EB-2015-0029/0049

Ontario Energy Board

ONTARIO ENERGY BOARD
IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c. 15 (Schedule B);

AND IN THE MATTER OF an Application by Enbridge Gas Distribution Inc. pursuant to Section 36(1) of the *Ontario Energy Board Act, 1998,* S.O. 1998, for an order or orders approving its Demand Side Management Plan for 2015-2020

Compendium Materials
Green Energy Coalition Panel
Energy Probe Research Foundation

August 30, 2015

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Corrected August 12, 2015

Table 3: Efficiency Benefits that Put Downward Pressure on Rates

Benefit		NPV of Lifetime Benefits per Annual m^3 Saved[36]		Average Annual Value from Utilities'2016-2020 DSM Plans (millions $)[37]		Benefits as a % of Average Annual (2016-2020) DSM Plan Budget[38]	
		Enbridge	Union	Enbridge	Union	Enbridge	Union
1	Avoided carbon regulation costs[39]	$0.98	$0.98	$73.2	$73.9	101%	129%
2	Price suppression effects[40]	$0.08	$0.08	$6.2	$6.3	9%	11%
3	Reduce purchase of most expensive gas[41]	$0.10	$0.18	$7.2	$13.3	10%	23%
4	Avoided distribution system costs[42]	$0.38	$0.24	$28.1	$18.2	39%	32%
	Total	**$1.54**	**$1.49**	**$114.7**	**$111.7**	**158%**	**195%**

[36] Assumes an average measure life of 16 years. All values in 2015 Canadian dollars (CDN).

[37] This is NPV of benefits per annual m3 saved multiplied by the average incremental annual m^3 savings forecast for the 2016-2020 period by Enbridge (74.4 million m^3) and Union (75.1 million m^3).

[38] Enbridge's average annual budget is $72.3 million; Union's is $57.4 million (both in 2015 dollars).

[39] Valued at Mr. Chernick's estimate of avoided costs of carbon emission regulations. As noted above, Mr. Chernick suggests such values would start at approximately $20 (2014 USD) per ton of CO_2 or $1.18 USD per MBtu of natural gas in the first year of a regulatory scheme. The values per m^3 of reduction are the same for both Enbridge and Union as the market clearing price unit of emissions is likely to be a provincial price.

[40] Mr. Chernick estimates that a 1 billion m^3 reduction in annual gas demand would produce a $0.00027 reduction in price per m^3. Over the 2016-2020 period, I assume that average annual gas sales in Ontario will be approximately 27 billion m^3. Thus, the price reduction benefit to Ontario gas users from a 1 billion m^3 reduction in gas demand would be worth approximately $7.2 million. That equates to a benefit of approximately $0.0072 for one year's worth of a single m^3 of demand reduction. That, in turn translates to a benefit of approximately $0.083 for 16 years (the average measure life) of one m^3 of demand reduction. The magnitude of this benefit is assumed to be the same (per m^3 of savings) for both utilities.

[41] For Enbridge, Mr. Chernick estimates that this benefit is equal to approximately $0.013 per m^3 of space heating gas saved per year and $0.011 per m^3 of combined space heating and water heating energy saved per year; there are essentially no such savings from baseload measures (industrial and water heating). For Union, I used the average of the differences Mr. Chernick reports for 2015 and 2016 (Chernick p. 28): $0.015 for baseload and $0.017 for space heating measures. Data on the mix of end use gas saved in the utilities' proposed plans were not included in their filing. Thus, I have assumed that the mix (in percentage terms) will be the same as in 2014 for Enbridge and the same as in 2014 for Union excluding the T2/Rate 100 savings. To the extent that the utilities will get more of their savings in future years from space heating these estimated benefits will be conservatively low."

[42] Enbridge used estimates of avoided distribution system costs developed for the Company by Navigant Consulting (Exh. C/T1/S4). The magnitude of those avoided costs varied by a factor of 4, depending on whether the savings were from space heating or from baseload measure end uses like water heating or industrial process efficiency improvements (See Navigant Table 7). Mr. Chernick has found that Enbridge's avoided distribution costs are actually three to five times higher than Navigant estimated for the Company. I have used the mid-point (factor of four) of that range. In this case, I estimated the lifetime NPV of an annual savings of an m^3 using a nominal discount rate (i.e. the 4% real discount rate adjusted for an assumed annual inflation rate of 1.68%) because Navigant estimates were expressed in constant nominal dollars. A weighted average value for the entire Enbridge portfolio was estimated based on the Company's 2014 distribution of savings by end use. Absent better information, the values for Union were assumed to be the same as for Enbridge per end use. However, because Union's savings are assumed to be more baseload heavy and less space heating focused, the weighted average value per m^3 is estimated to be lower for Union.

Response to Undertaking JT 3.1 Part 3

3. Mr. Neme estimated (in Table 3 of his evidence) the net present value of carbon emission reductions per first year m^3 of gas savings over the 2016 to 2020 program years to be $0.98. That estimate is based on Synapse's "mid case" estimates of the value of avoided carbon emissions. The comparable estimate using Synapse's "low case" estimates of avoided carbon emissions is $0.69 per first year m^3 saved (about 30% less than the "mid case"); the comparable estimate using Synapse's "high case" estimates is $1.39 per first year m^3 saved (about 41% more than the "mid case"). Note that these estimates were developed using the same high level, multi-program year, average analysis approach Mr. Neme used in developing Table 3. They do not reflect the more granular, year-by-year approach discussed in response to part 2 of this undertaking above (which, as discussed above, would produce slightly higher average values over the period in question if one assumed carbon emission reductions begin to have value in 2017).

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Considerations for the Board

- The 15% adder is a reasonable proxy to the carbon avoidance cost estimate as carbon pricing is not yet known or in place and the TRC+ is used for screening purposes only. Review at the mid-term may be appropriate.

Total NPV Benefits (2018)	15% Adder	Calculated Cost of Carbon
$228,930,159	$29,860,456	$36,538,849
% Difference in Total NPV Benefits		3%

15% adder calculated based on portion of total NPV benefits in TRC analysis associated with 15% non-energy benefit adder

"Calculated Cost of Carbon" calculated as Mr. Neme's NPV cost of carbon per annual m3 over a 16 year measure life reduced to account for price of $15.22CAD/tonne (as per GEC Cross Compendium Union Panel 1, p.20, 2018 Vintage, Mean Price) rather than $20USD/ton (equivalent of $28.73CAD/tonne)
Note: MTEM was not included in TRC Plus calculation and associated NPV benefits. For comparability MTEM annual m3 have been excluded from the "Calculated Cost of Carbon"

- Enbridge is amenable to some of the recommendations made by Synapse in their report

ENBRIDGE

IRR M.GEC.EP.12d) Attachment Tab 4 T&D

Filed: 2015-04-01, EB-2015-0049, Exhibit C, Tab 1, Schedule 4, Page 29 of 35

NAVIGANT

Table 7 – Annual Avoided Distribution Costs (nominal $/10³m³)

Decrement Scenario	$/10³m³/peak demand day
Industrial Processing	$3.45
Space Heating	$12.06
Water Heating	$3.28
Space and Water Heating	$11.09

per Chernick, these values are labeled per not peak day demand but are really per annual m3
Per Chernick, multiply by 3 to 5 to get reasonable values.

		SH	WH	SH + WH	Ind.	Wtd Avg.	
Navigant est.		12.06	3.28	11.09	3.45		
Chernick est.		48.24	13.12	44.36	13.8		
value per 1st yr.		0.048	0.013	0.044	0.014		
NPV lifetime		$0.50	$0.13	$0.46	$0.14	this is a value that doesn't change in nominal terms, so discounted with nominal disc rt	
Enbridge 2014 mix		61.5%	7.1%	5.7%	25.7%	$0.38	
Union 2014 mix		28.4%	9.4%	0.0%	62.2%	$0.24	
nominal Disc Rt	5.75%						

JT1.36 Attachment EP Update 2016

Tab2: Final 2014 & 2015&2016 Scorecards

Energy Probe Exhibit				Comparison of 2015 Scorecard Metrics to 2014														
B Tab 1 Schedule 1		2015 (Board-Directed) Rollover Scorecard					Ref. I.T2.EGDI.EP.4	2014 Scorecard			Ref. I.T3.EGDI.EP.2; I.T2.EGDI.EP.4 and I.T2.EGDI.CCC.11				Comparison 2016	B/1/4/ Tables 8,15,22	
Performance Band	Actual YTD [1]	Weight	Lower	Middle	Upper	SPEND $m	Actual YTD	Weight	Lower	Middle	Upper	SPEND $m	Changes 2014-2015 mid per % 2014 Achieved	2012-14 3 year avg	2016 mid	Delta 2012-14	Delta 2015
Resource Acquisition Total																	
Resource Acquisition CCM	188.92	92%	758.9	1,011.90	1,264.90	$ 16.64	664.37	92%	744.05	992.06	1240.08	$16.58	152%	820	894.4	74.4	-117.50
Residential Deep Savings	5,037	8%	571	762	952		5,213	8%	560	747	934		15%	2357	7,508	5151	6,746.00
Commercial/Industrial Deep Savings																	
															19.5	19.5	19.50
Low Income Total																	
Single Family - Part 9	6.16	50%	18.1	24.1	30.2	$ 6.86	25.67	50%	17.7	23.6	29.5	$6.42	94%	27.76	28.9	1.14	4.80
Multi-Residential - Part 3	15.50	45%	51.6	68.7	86		29.8	45%	48.15	64.2	80.25		231%	34.01	59	24.99	-9.70
Part 3 - RIR	N/A [2]	5%	30%	40%	50%		74.39%	5%	30%	40%	50%		54%	79.70%		-0.797	-0.40
SBD Residential Total (MT)																	
Builders Enrolled	19	60%	13	18	22	$ 4.89	23	60%	12	16	20	$3.05	78%	17	30	13	12.00
# of Completed Units	381	40%	833	1,111	1,389		1,059	40%	750	1000	1250		105%	1013	2501	1488	1,390.00
SBD Commercial Total (MT)																	
Commercial New Construction	15	100%	11	18	24		19	100%	8	12	19		95%	12	30	18	12.00
Home Labeling Total (MT)																	
Number of Committed Realtors	67,000	50%	N/A	5,001	10,001		40,040	70%	0	5,001	10,001		12%	42200	N/A	N/A	N/A
Ratings performed	439	50%	2,250	4,500	6,750		662	30%	750	1,500	2,250		680%	400	596	196	-3,904.00
					Subtotal	$ 28.39						$ 26.05					
					Overheads	$ 6.60						$6.45					
					Incremental	$ 5.25						0					
					TOTAL	$ 40.24						$ 32.50			2016 BUDGETS	B/1/4Table 1	
															RA Budget	$29,555,657	
										Residential	$1,836,456	Budget			Overhead	$5,076,336	
Notes:										Spend	$8,605,657	Actual			Subtotal	$34,631,993 58%	
1. Actual YTD results provided are as of 30-Jul															Incentive	$6,028,149	
2. Low Income Part 3 RIR results are determined at year-end. For that reason, Actual YTD results are not available.															Low Income	$10,151,789	
															Overhead	$1,743,622	
															Subtotal	$11,895,411 20%	
															Incentive	$2,070,551	
															MT Budget	$11,528,281	
															Overhead	$1,980,042	
															Subtotal	$13,508,323 23%	
															Incentive	$2,351,299	
															TOTAL	$60,035,727	
															Other	3,500,000	
															TOTAL	$63,535,727	

Tab 1 Final RA $/CCM

Comparison Table	Response to EP 4 and EP14				RA Efficiency/Cost Effectiveness				
References	I.T2.EGDI.EP.4		I.T3.EGDI.EP.14						
Resource Acquisition	2014 $/CCM	2015 $/CCM	2016 $/CCM	2017 $/CCM	2018 $/CCM	2019 $/CCM	2020 $/CCM		
			or	or	or	or	or		
			$/Participant	$/Participant	$/Participant	$/Participant	$/Participant		
FORMAT I.T3.EGDI.EP.14									
Large C&I Customers (Sum)	0.0120	?	0.0123	0.0126	0.0128	0.0130	$0.0132		
Large Custom			0.0114	0.0117	0.0119	0.0121	$0.0123		
Large Prescriptive			0.0195	0.0200	0.0203	0.0207	$0.0210		
Small C&I Customers (Sum)	0.0111	?	0.0414	0.0417	0.0417	0.0417	$0.0417		
Small Custom			0.0257	0.0259	0.0259	0.0259	$0.0259		
Small Prescriptive			0.0138	0.0139	0.0139	0.0139	$0.0139		
Small DI			0.0821	0.0827	0.0827	0.0827	$0.0827		
Small Commercial New			N/A	0.0893	0.1335	0.1251	$0.1073		
Residential Thermostats		?	0.0367	0.0320	0.0304	0.0296	$0.0294		
Residential HEC (CCM)	0.0959	?	0.1184	0.1111	0.1067	0.1037	$0.1017		
TOTAL			0.0330	0.0362	0.0385	0.0386	$0.0387		
Low Income	0.0930	?	?	?	?	?	?		
TOTAL I.T3.EGDI.CME.3		0.0490	0.0630	0.0680	0.0690	0.0700	0.0700		

FORMAT REQUESTED									
Resource Acquisition	2012 $/CCM [1]	2013 $/CCM [1]	2014 $/CCM [1]	2015 $/CCM [2]	2016 $/CCM [3]	2017 $/CCM [3]	2018 $/CCM [3]	2019 $/CCM [3]	2020 $/CCM [3]
Residential	$0.154	$0.068	$0.096	$0.102	$0.103	$0.091	$0.084	$0.083	$0.081
Commercial	$0.012	$0.010	$0.011	$0.013	$0.023	$0.025	$0.026	$0.026	$0.026
Industrial	$0.009	$0.012	$0.012	$0.014	$0.020	$0.021	$0.022	$0.023	$0.023
Total Resource Acquisition	$0.012	$0.013	$0.023	$0.021	$0.033	$0.036	$0.038	$0.038	$0.038
Low Income [4]									
Single Family - Part 9	$0.233	$0.141	$0.175	$0.185	$0.199	$0.206	$0.212	$0.218	$0.225
Multi Residential - Part 3	$0.032	$0.026	$0.044	$0.041	$0.056	$0.055	$0.055	$0.054	$0.054
Private	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Low Income	$0.105	$0.089	$0.093	$0.085	$0.116	$0.118	$0.116	$0.117	$0.117
TOTAL RA & LI	$0.018	$0.019	$0.029	$0.028	$0.040	$0.043	$0.045	$0.045	$0.045

1. 2014 $/CCM, as per response to Energy Probe IR# 4
2. 2015 $/CCM Forecast as of May 2015. $/CCM calculations based on Forecasted Program Spending, not OEB Approved Budget (in EP# 7)
3. 2016-2020 C&I $/CCM calculation includes CEM, RIR, Energy Compass, and budget from Energy Leaders
4. 2016-2020 Low Income $/CCM calculation excludes LI New Construction

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JT1.36 Question 7c).
Comparison of EGDI DSM Plan with DSMSim Achievable Potential

	2016		2017		2018		2019		2020	
Gross Annual m3 (millions)	DSM Plan	DSMSim	DSM Plan	DSMSim	DSM Plan	DSMSim	DSM Plan	DSMSim	DSM Plan	DSMSim
Residential	12.14	24	17.69	23.6	23.05	23.5	24.16	23.5	25.07	23.35
Low Income	8.43	4.9	8.85	4.8	9.60	4.7	9.74	4.7	9.89	4.8
Commercial / Industrial	73.68	84.7	74.99	85.2	75.63	86.1	76.23	86.5	77.12	86.2
Total Gross Annual m3	**94.25**	**113.6**	**101.53**	**113.6**	**108.28**	**114.3**	**110.14**	**114.7**	**112.08**	**114.35**
Budget ($ millions)	**2016**		**2017**		**2018**		**2019**		**2020**	
Residential	$13.0	$18.3	$16.7	$18.2	$20.2	$18.3	$20.6	$18.4	$21.0	$18.4
Low Income	$9.0	$9.6	$9.7	$9.7	$10.2	$10.0	$10.4	$10.2	$10.7	$10.5
Commercial / Industrial	$16.5	$18.6	$18.2	$18.7	$19.4	$19.0	$19.8	$19.1	$20.2	$19.1
Total "CCM" Program Budget	**$38.6**	**$46.5**	**$44.6**	**$46.6**	**$49.8**	**$47.3**	**$50.8**	**$47.7**	**$51.8**	**$48.0**
Gross m3 / $	**2016**		**2017**		**2018**		**2019**		**2020**	
Residential	0.93	1.31	1.06	1.30	1.14	1.28	1.17	1.28	1.19	1.27
Low Income	0.93	0.51	0.92	0.49	0.94	0.47	0.93	0.46	0.93	0.46
Commercial / Industrial	4.46	4.55	4.12	4.56	3.90	4.53	3.85	4.53	3.82	4.51
Total Gross m3 / $	**2.44**	**2.44**	**2.28**	**2.44**	**2.17**	**2.42**	**2.17**	**2.40**	**2.16**	**2.38**