

Newfoundland and Labrador
BOARD OF COMMISSIONERS OF PUBLIC UTILITIES
Rate Mitigation Options
MUSKRAT FALLS PROJECT

William Brown B.E. (Mech) Retired

- NEED FOR MITIGATION ???
- CFL PROJECT
- MFL PROJECT
- CFL + MFL PROJECTS
- RESIDENTIAL RATE HISTORY
- RATE INCREASE RECOMMENDATION
- CONCLUSIONS / CONCERNS
- FUTURE POSSIBILITIES / OPPURTUNITIES

	YEAR	2019	2020	2021	2022	2023	2039	2040	2041	2042	2049	2054	2055	2059	2069	2070	2071	2076		
MUSKAT FALLS PROJECT	YR No.	0	1	2	3	4	20	21	22	23	30	35	36	40	50	51	52	57		
		43	44	45	46	47	63	64	65	66	73	78	79	83	93	94	95	100		
MUSKRAT FALLS PROJECT (CONST+DCI) \$M	\$6,473	\$14,900	(Includes \$1.2B for power lines and under sea cables, plus \$2.1B for amera, plus \$100M for reservoir cleaning))																	
MLK CAPITAL COST (EXCL 2.1 AMERA, 1.2 LIL) \$M		\$11,600																		
FIRST REFIT		\$3,237															\$104,672			
AMORTIZATION 11600 @ 3.8% FOR 40 YRS			\$569	\$569	\$569	\$569	\$569	\$569	\$569	\$569	\$569	\$569	\$569	\$569	\$0	\$3,978	\$3,934	\$3,688		
(MOMS) MGMT+OPER+MAINT+SALES (CPI OF 3.5%) \$M (uses annual rate per MW from CFL)		\$21.29	\$22	\$23	\$24	\$24	\$42	\$43	\$44	\$45	\$53	\$59	\$60	\$66	\$83	\$85	\$87	\$97		
TOTAL COST PER YR \$M			\$591	\$592	\$592	\$593	\$611	\$612	\$613	\$614	\$621	\$628	\$629	\$635	\$83	\$4,062	\$4,020	\$3,785		
SAVINGS (CLOSING OF HOLY ROOD) \$M - FUEL \$M 50% in 2020		50% in 2	-\$144	-\$295	-\$302	-\$309	-\$452	-\$463	-\$474	-\$485	-\$573	-\$645	-\$660	-\$726	-\$920	-\$942	-\$965	-\$1,087		
		50% in 2	-\$123	-\$251	-\$258	-\$264	-\$392	-\$402	-\$412	-\$422	-\$502	-\$568	-\$582	-\$643	-\$823	-\$843	-\$864	-\$978		
NET COST PER YR \$M			\$324	\$45	\$33	\$20	-\$233	-\$253	-\$273	-\$294	-\$453	-\$585	-\$614	-\$734	-\$1,660	\$2,277	\$2,191	\$1,721		
MWH PER YR (824-25 "for low water")		799	799	799	799	799	799	799	799	799	799	799	799	799	799	799	799	799		
COMMITMENT TO AMERA - 165 MWH FOR 35 YRS		165	165	165	165	165	165	165	165	165	165	165	0	0	0	0	0	0		
MWH AVAILABLE TO MFL (excl 165 for 35 yrs)			634	634	634	634	634	634	634	634	634	634	799	799	799	799	799	799		
AMERA PROJECT SIZE		2100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100		
COMMITTED SALES TO AMERA/YR OF 165 MWH for 35 YRS YEARLY %		\$16,820	\$92	\$100	\$108	\$117	\$416	\$451	\$488	\$528	\$920	\$1,367	\$0	\$0	\$0	\$0	\$0	\$0	\$16,820	
			4.40%	4.76%	5.15%	5.58%	19.82%	21.46%	23.23%	25.15%	43.80%	65.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	22.88%	
LIL PROJECT SIZE		\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200		
LIL \$ TO ACHEIVE 8% / YR Forever YEARLY %		\$5,472	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$5,472	
			8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	
OPEN MKT PRICE PER MWH (assumes annual rate incr of 8.25%)		59	64	69	75	81	288	312	337	365	636	946	1024	1406	3106	3363	3640	5411		
SALES \$M			\$447	\$484	\$524	\$567	\$2,016	\$2,182	\$2,362	\$2,557	\$4,454	\$6,620	\$7,167	\$9,841	\$21,742	\$23,536	\$25,477	\$37,870		
MKL PROFIT (LOSS) \$M (Sales - Net Cost - Amera - LIL)			-\$65	\$243	\$287	\$334	\$1,737	\$1,889	\$2,052	\$2,227	\$3,892	\$5,742	\$7,684	\$10,479	\$23,306	\$21,163	\$23,190	\$36,053		
MFL CUMULATIVE PROFIT(LOSS)			-\$65	\$177	\$464	\$798	\$16,053	\$17,941	\$19,993	\$22,220	\$43,977	\$68,709	\$76,393	\$113,847	\$283,970	\$305,133	\$328,323	\$480,875		
ROI		\$11,600					1.50%	2.50%		4.50%		0.0521	5.45%	6.00%	6.60%	6.10%	6.76%			

HAMILTON RIVER PROJECTS (HRP)	THROUGH====>	20	2020	2021	2022	2023	2024	2025	2026	2030	2042	2059	2060	2076
MUSKRAT FALLS (MFL)		1	2	3	4	5	6	7	11	23	40	41	57	
CFL		44	45	46	47	48	49	50	54	66	83	84	100	
MFL 2020 FIRST POWER VERSION														
	CAPITAL (1976\$)													
CFL CUMULATIVE PROFIT(LOSS) \$M	\$650	\$786	\$857	\$935	\$1,020	\$1,112	\$1,213	\$1,307	\$869	\$6,036	\$195,866	\$217,311	\$1,413,124	
MFL CUMULATIVE PROFIT(LOSS) \$M (incl Holyrood Savings)	\$326	-\$65	\$177	\$464	\$798	\$1,183	\$1,621	\$2,116	\$4,754	\$22,220	\$113,847	\$125,738	\$480,875	
TOTAL CUM (CFL+MFL-HOLYROOD) \$M	\$976	\$721	\$1,035	\$1,399	\$1,818	\$2,295	\$2,834	\$3,423	\$5,622	\$28,256	\$309,714	\$343,050	\$1,893,999	

ROI						1.80%	2.20%		3.30%	5.20%	7.20%	7.23%	7.86%	

	YEAR	2019	2020	2021	2022	2023	2039	2040	2041	2042	2049	2054	2055	2059	2069	2070	2071	2076		
MUSKAT FALLS PROJECT (2021)	YR No.	0	0	1	2	3	19	20	21	22	29	34	35	39	49	50	51	56		
		43	44	45	46	47	63	64	65	66	73	78	79	83	93	94	95	100		
MUSKRAT FALLS PROJECT (CONST+DCI) \$M	\$6,473	\$16,300	(Includes \$1.2B for power lines and under sea cables, plus \$2.1B for amera, plus \$500M for reservoir cleaning \$1000M for add'l DCI)																	
MLK CAPITAL COST (EXCL 2.1 AMERA, 1.2 LIL) \$M		\$13,000																		
FIRST REFIT		\$3,237																\$112,222		
AMORTIZATION 13000 @ 3.8% FOR 40 YRS				\$637	\$637	\$637	\$637	\$637	\$637	\$637	\$637	\$637	\$637	\$637	\$637	\$637	\$5,502	\$5,502		
(MOMS) MGMT+OPER+MAINT+SALES (CPI OF 3.5) \$M (uses annual rate per MW from CFL)		\$21.29	\$22	\$23	\$24	\$24	\$42	\$44	\$45	\$47	\$60	\$71	\$73	\$84	\$119	\$123	\$127	\$151		
TOTAL COST PER YR \$M			\$0	\$660	\$661	\$662	\$680	\$681	\$683	\$684	\$697	\$708	\$711	\$722	\$756	\$760	\$5,630	\$5,653		
SAVINGS (CLOSING OF HOLY ROOD) \$M - FUEL \$M		50% In 2021		-\$147	-\$302	-\$309	-\$452	-\$463	-\$474	-\$485	-\$573	-\$646	-\$660	-\$726	-\$920	-\$942	-\$965	-\$1,087		
50% In 2021		50% In 2021		-\$126	-\$258	-\$264	-\$392	-\$402	-\$412	-\$422	-\$502	-\$568	-\$582	-\$643	-\$823	-\$843	-\$864	-\$978		
NET COST PER YR \$M			\$0	\$387	\$101	\$88	-\$164	-\$183	-\$203	-\$223	-\$378	-\$505	-\$532	-\$647	-\$987	-\$1,025	\$3,800	\$3,589		
MWH PER YR (624-25 "for low water")				799	799	799	799	799	799	799	799	799	799	799	799	799	799	799		
COMMITMENT TO AMERA - 165 MWH FOR 35 YRS				165	165	165	165	165	165	165	165	165	165	0	0	0	0	0		
MWH AVAILABLE TO MFL/YR UNTIL YR 35				634	634	634	634	634	634	634	634	634	634	799	799	799	799	799		
AMERA PROJECT SIZE		\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100		
COMMITTED SALES TO AMERA/YR OF 165 MWH for 35 YR YEARLY %		\$0	\$100	\$108	\$117	\$416	\$451	\$488	\$528	\$920	\$1,367	\$1,480	\$0	\$0	\$0	\$0	\$0	\$0	\$18,207	
		0.00%	4.76%	5.15%	5.58%	19.82%	21.46%	23.23%	25.15%	43.80%	65.10%	70.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
LIL PROJECT SIZE		\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200		
LIL \$ TO ACHEIVE 8% / YR Forever YEARLY %		\$0	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$96	\$5,376	
		0.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%		
OPEN MKT PRICE PER MWH		\$59	\$64	\$69	\$75	\$81	\$288	\$312	\$337	\$365	\$636	\$946	\$1,024	\$1,406	\$3,106	\$3,363	\$3,640	\$5,411		
SALES \$M			\$0	\$484	\$524	\$567	\$2,016	\$2,182	\$2,362	\$2,557	\$4,454	\$6,620	\$7,167	\$9,841	\$21,742	\$23,536	\$25,477	\$37,870		
MKL PROFIT (LOSS) \$M (Sales - Amera - LIL - Net Cost)			\$0	-\$99	\$218	\$265	\$1,668	\$1,819	\$1,981	\$2,156	\$3,816	\$5,662	\$6,122	\$10,392	\$22,633	\$24,465	\$21,581	\$34,185		
MFL CUMULATIVE PROFIT(LOSS)			\$0	-\$99	\$119	\$385	\$14,540	\$16,359	\$18,341	\$20,497	\$41,739	\$66,078	\$72,200	\$109,315	\$272,789	\$297,254	\$318,835	\$462,583		

HAMILTON RIVER AUTHORITY (HRA)	THROUGH====> 20	2020	2021	2022	2023	2024	2025	2026	2030	2042	2059	2060	2076
			1	2	3	4	5	6	10	22	39	40	56
MFL 2021 FIRST POWER VERSION		44	45	46	47	48	49	50	54	66	83	84	100
	CAPITAL (1976\$)												
CFL CUMULATIVE PROFIT(LOSS) \$M	\$650	\$786	\$857	\$935	\$1,020	\$1,112	\$1,213	\$1,307	\$869	\$6,036	\$195,866	\$217,311	\$1,413,124
MFL CUMULATIVE PROFIT(LOSS) \$M (incl Holyrood Savings)	\$326		-\$99	\$119	\$385	\$700	\$1,070	\$1,497	\$3,860	\$20,497	\$109,315	\$120,549	\$462,583
TOTAL CUM (CFL+MFL-HOLYROOD) \$M	\$976	\$786	\$758	\$1,054	\$1,404	\$1,812	\$2,283	\$2,803	\$4,728	\$26,533	\$305,181	\$337,860	\$1,875,707
ROI	\$976					1.30%	1.75%		2.96%	5.15%	7.17%	7.21%	7.85%

MUSKRAT FALLS RATE MITIGATION OPTIONS AND IMPACTS
PUBLIC PRESENTATION OCT 18 2019

William R. Brown B. E. Mech NSTC (Retired)

RETAIL RATE HISTORY -LAST 8.5 YEARS

APRIL 1, 2011 OCT 1 2019

CITY	RATE	RATE	GROWTH
HALIFAX	13.6	16.4	2.
CHARLOTTETOWN	14.6	16.2	1.
REGINA	13.8	16.0	2.
TORONTO	12.9	13.8	0.
ST. JOHN'S	11.0	13.1	2.
MONCTON	11.8	12.8	1.
VANCOUVER	8.3	12.7	4.
WINNIPEG	7.3	9.4	2.
MONTREAL	6.8	7.2	0.
TOTAL	100.1	117.6	17.
8.5 YR AVG	11.78	13.84	20.
YEARLY %			1.

RATE INCREASE RECOMMENDATION

BASED ON ABOVE AND NO RATE INCREASE IN 2019

- DOUBLE THE ABOVE PERCENTAGE OR 3.84%
IS WARRANTED

MUSKRAT FALLS RATE MITIGATION OPTIONS AND IMPACTS
PUBLIC PRESENTATION OCT 18 2019

William R. Brown B. E. Mech NSTC (Retired)

CONCERNS

- THE NORTH SPUR POSSIBILITY OF COLLAPSE
- METHYL/MERCURY CONTAMINATION
- GE FAILURE TO FIX SOFTWARE BEFORE 2023

CONCLUSIONS

- NL HYDRO CONTINUE ON AS ALWAYS
WITH BUSINESS AS USUAL RATE INCREASES
- RATE MIGITRATION IS NOT A CONCERN
AT LEAST, NOT UNTIL AFTER 2023

MUSKRAT FALLS RATE MITIGATION OPTIONS AND IMPACTS
PUBLIC PRESENTATION OCT 18 2019

William R. Brown B. E. Mech NSTC (Retired)

FUTURE FOR NL

THE FUTURE IS FANTASTIC BASED ON THE MODELS

WITH THE ADDITION OF TRANSMISSION LINES
AND UNDER SEA CABLES, THE REMAINING MWH
(2924+2250+270) CAN BE REALIZED RESULTING IN
A GROSS PROFIT OF OVER 6 TRILLION \$ BY 2076
ONCE GULL ISLAND IS COMPLETED BY EARLY 2030'S

THEN OTHER RESOURCE COMPANIES CAN BE
BROUGHT HOME SUCH AS

IRON ORE

NICKEL

FISH PROCESSING

TO NAME JUST A FEW

..... AND WE WILL BECOME THE "NORWAY" OF THE AMERICAS