

Hydropower Generation and Capacity

Energy: Level of power delivered multiplied by the amount of time that the level of power is delivered (average Megawatts)

Capacity: The maximum load that a generator, piece of equipment, substation, transmission line, or system can carry under existing service conditions (Megawatts).

Marginal Resource Approach - Assumptions

- Gas-fired power plants are likely to be the marginal resource used to provide energy and capacity
- Prices used:
 - Low Price*: ~ \$30 per Megawatt hour
 - High Price*: ~ \$57 per Megawatt hour
 - AURORA: Model that calculates the variable cost of the marginal resource in a competitively priced electric energy market. (Based on BPA Final Rate Case 12)

*6th Power Plan and August 2011 Gas Price forecast from NWPC

Canadian Entitlement

	Canadian Entitlement Value ¹		
	Low Gas ²	70 Year Average AURORA FY 12 ³	High Gas ²
Energy 442 aMW	\$ 113,643,562	\$ 144,456,930	\$ 219,094,916
Capacity 1331 MW ⁴	\$ 115,607,475	\$ 115,607,475	\$ 115,607,475
Total	\$ 229,251,038	\$ 260,064,405	\$ 334,702,392

1. Forecast for 2025

2. NWPCC - Update to Council's Forecast of Fuel Prices (August 10, 2011) - Lower

3. Final Rate Case 12, 70 year average Mid-C Heavy Load Hour Prices

4. NWPCC 6th Power Plan - Mitsubishi 501G Combined Cycle Plant

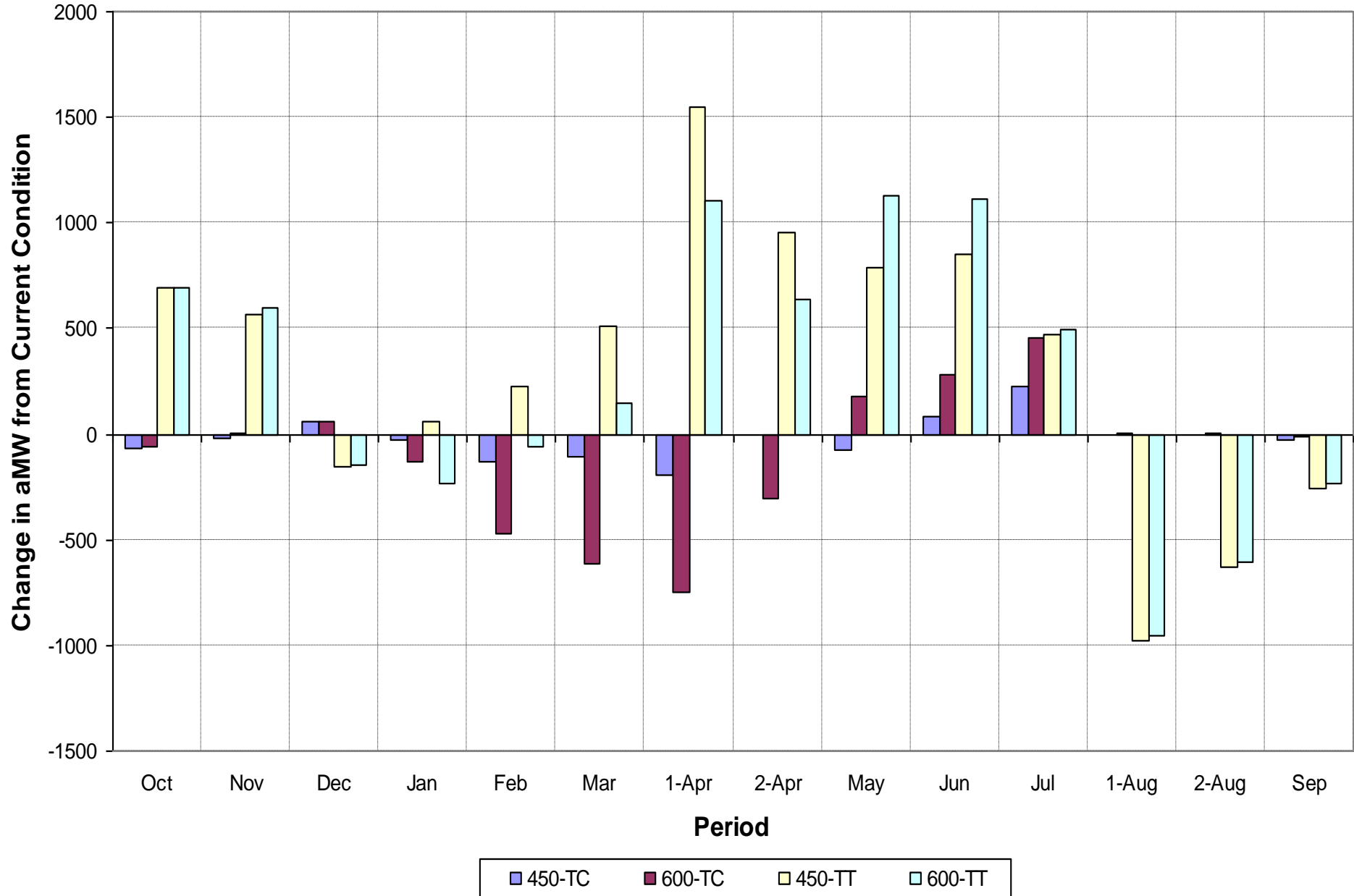
Energy



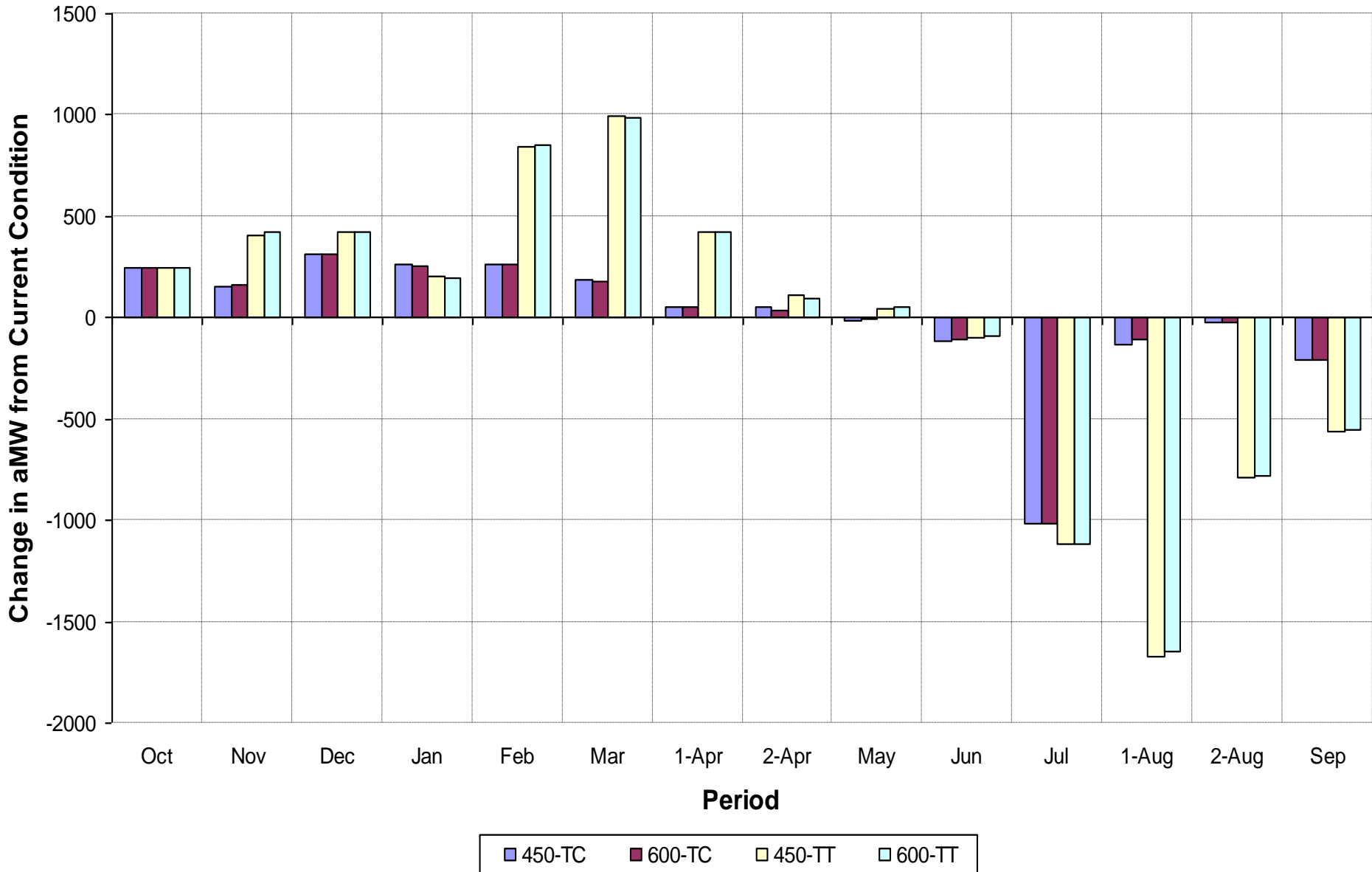
Note: Removes Canadian Entitlement obligation in Treaty Terminates Alternatives

U.S. System: Change in Generation from Current Condition

Average Megawatts (aMW)



Canadian Generation: Change in Generation from Current Conditions Average Megawatts (aMW)



U.S. Generation (aMW)

US System Generation (less 442 aMW under Treaty continues scenarios)															Average Annual
	10/31	11/30	12/31	01/31	02/28	03/31	04/15	04/30	05/31	06/30	07/31	08/15	08/31	09/30	
RC-CC	8587	10813	13164	14495	13540	12784	13616	14062	15683	15431	13247	11280	9965	9127	12605
450-TC	8522	10790	13222	14467	13406	12676	13420	14061	15609	15512	13470	11274	9963	9103	12590
600-TC	8524	10815	13222	14363	13068	12172	12869	13756	15865	15713	13702	11287	9970	9115	12539
450-TT	9278	11383	13013	14557	13769	13292	15166	15020	16472	16282	13718	10306	9333	8873	12955
600-TT	9281	11408	13020	14259	13478	12931	14724	14697	16809	16547	13738	10323	9356	8893	12904

US System Generation: Difference from Reference Case															Average Annual
	10/31	11/30	12/31	01/31	02/28	03/31	04/15	04/30	05/31	06/30	07/31	08/15	08/31	09/30	
(450-TC) - (RC-CC)	-65	-23	58	-28	-134	-108	-196	0	-73	81	223	-6	-2	-24	-15
(600-TC) - (RC-CC)	-63	2	58	-132	-472	-612	-747	-306	182	282	456	6	5	-13	-66
(450-TT) - (RC-CC)	691	570	-151	62	230	508	1550	959	789	851	471	-975	-631	-255	350
(600-TT) - (RC-CC)	694	596	-144	-236	-62	147	1108	636	1126	1116	492	-958	-609	-234	299

Canadian Generation (aMW)

Canadian Generation (plus 442 aMW under the Treaty continues scenarios)															Average Annual
	10/31	11/30	12/31	01/31	02/28	03/31	04/15	04/30	05/31	06/30	07/31	08/15	08/31	09/30	
RC-CC	3462	3818	4884	4383	3087	2652	2331	2378	3231	3693	4544	5128	4610	4184	3771
450-TC	3707	3976	5200	4647	3347	2841	2385	2435	3220	3578	3526	4997	4589	3973	3774
600-TC	3707	3983	5200	4638	3348	2833	2382	2411	3226	3585	3533	5017	4589	3976	3775
450-TT	3265	3786	4861	4148	3492	3203	2313	2052	2833	3156	2983	3018	3382	3183	3360
600-TT	3265	3796	4861	4135	3493	3197	2309	2030	2844	3162	2983	3042	3385	3189	3361

Canadian Generation: Difference from Reference Case															Average Annual
	10/31	11/30	12/31	01/31	02/28	03/31	04/15	04/30	05/31	06/30	07/31	08/15	08/31	09/30	
(450-TC) - (RC-CC)	245	157	316	264	261	189	54	57	-11	-115	-1019	-131	-21	-211	3
(600-TC) - (RC-CC)	245	165	316	256	262	181	51	33	-5	-108	-1012	-111	-20	-207	4
(450-TT) - (RC-CC)	-197	-32	-23	-235	405	551	-18	-326	-398	-537	-1561	-2110	-1228	-1001	-411
(600-TT) - (RC-CC)	-197	-22	-23	-248	406	545	-23	-348	-387	-532	-1561	-2086	-1225	-995	-410

Federal Generation (aMW)

Federal Generation (less 320 aMW under the Treaty continues scenarios)															Average Annual
	10/31	11/30	12/31	01/31	02/28	03/31	04/15	04/30	05/31	06/30	07/31	08/15	08/31	09/30	
RC-CC	5395	6711	8388	9382	8968	8704	8686	9142	10211	9652	8506	7418	6475	5938	8139
450-TC	5347	6692	8429	9356	8872	8623	8554	9139	10160	9692	8672	7409	6472	5924	8126
600-TC	5348	6711	8429	9281	8593	8231	8169	9006	10425	9825	8847	7425	6478	5933	8095
450-TT	5924	7211	8251	9445	9115	9067	9784	9842	10780	10214	8855	6669	6042	5653	8385
600-TT	5925	7231	8257	9232	8874	8782	9473	9702	11096	10392	8870	6686	6059	5670	8354

Federal Generation: Difference from Reference Case															Average Annual
	10/31	11/30	12/31	01/31	02/28	03/31	04/15	04/30	05/31	06/30	07/31	08/15	08/31	09/30	
(450-TC) - (RC-CC)	-48	-19	41	-26	-96	-82	-132	-3	-50	41	166	-9	-3	-14	-13
(600-TC) - (RC-CC)	-46	0	41	-101	-375	-473	-518	-136	214	173	340	7	3	-5	-43
(450-TT) - (RC-CC)	529	500	-137	63	147	362	1098	700	569	562	349	-749	-433	-285	247
(600-TT) - (RC-CC)	530	520	-132	-150	-94	78	787	560	886	740	364	-732	-417	-267	215

Mid-C Generation (aMW)

Mid-C Generation (less 122 aMW under the Treaty continues scenarios)															Average Annual
	10/31	11/30	12/31	01/31	02/28	03/31	04/15	04/30	05/31	06/30	07/31	08/15	08/31	09/30	
RC-CC	1685	2178	2617	2796	2528	2301	2435	2509	2892	2798	2516	2331	2236	1807	2406
450-TC	1666	2173	2633	2786	2487	2264	2369	2509	2869	2838	2573	2329	2237	1804	2401
600-TC	1666	2178	2633	2763	2429	2160	2205	2345	2860	2910	2632	2334	2239	1807	2384
450-TT	1892	2373	2569	2837	2598	2445	2895	2780	3127	3083	2636	2047	2012	1682	2508
600-TT	1892	2377	2570	2759	2559	2384	2765	2604	3145	3175	2638	2052	2018	1688	2492

Mid-C Generation: Difference from Reference Case															Average Annual
	10/31	11/30	12/31	01/31	02/28	03/31	04/15	04/30	05/31	06/30	07/31	08/15	08/31	09/30	
(450-TC) - (RC-CC)	-19	-5	16	-10	-41	-36	-66	0	-23	40	58	-2	0	-3	-5
(600-TC) - (RC-CC)	-19	0	16	-32	-99	-141	-230	-164	-32	112	116	2	2	0	-22
(450-TT) - (RC-CC)	206	196	-48	41	71	144	460	271	235	285	120	-285	-224	-125	102
(600-TT) - (RC-CC)	207	200	-47	-36	31	83	330	96	253	377	123	-280	-219	-120	86

U.S. System Generation (aMW)

Total US Generation	(450-TC) - (RC-CC)	(600-TC) - (RC-CC)	(450-TT) - (RC-CC)	(600-TT) - (RC-CC)
Low 14 Years				
Fall, Sep - Nov	-56	-27	131	153
Winter, Dec - Feb	-18	-31	92	16
Spring, Mar - May	-34	-57	724	783
Summer, Jun - Aug	44	107	-348	-288
Annual	-9	1	113	126
Middle 42 Years				
Fall, Sep - Nov	-35	-24	379	393
Winter, Dec - Feb	-60	-204	58	-114
Spring, Mar - May	-79	-307	1017	878
Summer, Jun - Aug	141	276	286	406
Annual	-7	-63	448	405
High 14 Years				
Fall, Sep - Nov	-31	-31	460	475
Winter, Dec - Feb	42	-220	-64	-425
Spring, Mar - May	-194	-604	455	149
Summer, Jun - Aug	34	303	328	410
Annual	-46	-142	293	153
All Water Years				
Annual	-15	-66	350	299

Note: Differences take into account U.S. portion of Canadian Entitlement: 442 aMW

Federal Generation (aMW)

Total Federal Generation	(450-TC) - (RC-CC)	(600-TC) - (RC-CC)	(450-TT) - (RC-CC)	(600-TT) - (RC-CC)
Low 14 Years				
Fall, Sep - Nov	-41	-19	89	106
Winter, Dec - Feb	-14	-32	34	-28
Spring, Mar - May	-21	-34	559	600
Summer, Jun - Aug	27	78	-231	-189
Annual	-8	0	83	90
Middle 42 Years				
Fall, Sep - Nov	-26	-16	282	295
Winter, Dec - Feb	-46	-160	41	-91
Spring, Mar - May	-47	-190	729	664
Summer, Jun - Aug	98	199	181	269
Annual	-4	-40	319	295
High 14 Years				
Fall, Sep - Nov	-22	-24	339	350
Winter, Dec - Feb	28	-176	-57	-329
Spring, Mar - May	-171	-366	290	130
Summer, Jun - Aug	13	188	205	243
Annual	-45	-97	194	101
All Water Years				
Annual	-13	-43	247	215

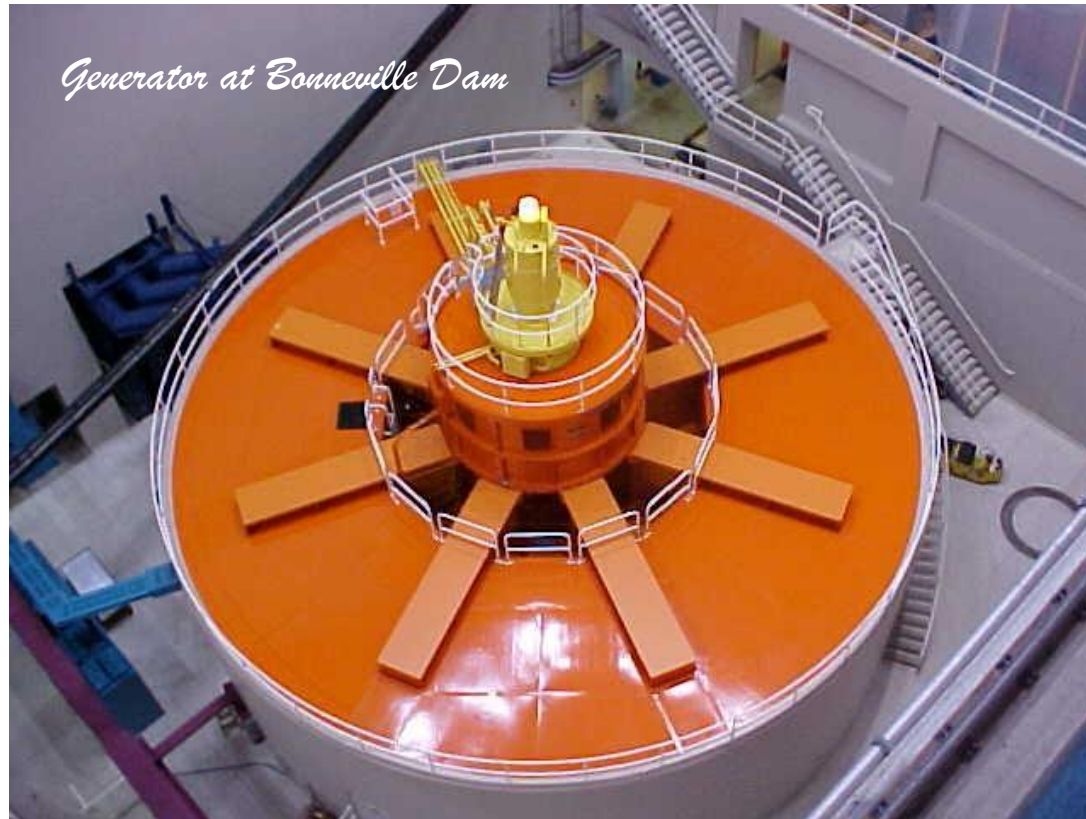
Note: Differences take into account Federal portion of Canadian Entitlement: 320 aMW

Mid-C Generation (aMW)

Total Mid-C Generation	(450-TC) - (RC-CC)	(600-TC) - (RC-CC)	(450-TT) - (RC-CC)	(600-TT) - (RC-CC)
Low 14 Years				
Fall, Sep - Nov	-12	-7	31	34
Winter, Dec - Feb	-5	-2	32	14
Spring, Mar - May	-12	-25	213	234
Summer, Jun - Aug	15	30	-126	-108
Annual	-2	-1	24	30
Middle 42 Years				
Fall, Sep - Nov	-9	-6	105	109
Winter, Dec - Feb	-18	-45	26	-5
Spring, Mar - May	-33	-117	291	219
Summer, Jun - Aug	42	76	83	116
Annual	-4	-22	131	114
High 14 Years				
Fall, Sep - Nov	-9	-9	129	132
Winter, Dec - Feb	6	-47	-14	-95
Spring, Mar - May	-42	-238	149	23
Summer, Jun - Aug	21	123	117	166
Annual	-8	-44	95	57
All Water Years				
Annual	-5	-22	102	86

Note: Differences take into account Mid-C portion of Canadian Entitlement: 122 aMW

Value of Energy and Capacity



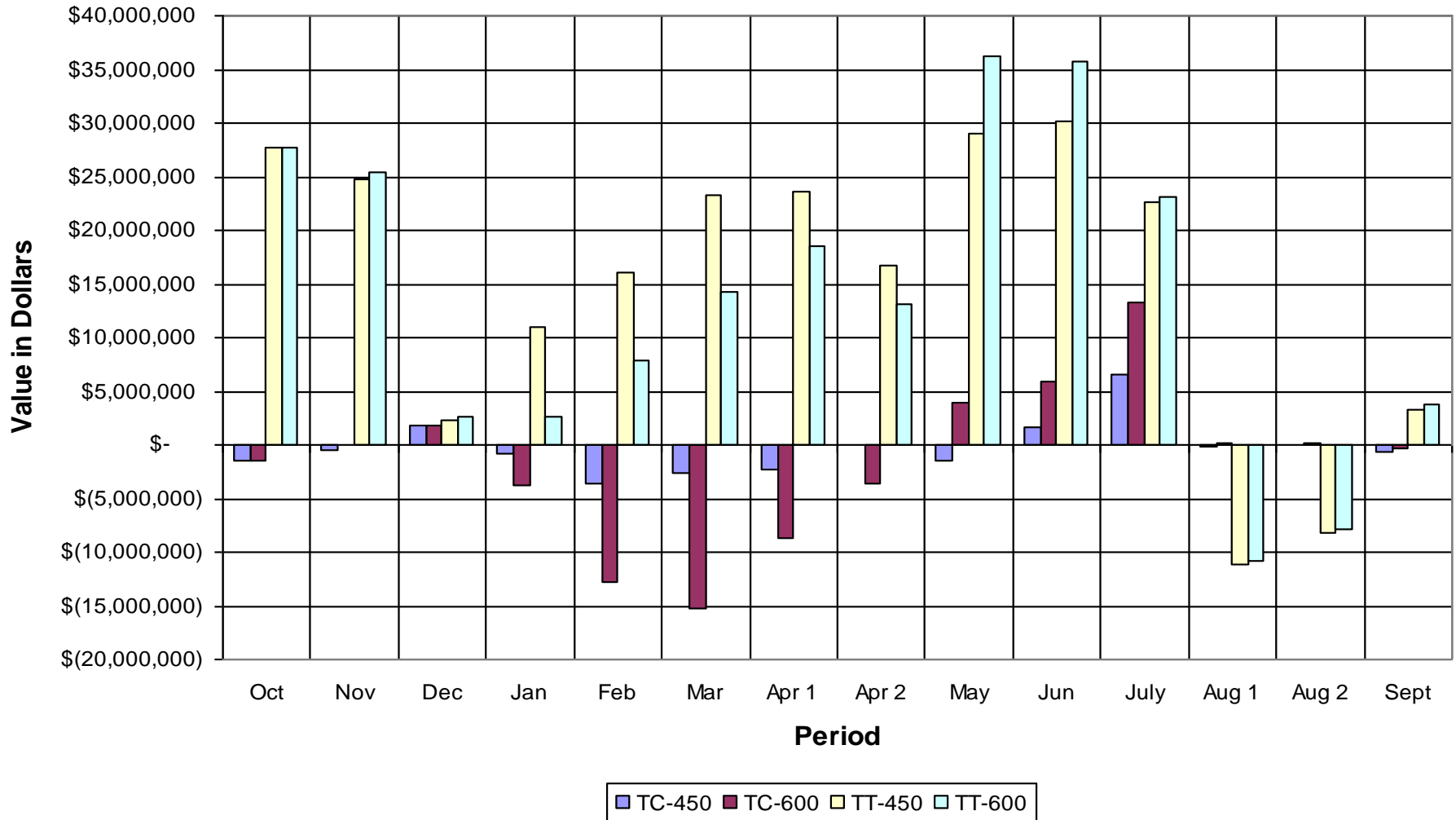
U.S. and Canadian: Change in Generation Value* Compared to Current Condition [Annual]

	Low Gas		70 Year Average AURORA FY 12		High Gas	
	U.S.	Canada	U.S.	Canada	U.S.	Canada
TC-450	\$ (3,551,397)	\$ 710,052	\$ (3,662,382)	\$ (505,616)	\$ (7,196,080)	\$ 1,368,919
TC-600	\$ (17,737,106)	\$ 992,523	\$ (20,721,600)	\$ (154,763)	\$ (33,505,459)	\$ 1,913,499
TT-450	\$193,887,980	\$ (238,656,411)	\$211,253,115	\$ (256,232,690)	\$277,443,782	\$ (319,303,413)
TT-600	\$178,598,239	\$ (220,986,115)	\$192,212,514	\$ (255,899,894)	\$249,918,598	\$ (318,768,339)

- Under the Treaty Continues alternatives, the U.S. had an overall loss of revenue of about \$4 – 34 million dollars, while the Canadian revenues vary from a loss of \$0.2 million to a gain of nearly \$2 million dollars.
- Treaty Termination resulted in an overall decrease in annual of revenue for Canada (about \$220 – 320 million), but an increase for the U.S. (about \$180 – 280 million).

*U.S. value includes U.S. energy, federal capacity, and CE. Canadian value includes Canadian energy less CE

U.S. System: Change in Monthly Value* of Generation Compared to Current Conditions Monthly aMW



*Includes U.S. Energy, Federal Capacity, and Canadian Entitlement, all valued based on Aurora Final Rate Case FY 12

Federal System Capacity Change Compared to Current Conditions

Federal System Capacity Gain (Loss) in MW (includes 1331 MW of CE capacity in Treaty Terminates Alternatives)						
In Megawatts						
	Dec	Jan	Feb	July	Aug 1	Aug 2
TC-450	51	-28	-134	103	-6	-4
TC-600	51	-132	-471	200	5	4
TT-450	759	950	1120	1349	332	112
TT-600	766	653	828	1359	353	142

Federal System Capacity Gain (Loss) in MW (includes 1331 MW of CE capacity in Treaty Terminates Alternatives)						
In Dollars						
	Dec	Jan	Feb	July	Aug 1	Aug 2
TC-450	\$ 309,645	\$ (170,001)	\$ (813,577)	\$ 625,361	\$ (18,214)	\$ (12,143)
TC-600	\$ 309,645	\$ (801,434)	\$ (2,859,661)	\$ 1,214,293	\$ 15,179	\$ 12,143
TT-450	\$ 4,608,244	\$ 5,767,894	\$ 6,800,043	\$ 8,190,409	\$ 1,007,864	\$ 340,002
TT-600	\$ 4,650,744	\$ 3,964,668	\$ 5,027,175	\$ 8,251,124	\$ 1,071,614	\$ 431,074

*HOSS: Hourly Operating and Scheduling Simulator. BPA model that simulates the hourly dispatch of Federal hydropower resources for a study period of multiple months and years. It is used to examine system capacity, marketing and various environmental concerns that require hourly detail.

Summary of Results: Hydropower

- Canadian Entitlement for 2024-25:
 - **Energy: 442 aMW (valued at \$113 – \$219 million)**
 - **Capacity: 1331 MW (valued at \$115 million)**
 - **Total: \$229 - \$335 million**
- Treaty Termination resulted in a loss of annual average generation for Canada (approx. 410 aMW), but an increase for the U.S. (approx. 300 to 350 aMW).
- Treaty Termination resulted in an overall decrease in annual revenue for Canada (about \$220 – 320 million), but an increase for the U.S. (about \$180 – 280 million).
- Treaty Continues resulted in no real change in annual average generation for Canada (approx. 3-4 aMW), but a small loss for the U.S. (approx. 15 to 70 aMW).
- Treaty Continues resulted in an overall loss of revenue for the U.S. of about \$4 – 34 million dollars, while the Canadian revenues varied from a loss of \$0.5 million to a gain of nearly \$2 million dollars.
- Transitioning from a flood flow protection level of 450 kcfs to a less conservative level of 600 kcfs, resulted in a revenue loss of \$14 to 28 million for the U.S.