind - Onshore	NC01	NC	1,493	$143	-$5	$2	$10	$0	$0	$10	$159
Wind - Onshore	BC20	NC	245	$144	-$6	$2	$10	$0	$0	$10	$160
Wind - Onshore	SI19	KL	123	$151	-$8	$2	$6	$0	$0	$10	$160
Wind - Onshore	SI27	LM	207	$155	-$4	$0	$0	$0	$0	$10	$161
Wind - Onshore	VI10	VI	77	$157	-$6	$0	-$1	$0	$0	$10	$161
Wind - Onshore	PC17	PR	270	$137	-$4	$2	$15	$0	$0	$10	$161
Wind - Onshore	NC10	CI	217	$147	-$8	$2	$10	$0	$0	$10	$161

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Wind - Onshore	SI18	KL	281	$151	-$7	$2	$6	$0	$0	$10	$161
Wind - Onshore	PC44	PR	99	$139	-$5	$2	$16	$0	$0	$10	$162
Wind - Onshore	SI04	KL	210	$151	-$6	$2	$6	$0	$0	$10	$162
Wind - Onshore	PC37	PR	199	$137	-$2	$2	$15	$0	$0	$10	$162
Wind - Onshore	NC02	NC	568	$149	-$5	$2	$10	$0	$0	$10	$166
Wind - Onshore	VI02	VI	396	$164	-$7	$0	-$1	$0	$0	$10	$166
Wind - Onshore	SI22	KL	99	$155	-$6	$2	$6	$0	$0	$10	$167
Wind - Onshore	SI14	REV	192	$149	-$4	$2	$11	$0	$0	$10	$168
Wind - Onshore	BC22	NC	569	$152	-$6	$2	$10	$0	$0	$10	$168
Wind - Onshore	PC03	PR	209	$144	-$3	$2	$16	$0	$0	$10	$169
Wind - Onshore	SI16	KL	1,310	$157	-$6	$2	$6	$0	$0	$10	$169
Wind - Onshore	SI05	KL	290	$159	-$7	$2	$6	$0	$0	$10	$170
Wind - Onshore	BC19	NC	236	$154	-$6	$2	$10	$0	$0	$10	$170
Wind - Onshore	VI06	VI	276	$166	-$5	$0	-$1	$0	$0	$10	$170

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Wind - Onshore	PC07	PR	313	$144	-$2	$2	$16	$0	$0	$10	$170
Wind - Onshore	PC34	PR	755	$146	-$4	$3	$17	$0	$0	$10	$171
Wind - Onshore	BC18	NC	353	$155	-$6	$2	$11	$0	$0	$10	$172
Wind - Onshore	SI28	KL	216	$159	-$3	$2	$6	$0	$0	$10	$174
Wind - Onshore	NC12	NC	181	$157	-$5	$2	$11	$0	$0	$10	$174
Wind - Onshore	NC07	NC	244	$159	-$6	$2	$11	$0	$0	$10	$176
Wind - Onshore	SI32	SL	74	$154	-$1	$2	$11	$0	$0	$10	$177
Wind - Onshore	PC01	PR	389	$152	-$5	$2	$17	$0	$0	$10	$177
Wind - Onshore	VI11	VI	86	$178	-$9	$0	-$1	$0	$0	$10	$178
Wind - Onshore	SI03	KL	290	$169	-$9	$2	$7	$0	$0	$10	$179
Wind - Onshore	SI11	REV	272	$160	-$5	$2	$12	$0	$0	$10	$179
Wind - Onshore	BC26	KL	306	$169	-$8	$2	$7	$0	$0	$10	$179
Wind - Onshore	BC25	CI	348	$164	-$8	$2	$11	$0	$0	$10	$180
Wind - Onshore	PC32	PR	305	$154	-$4	$3	$17	$0	$0	$10	$180

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Wind - Onshore	PC36	PR	356	$155	-$5	$3	$17	$0	$0	$10	$180
Wind - Onshore	SI30	KL	324	$170	-$7	$2	$7	$0	$0	$10	$181
Wind - Onshore	PC08	PR	124	$156	-$3	$2	$18	$0	$0	$10	$183
Wind - Onshore	SI37	EK	69	$164	-$6	$2	$12	$0	$0	$10	$183
Wind - Onshore	PC38	PR	272	$157	-$4	$3	$18	$0	$0	$10	$184
Wind - Onshore	BC24	CI	264	$169	-$8	$2	$12	$0	$0	$10	$185
Wind - Onshore	SI13	REV	453	$170	-$9	$3	$12	$0	$0	$10	$186
Wind - Onshore	BC21	NC	498	$170	-$7	$2	$12	$0	$0	$10	$186
Wind - Onshore	SI29	KL	253	$173	-$5	$2	$7	$0	$0	$10	$186
Wind - Onshore	SI01	KL	437	$176	-$7	$2	$7	$0	$0	$10	$188
Wind - Onshore	NC11	CI	147	$173	-$8	$2	$12	$0	$0	$10	$189
Wind - Onshore	SI09	KL	171	$178	-$6	$2	$7	$0	$0	$10	$191
Wind - Onshore	SI06	KL	236	$179	-$7	$2	$7	$0	$0	$10	$191
Wind - Onshore	BC23	NC	227	$175	-$7	$2	$12	$0	$0	$10	$192

Resource Option	Project Name	Transmission Region[7]	Average Annual Energy (GWh)	UEC at POI ($/MWh)	Firm Energy Adjusters[8] ($/MWh)	CIFT ($/MWh)	Line Losses ($/MWh)	GHG Cost ($/MWh)	Capacity Credit ($/MWh)	Wind Integration Cost ($/MWh)	Adjusted Firm UEC ($/MWh)
				1	2	3	4	5	6	7	∑1 to 7
Wind - Onshore	SI08	KL	209	$180	-$6	$2	$7	$0	$0	$10	$193
Wind - Onshore	PC24	CI	234	$176	-$6	$2	$12	$0	$0	$10	$194
Wind - Onshore	PC29	PR	169	$167	-$5	$3	$19	$0	$0	$10	$194
Wind - Onshore	SI26	KL	219	$179	-$3	$2	$7	$0	$0	$10	$194
Wind - Onshore	BC11	NC	320	$178	-$7	$2	$12	$0	$0	$10	$195
Wind - Onshore	NC08	NC	342	$179	-$6	$3	$12	$0	$0	$10	$198
Wind - Onshore	VI04	VI	148	$199	-$9	$0	-$1	$0	$0	$10	$199
Wind - Onshore	BC10	NC	379	$182	-$7	$2	$12	$0	$0	$10	$199
Wind - Onshore	PC23	CI	118	$181	-$6	$2	$13	$0	$0	$10	$199
Wind - Onshore	SI31	KL	273	$189	-$9	$2	$7	$0	$0	$10	$199
Wind - Onshore	SI38	EK	183	$180	-$6	$3	$14	$0	$0	$10	$200