

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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Exhibit L GEC.1 Evidence of C. Neme Page 18

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 m³ savings forecast for the 2016-2020 period by Enbridge (74.4 million m³) and Union (75.1 million m³).

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 CO₂ or \$1.18 USD per MBtu of natural gas in the first year of a regulatory scheme. The values per m³ 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 m³ reduction in annual gas demand would produce a \$0.00027 reduction in price per m³. Over the 2016-2020 period, I assume that average annual gas sales in Ontario will be approximately 27 billion m³. Thus, the price reduction benefit to Ontario gas users from a 1 billion m³ 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 m³ of demand reduction. That, in turn translates to a benefit of approximately \$0.083 for 16 years (the average measure life) of one m³ of demand reduction. The magnitude of this benefit is assumed to be the same (per m³ of savings) for both utilities.

⁴¹ For Enbridge, Mr. Chernick estimates that this benefit is equal to approximately \$0.013 per m³ of space heating gas saved per year and \$0.011 per m³ 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 m³ 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 m³ 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 m3 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 m3 saved (about 30% less than the "mid case"); the comparable estimate using Synapse's "high case" estimates is \$1.39 per first year m3 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

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

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

Decrement Scenario	\$/10 ³ m ³ 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

[illegible]

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 \$/Participant	or \$/Participant	or \$/Participant	or \$/Participant	or \$/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 \$/CCM¹	2013 \$/CCM¹	2014 \$/CCM¹	2015 \$/CCM²	2016 \$/CCM³	2017 \$/CCM³	2018 \$/CCM³	2019 \$/CCM³	2020 \$/CCM³
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 Income⁴										
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

JT1.36 Question 7c).

Comparison of EGDI DSM Plan with DSMSim Achievable Potential

	2016		2017		2018		2019		2020	
	DSM Plan	DSMSim	DSM Plan	DSMSim	DSM Plan	DSMSim	DSM Plan	DSMSim	DSM Plan	DSMSim
Gross Annual m3 (millions)										
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)										
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 / \$										
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