

Appendix 4
Weather Normalization Mechanism and Reserve

Purpose

The purpose of a Weather Normalization Reserve is to stabilize electricity rates to customers by removing the volatility in sales and energy supply costs caused by temperature changes relative to historical averages. Where the Heating Degree Days¹ (HDD) variation is above normal, the Company will experience incremental marginal net revenue (revenue less energy costs) which would need to be returned to customers but when HDD variation is below normal there will be a shortfall in net revenue which will need to be recovered from customers.

Calculation of Contribution to the Reserve

The balance in the Weather Normalization Reserve on the Company's balance sheet represents the cumulative monthly change in contribution from sales resulting from variations in HDD from normal and should, over time, net to zero.

As illustrated in Schedule 1, in a year when HDD are higher than normal (2013 and 2014), a marginal net revenue amount will be subtracted on the Company's income statement and added to the Reserve. When HDD are lower than normal (2010 – 2012), a marginal net revenue amount will be added to the Company's income statement and subtracted from the Reserve. Over the ten year period, the variation from average HDD balances to zero as does the balance in the reserve account.

As a formula,

$$\text{Contribution to Weather Normalization Reserve} = \text{MWh Variation from Average} \times \text{Marginal Net Revenue}$$

¹ http://climate.weather.gc.ca/glossary_e.html - Heating degree-days for a given day are the number of degrees Celsius that the mean temperature is below 18°C. If the temperature is equal to or greater than 18°C, then the number will be zero. For example, a day with a mean temperature of 15.5°C has 2.5 heating degree-days; a day with a mean temperature of 20.5°C has zero heating degree-days.

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Where,

MWh Variation from Average = (Actual HDD Value - Average HDD Value) X (MWh per HDD Coefficient)

Marginal Net Revenue = Forecast Unit Revenue per MWh - Forecast Unit Energy Cost per MWh

The following describes the components and operation of the Weather Normalization Reserve.

Determination of Average HDD Value

The first step in establishing the mechanics of the Weather Normalization Reserve is the determination of the Average HDD Value using the rolling 10 year average HDD value based upon the most recent 10 years of information available as measured by Environment Canada for the Charlottetown Airport weather station. As calculated in Schedule 2, the average annual HDD value to be used for 2016 is calculated to be 4,339 (2005-2014).

Calculation of MWh/HDD Coefficient

The next step is the determination of the annual MWh/HDD Coefficient (the "Coefficient") to be used for the upcoming year using econometric modelling. As shown in Schedule 3, using a linear regression analysis the Coefficient for 2016 is calculated at 41.73 (based on October 2014 to May 2015 data), which is the estimated change in MWh sales (customer usage) resulting from a unit variation in HDD (i.e. 41.73 MWh per HDD). The calculation excludes from the analysis the data for the months of June to September as these months are primarily cooling months, which would distort the Coefficient calculation for HDD and reduce its accuracy. In addition, only sales for year round Residential, General Service and Small Industrial classes are used as these are the only classes materially affected by variations in HDD.

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Calculation of Marginal Net Revenue

The final variable is the Marginal Net Revenue rate which is calculated as the forecast unit revenue per MWh less the forecast unit energy cost per MWh. For the same reason noted above, the unit revenue is comprised of only demand and energy charge revenues (i.e. excluding the service charge or site revenue) for Residential, General Service and Small Industrial classes as these are the only revenue factors and rate classes affected by variations in HDD. In addition, the energy cost per MWh for the year is set at the Base Rate in the ECAM for the particular year as approved by the Commission. Schedule 4 shows the calculation of the 2016 Marginal Net Revenue Rate of \$50.42/MWh.

Application

The determination of the Weather Normalization Reserve adjustment on the Company's balance sheet is to be calculated on a monthly basis as described above, effective January 1, 2016.

Revisions to the components of MWh Variation from Average and Marginal Net Revenue formulas for a calendar year are to be submitted to the Commission for approval on or before October 31 of the year prior thereto.

SCHEDULE 1							
Illustration of Annual Change in Weather Normalization Reserve							
Year	Heating Degree Days (below 18 deg C)		Space heating load		Marginal Net Revenue (\$/MWh)	Weather Normalization Reserve	
	Actual HDD	Variation from Average (4,339 days)	Coefficient (MWh/HDD)	Variation from Average (MWh)		Increase (Decrease) (\$)	Balance Owing (Recoverable) (\$)
2005	4,448	109	41.73	4,553	50.42	229,577	229,577
2006	3,996	(343)	41.73	(14,310)	50.42	(721,558)	(491,981)
2007	4,677	338	41.73	14,110	50.42	711,458	219,477
2008	4,389	50	41.73	2,091	50.42	105,425	324,901
2009	4,559	220	41.73	9,186	50.42	463,153	788,054
2010	3,968	(371)	41.73	(15,479)	50.42	(780,478)	7,575
2011	4,231	(108)	41.73	(4,503)	50.42	(227,052)	(219,477)
2012	4,055	(284)	41.73	(11,848)	50.42	(597,406)	(816,882)
2013	4,519	180	41.73	7,516	50.42	378,981	(437,901)
2014	4,547	208	41.73	8,685	50.42	437,901	(0)
		(0)		(0)			

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SCHEDULE 2											
Calculation of 10-Year Average HDD											
Month	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	10 year average (2005 - 2014)
Jan	854	626	737	728	866	686	744	715	812	771	754
Feb	698	677	763	686	664	608	697	700	672	717	688
Mar	654	594	643	694	675	556	621	572	603	760	637
Apr	406	411	491	418	420	367	420	379	441	453	421
May	314	204	308	286	245	262	259	224	235	308	265
Jun	117	55	121	95	102	114	150	119	107	120	110
Jul	29	5	29	0	42	13	21	12	13	1	17
Aug	17	52	38	20	30	21	14	5	17	28	24
Sep	82	116	120	121	135	107	90	76	106	118	107
Oct	247	290	248	300	345	290	249	240	291	228	273
Nov	402	374	446	421	392	429	397	424	472	461	422
Dec	628	592	733	620	643	515	569	589	750	582	622
	4,448	3,996	4,677	4,389	4,559	3,968	4,231	4,055	4,519	4,547	4,339
	Standard Deviation										258

SCHEDULE 3								
Calculation of MWh/HDD Coefficient								
Year	Month	Days in month	Actual HDD	HDD per day	Reported sales (MWh)	Fewer hours of daylight	Average HDD per day	Average MWh per day
2014	Jul	31	1	0.0	70,921			
	Aug	31	28	0.9	79,973			
	Sep	30	118	3.9	74,136			
	Oct	31	228	7.4	72,767	2.52	5.6	2,426
	Nov	30	461	15.4	84,725	4.07	11.4	2,733
	Dec	31	582	18.8	88,471	5.21	17.1	2,949
2015	Jan	31	829	26.7	103,575	5.40	22.8	3,341
	Feb	28	858	30.6	107,097	4.53	28.7	3,455
	Mar	31	743	24.0	95,132	3.11	27.3	3,398
	Apr	30	537	17.9	90,109	1.53	20.9	2,907
	May	31	233	7.5	78,424	0.00	12.7	2,614
	Jun	30		-	72,384			

Linear regression results: (Oct 2014 - May 2015)				
HDD	Daylight hrs	b		
41.73	50.89	2045.89	coefficients	
3.43	14.71	69.33	standard error coefficients	
0.98	68.90	#N/A	R ² , standard error y	
106.89	5.00	#N/A	F, degrees of freedom	
1014942	23737.67	#N/A	Regression SS, residual SS	
12.17	3.46	29.51	t values	

SCHEDULE 4			
Calculation of Forecast Marginal Net Revenue Rate for 2016			
Rate Class	2016 (Forecast)		
	Revenue (\$)	Sales (MWh)	Unit Revenue (\$/MWh)
Residential	70,955,849	545,578	*
General Service I	55,143,280	372,955	*
General Service II	1,530,913	10,751	
Small Industrial	12,692,471	98,933	
Total	140,322,513	1,028,217	\$ 136.47
ECAM Base Rate (Proposed)			\$ (86.05)
	Marginal Net Revenue Rate		\$ 50.42

* Excludes revenue and kWh sales from seasonal customers