BOARD STAFF SUBMISSION

Board Staff Submission on Enbridge Gas Distribution Inc.'s
Application for Clearance of the
2013 Demand Side Management Variance Accounts

EB-2014-0277

January 22, 2015

INTRODUCTION

Enbridge Gas Distribution Inc. ("Enbridge") filed an application with the Ontario Energy Board (the "Board") dated October 2, 2014 seeking approval of the final balances in certain 2013 Demand Side Management ("DSM") deferral and variance accounts. Enbridge is also seeking the disposition of the balances in these accounts, and inclusion into rates, within the next available Quarterly Rate Adjustment Mechanism.

The accounts which are the subject of the application and the balances recorded are as follows:

DSM Incentive Deferral Account	$4,538,188 (to shareholder)
Lost Revenue Adjustment Mechanism Variance Account	($50,317) (to ratepayers)
DSM Variance Account	($3,601,806) (to ratepayers)

The net balance of the DSM Accounts is $886,065 to be collected from ratepayers.

DSM FRAMEWORK

The deferral and variance accounts for which Enbridge seeks approval and disposition in this application are related to Enbridge's 2013 DSM activities. The 2013 DSM activities were the activities for the second year of Enbridge's 2012-2014 multi-year DSM plan (EB-2011-0295) which was premised on the 2011 DSM Guidelines (EB-2008-0346).

The DSM Guidelines and Enbridge's 2012-2014 DSM Plan outlined the required process Enbridge should undertake with respect to stakeholder consultation and monitoring and evaluation for each year of the plan. Board staff submits that Enbridge has complied with the DSM Guidelines regarding stakeholder review and verification of results through the engagement of Custom Project Savings Verification Contractors ("CPSV Contractors") and an Auditor.

Specifically, the DSM Consultative elected an Enbridge Audit Committee ("AC") for 2013 which consisted of representatives from the Green Energy Coalition ("GEC"), Low Income Energy Network ("LIEN") and School Energy Coalition ("SEC"). In March 2014,

the SEC representative stepped down from the AC and the DSM Consultative selected a member from the Federation of Rental-Housing Providers of Ontario ("FRPO") to fill the vacancy.

With input from the Technical Evaluation Committee ("TEC") Enbridge retained two engineering firms as CPSV Contractors to evaluate its 2013 DSM program results: MMM Group Ltd. ("MMM Group") was retained to review commercial custom and low-income custom projects and Genivar Inc. ("Genivar") was retained to review industrial custom projects.

Finally, Enbridge prepared its 2013 Draft Evaluation Report, which included the results of the review of custom projects by the CPSV Contractors.

Consistent with Section 15.3 of the DSM Guidelines, Enbridge consulted with the AC on the terms of reference and the Audit Work Plan for the audit of its 2013 DSM results. Enbridge retained Optimal Energy Inc. ("Optimal") who acted as the 2013 DSM Auditor.

SUMMARY OF STAFF COMMENTS

Board staff submits that the major issues raised by School Energy Coalition ("SEC") in the review of the 2012 results (EB-2013-0352) remain the same for the assessment of the 2013 results. These issues relate to the appropriate consideration of free ridership, base case, effective useful life, persistence of savings and advancement of DSM investment decisions in the calculation of project savings for the commercial and industrial custom projects. The Board provided guidance on how these issues can be addressed in sections 6 and 7 of the 2011 DSM Guidelines.

Board staff submits that its review of the annual and cumulative gas savings estimates for some of the largest commercial and industrial custom projects revealed that they were not always consistent with the DSM Guidelines in many of the areas described above. Board staff's observations and recommendations are provided below:

Board Staff Observations

Free Ridership

Section 7.1 of the DSM Guidelines state that "free ridership… should be assessed for reasonableness prior to the implementation of the multi-year plan and annually thereafter, as part of each natural gas utility's ongoing program evaluation and audit process". It appears that during the first two years of the DSM framework free ridership studies were not undertaken as part of the evaluation of the program savings. The estimated gas savings are mechanically calculated based on the free riders

assumptions developed as part of the approval of their DSM plans. Neither the CPSV Contractors nor the Auditor addressed this issue during the verification and audit of the results for the commercial and industrial custom projects. In addition, using payback acceptance curve results detailed in Appendix A, there appears to be cases where financial incentives may not be needed to convince the customer to invest in some DSM technologies.

Furthermore, it appears that for some custom projects the investment decisions were not driven by saving natural gas but for saving electricity with gas savings being the result of installing electricity measures such as fans and other controls. In these cases, it was not clear whether the customer had participated in a conservation program offered by OPA. If the customer did not apply to the OPA for financial support, it could be argued that an incentive would not be needed for the gas savings that are a by-product of electricity conservation initiatives.

Base Case

Section 6.1.1 of the DSM Guidelines states that "estimated savings and costs of DSM programs need to be defined relative to a frame of reference or "base case" that specify what would happen in the absence of the DSM program. At the minimum, the base case technology should be equal to or more efficient than the technology benchmarks mandated in energy efficiency standards, as updated from time to time".

The definition of the base case can change depending on whether or not the equipment being replaced has reached its useful life, or the measure is not a piece of equipment but an action or behaviour, or the gas usage in the future will be different than the existing gas usage. These issues are covered under section 7.3 of the DSM Guidelines under Persistence. As discussed below, Board staff is concerned that the base case has not been defined properly in some of the custom projects.

Persistence of Savings

The factors that should be taken into account for persistence include the length of time the equipment is expected to be in place relative to the base case, whether the participant was planning to implement the measure on its own in the future, potential changes in the usage or shutting down of the plant in which the measure was installed, etc. It appears that these issues have not been taken into consideration during the delivery of the Enbridge custom programs nor when the cumulative savings are calculated for the commercial and industrial custom projects.

In the Board's Decision and Order dated May 1, 2014, page 3 (EB-2013-0352) the Board indicated that a persistence study would be useful in addressing these issues.

Enbridge responded to Board staff's interrogatory #1 and indicated that it had not initiated a persistence study with respect to its large commercial and industrial custom DSM programs. As a result, the issues related to persistence of savings raised in the 2012 clearance of DSM accounts remain.

Cumulative Savings

Board Staff is concerned about the mechanistic approach applied to calculating cumulative savings without consideration of the persistence of savings and taking into consideration the economic or the remaining useful life of the existing technologies that were retrofitted.

Board Staff Recommendations

a) For the reasons stated above, Board staff believes that the cumulative gas savings reported for the commercial and industrial custom projects are overstated. To address this issue Board staff proposes two options for the Board's consideration:

   Option 1: The Board could consider a 20% reduction in the gas savings claimed from the commercial and industrial custom projects. This is similar to the last decision regarding the 2012 results.

   Option 2: The Board may want to consider the appointment of its own independent auditor to undertake an analysis and evaluation of the DSM claims with respect to custom DSM programs. The results of this audit will assist in establishing the savings for 2013 but could also serve as a guide on how these evaluations should take place for the estimation of 2014 results and the years to follow under the new DSM framework. This approach is consistent with the approach the Board plans to take under the new DSM framework for the period 2015-2020.

b) The net cumulative savings from most projects are calculated by multiplying the measure's annual savings by the measure life after adjusting for free riders. This implies that for most projects the savings will persist through the assumed life of the technology. This is not consistent with section 7.3 of the DSM Guidelines which requires the persistence of savings to be assessed. This issue is evident in the commercial and industrial custom projects reviewed. Board staff believes that a persistence study should be undertaken to assess the persistence of the

savings achieved from the commercial and industrial custom projects implemented over the last few years. The results from this study should be incorporated into the evaluation of the 2014 results and inform the development of the DSM plans under the new DSM framework.

c) Board staff's review of the projects that involve a replacement of heating boilers found that the standard boiler is assumed in most cases to have an efficiency of 80.5% under the base case. This estimate does not appear to be based on market research and it is possible that the market has moved to higher efficiency levels. If that is the case the estimated savings associated with heating boiler replacements could be overstated. Board staff agrees with the Auditor's recommendation that the utilities conduct a baseline heating boiler study to confirm whether or not the baseline efficiency of boilers in the commercial sector has increased above the 80.5% efficiency level assumed under the base case. The results of this study should be applied in the evaluation of the 2014 results and inform the development of the DSM plans under the new framework.

d) Board staff submits that the estimation of the payback periods for the custom projects will be useful as it provides an assessment of the economic attractiveness of the project and the likelihood that it could be implemented without a financial incentive. Appendix A provides more information on the empirical evidence that shows the payback period to be one of the evaluation tools used in DSM investment decisions by residential, commercial and industrial customers. This information has been used for the estimation of the achievable gas savings potential in the latest Enbridge Potential Study. It should be acknowledged however that there could be other barriers that can prevent the customer from installing DSM measures which should be taken into consideration when the program results are evaluated.

BOARD STAFF COMMENTS BY PROGRAM

Board staff provides detailed comments on Enbridge's estimation of gas savings for selected DSM programs.

1. Residential Sector

1.1 Residential Community Energy Retrofit (CER) Program

The gas savings are estimated based on accredited modeling software used by certified Energy Auditors which estimate the gas savings associated with different DSM

measures installed in a house. Although these models play an important role in the estimation of gas savings during the delivery of the program, they cannot provide objective estimation of the actual savings associated with the residential Community Energy Retrofit program. Given that 2013 is the second year that this program is delivered, Board staff believes that it is time to evaluate the impact of the program by analyzing actual billing data before and after participation in the program for a sample of participants and non-participants.

2. Commercial sector

2.1 Commercial Run It Right (RiR) Program

Enbridge's Commercial RiR program is a custom offering designed for property managers of large commercial, multi-family and institutional buildings to achieve continuous operational savings through no-cost/low-cost energy efficient solutions. Based on the auditor's evaluation of Enbridge's regression methodology to calculate savings, significant methodological problems were found which resulted in a reduction of the claimed savings. The free ridership rate has not been approved by the Board for RiR, but it was accepted by Optimal to be 0%.

The expected savings were reduced by 75% percent from a target of 10% to an average savings of 2.5% for participants.

However, Board staff found that Enbridge's method of determining the free ridership and spillover effects did not appear to be consistent with the DSM Guidelines. Section 7.1 of the DSM Guidelines requires the utilities to undertake comprehensive studies to account for free ridership and particularly for spillover effects. Board staff submits there was no research provided to substantiate the 0% free ridership for the RiR program.

2.2 Commercial Custom Project Review

MMM Group reviewed a sample of 27 commercial projects randomly selected from another consulting company using an established sampling methodology.

Board staff constructed the following table which shows the measure assumptions, annual and lifetime savings, payback period and free ridership rates for the commercial custom projects audited, along with the financial incentive received by the customer. This table is based on the information provided in the MMM Group report in EB-2014-0277, Exhibit B, Tab 5, Schedule 1 and Enbridge's response to Board staff interrogatory #7.

Table 2.2 Enbridge's Commercial Custom Projects

Report Section	DSM Code	Sector (Technology)	Measure Life (years) a	Free ridership b	Claimed Natural Gas Savings (m3) * c	Gross Gas Savings (m3)	Audited Gross CCM Savings (m3)	Claimed CCM Savings (m3) a x (1-b) x c	Audited CCM Savings (m3) **	Payback Period	Incentive
3.1	RA.MR.EX.004.13	Multi-residential (boiler)	25	20%	42,783	1,069,580	1,069,580	855,664	855,664	0.57	$ 6,600
3.2	RA.MR.EX.017.13	Multi-residential (boiler controls)	15	20%	24,971	374,565	-	299,650	-	0.81	$ 2,497
3.3	RA.MR.EX.018.13	Multi-residential (VFD)	15	20%	70,110	1,051,650	970,095	841,320	776,076	1.04	$ 7,011
3.4	RA.MR.EX.020.13	Multi-residential (boiler)	25	20%	14,977	374,425	482,650	299,535	386,120	4.69	$ 3,731
3.5	RA.MR.EX.023.13	Multi-residential (boiler)	25	20%	207,221	5,180,525	4,896,950	4,144,422	3,917,560	0.64	$ 33,112
3.6	RA.MR.EX.041.13	Multi-residential (controls)	15	20%	159,967	2,399,505	2,384,805	1,919,604	1,907,844	1.25	$ 15,997
3.7	RA.MR.EX.046.13	Multi-residential (boiler)	25	20%	117,028	2,925,700	3,012,500	2,340,558	2,410,000	0.30	$ 20,653
3.8	RA.MR.EX.053.13	Multi-residential (boiler)	25	20%	75,374	1,884,350	1,740,700	1,507,497	1,392,560	4.26	$ 16,386
3.9	RA.MR.EX.108.13	Multi-residential (heat reflector panels)	15	20%	52,779	791,685	559,923	633,351	447,938	5.11	$ 5,278
3.10	RA.REC.EX.003.13	Recreational centre (heat recovery)	15	12%	53,700	805,500	369,825	708,840	325,446	1.52	$ 5,370
3.11	RA.GOV.EX.007.13	Office (ventilation)	15	12%	27,082	406,230	410,700	357,482	361,416	3.00	$ 2,708
3.12	RA.HC.EX.016.13	Healthcare (boiler)	20*	12%	527,704	12,792,600	7,833,775	11,257,488	6,893,722	15.33	$ 30,000
3.13	LW.MR.PART3.044.14	Multi-residential (boiler)	25	0%	144,416	3,610,400	781,255	3,610,400	781,255	0.36	$ 15,000
3.14	RA.ACC.EX.017.13	Hospitality (sensors)	15	12%	18,131	271,965	274,935	239,329	241,943	27.29	$ 1,813
3.15	RA.GOV.EX.021.13	Healthcare (ventilation)	15	12%	590,285	8,854,275	465,315	7,791,762	409,477	14.87	$ 59,029
3.16	RA.GOV.EX.024.13	Sewage processing (boiler)	25	12%	1,050,208	26,255,200	26,255,200	23,104,576	23,104,576	2.78	$ 100,000
3.17	RA.HC.EX.021.13	Healthcare (heat recovery)	25	12%	93,114	2,327,850	1,460,400	2,048,508	1,285,152	16.47	$ 13,967
3.18	RA.HC.EX.049.13	Healthcare (boiler)	25	12%	45,325	1,133,125	1,816,672	997,150	1,598,671	5.88	$ 6,571
3.19	RA.MR.EX.054.13	Multi-residential (boiler)	25	20%	41,760	1,044,000	888,350	835,202	710,680	8.12	$ 9,089
3.2	RA.MR.EX.105.13	Multi-residential (heat reflector panels)	20	20%	69,570	1,391,400	538,348	834,836	430,678	4.16	$ 6,957
3.21	RA.MR.EX.140.13	Multi-residential (boiler)	22**	20%	215,509	4,602,839	4,040,985	3,682,271	3,232,788	0.90	$ 22,245
3.22	RA.MR.EX.169.13	Multi-residential (boiler)	25	20%	83,054	2,076,350	1,921,900	1,661,072	1,537,520	1.27	$ 13,203
3.23	RA.MR.EX.211.13	Multi-residential (boiler)	25	20%	22,680	567,000	534,200	453,597	427,360	0.50	$ 4,556
3.24	RA.PRO.EX.016.13	Office (boiler)	25	12%	72,778	1,819,450	2,278,650	1,601,119	2,005,212	0.73	$ 11,181
3.25	RA.PRO.EX.027.13	Office (demand control ventilation)	15	12%	16,644	249,660	295,545	219,701	260,080	4.54	$ 1,664
3.26	RA.RET.EX.070.13	Retail (boiler)	25	12%	24,939	623,475	592,900	548,659	521,752	14.75	$ 5,273
3.27	RA.UNIV.EX.006.13	Academic (ventilation)	15	12%	531,963	7,979,445	6,750,885	7,021,912	5,940,779	10.68	$ 100,000

Notes:
* As per Staff Interrogatory #7, Enbridge's natural gas savings (m3) are the annual savings originally reported.
** The audited CCM savings (m3) were confirmed by MMM Group.

Board staff reviewed all commercial custom projects in the sample and analyzed the issues from three of the largest projects in detail below. As shown in Table 2.2, the claimed cumulative savings are calculated by multiplying the annual savings by the measure life adjusting for free ridership. In other words, annual savings are assumed to last for the life of the technology installed.

The payback period estimates based on the calculated savings are less than one year for 8 custom projects. Based on the results of the empirical market research provided in Appendix A, many of these projects could have been implemented by the customers without an incentive from the utility. The reports provided by the MMM Group about these projects have not provided information for other barriers in the marketplace that could have prevented the implementation of these projects.

It should be noted that there are 3 custom projects with payback periods of more than 15 years. In addition, about 5 projects involved ventilation controls and fan replacements to improve ventilation. In the latter cases, it appears that the investment decisions were not driven by saving natural gas but for electricity with gas savings being the result of installing electricity measures. It is not clear from the review of the CPSV Contractors that the customer participated in an OPA conservation program for the electricity savings anticipated from these projects. If the customer did not apply to the OPA for financial support, it is arguable that an incentive would not be needed for the gas savings that are a by-product of electricity conservation initiatives.

2.3 Board Staff Review of Specific Commercial Custom Projects

Staff analyzed the largest projects reviewed by MMM Group in terms of annual savings claimed by Enbridge to determine if there are material issues with the results. Staff notes the following:

1) RA.GOV.EX.024.13 *(Exhibit B, Tab 5, Schedule 1, pages 88-91)*

This is the largest commercial custom project in the audit sample based on annual and cumulative gas savings. The cumulative net savings claimed were over 23 million m^3, approximately 6% of the total savings reported from the commercial custom projects. This facility has a digester gas collection system which can be used as a fuel source. There are already two boilers running on digester gas operating year round to provide heating. For this project, two existing natural gas hot water boilers were retrofitted to be able to run on digester gas. In order for the two existing boilers to run both on natural gas and digester gas year round, they required new burners, controls and digester gas boosters.

Enbridge calculated the annual gross savings using E-tools to be 1,050,208 m^3 when digester gas displaces the use of natural gas. Enbridge calculated lifetime savings by multiplying the annual savings by 25 years (assuming that the retrofitted boilers will last for 25 years). MMM Group confirmed validity of the annual and cumulative savings proposed. The total cost was $730,885 for the retrofit with a contribution of $100,000 provided by Enbridge. The simple payback period was about 3 years before the financial incentive. A free ridership rate of 12% used by Enbridge appeared to be reasonable to MMM Group. Both MMM Group and Optimal accepted the savings estimates for this project.

Staff Discussion:

1. ***Adjustments for free ridership:*** The 12% free ridership for commercial custom projects is based on the Board-approved list of input assumptions, EB-2013-0430, Exhibit B, Tab 1, Schedule 2, page 10. Neither MMM Group nor Optimal raised the issue that this investment could have happened without an incentive given that the company had two other boilers operating on digester gas.

2. ***Adjustments for persistence:*** There was no assessment about the potential persistence of the savings for 25 years and no adjustment for persistence of savings was made. However, given the relatively low payback period and the fact that there are two other boilers that already operate on digester gas, the customer would have been aware of the potential savings using digester gas and most likely would have converted the remaining boilers to digester gas in the future. As a result, to calculate the cumulative gas savings over a 25 year period

seems to be overstating the savings as this appears to be an advancement of conversion to digester gas. Based on the DSM Guidelines, savings from an advanced retrofit should be claimed for the period of advancement. Since Enbridge has claimed savings for the entire life of the measure, Board staff believes that the project's savings have been overestimated.

3. ***Calculation of Savings:*** The savings were calculated using an E-tool program and made assumptions about the operation of the boiler based on outdoor air temperatures. A more reliable calculation of savings would have been the use of before and after gas billing or metering data and regression analysis to take into account and normalize for outdoor air temperature. This method has been used in many other custom projects. Board staff believes that this approach will provide a more reliable estimate of savings.

4. ***Measure life:*** Although the 25 years measure life for new boilers used for space heating in commercial applications is consistent with the Board-approved measure life assumptions, no evidence has been provided about the age of the retrofitted boilers and to what extent they could last for an additional 25 years.

2) RA.GOV.EX.021.13 *(Exhibit B, Tab 5, Schedule 1, pages 83-88)*

This is the second largest commercial project based on annual savings claimed. Enbridge's cumulative savings originally claimed were over 7.8 million m^3 or about 2% of the total net savings reported from the commercial custom projects. This project is a ventilation system retrofit that involves removing 143 fume hood exhaust fans and replacing them with 6 large variable frequency fans. Based on the MMM Group's report, "The driving force behind this project appears to be electricity savings as well as increased reliability and redundancy". The gas savings were to result from the re-balancing of the air flow in the building after the installation of the 6 large fans.

Enbridge initially calculated the annual gross savings using E-tools to be 590,285 m^3. Enbridge calculated lifetime savings by multiplying the annual savings by 15 years (the expected life of the new fans) to estimate cumulative savings of 7,791,762 m^3. The MMM Group audit led to the recalculation of natural gas savings resulting in a 95% drop in the claimed cumulative savings to 409,477 m^3.

Optimal reviewed the project and found that MMM Group had used an outdated balancing report produced when the system was still being commissioned. Optimal made adjustments to the calculations and estimated the cumulative gross savings to be 1,305,733 m^3 (Exhibit B, Tab 2, Schedule 1 pages 23-24).

Enbridge provided a financial incentive of about $60,000 to the customer, but the total project cost was $5.8 million. The payback for this project is about 15 years (Enbridge's response to Board Staff interrogatory #7) and a free ridership rate of 12% used by Enbridge appeared to be reasonable to MMM Group.

Staff Discussion:

According to MMM Group, the reasons for the customer to undertake this project were to:

a) mainly reduce electricity consumption by replacing the 143 fans with 6 large variable frequency fans,
b) increase reliability of the ventilation system, and
c) build in more redundancy for ventilation

It appears the gas savings are the result of rebalancing the system that usually takes place after such a significant change has been introduced in the ventilation system.

Board staff believes that a $60,000 contribution to a project with a total cost of $5.8 million will not make a difference in the customer's decision. The payback period of 15 years further confirms that the savings will not come from gas reduction but rather from the reduction in electricity usage.

Board staff questions the savings from this project. Firstly, it appears that the customer's investment in 6 large fans was to reduce electricity consumption. The balancing of the system most likely would have happened without requiring an incentive. Secondly, the estimated gas savings depend on how the ventilation system will be operating. The assumption that it will operate for 15 years producing the same annual gas saving over this period appears to be optimistic.

3) ***RA.UNIV.EX.006.13*** *(EB-2014-0277, Exhibit B, Tab 5, Schedule 1, pages 136-140)*

This is the third largest commercial project based on annual savings claimed. Enbridge's cumulative savings originally claimed were over 7 million m^3, approximately 2% of the total net savings reported from the commercial custom projects. The project is a demand-based ventilation retrofit that involves retrofitting a Building Automation System and controls by "adjusting the ventilation based on actual occupancy using people counters, CO_2 sensors as a backup system, VFDs and air dampers".

Using E-tools, Enbridge used a bill analysis to confirm 531,963 m^3 of gas and 618,000 kWh of electricity annual savings for 15 years for this project. Enbridge calculated

lifetime gas savings by multiplying the annual savings by 15 years (the expected life of the demand-based ventilation) to estimate cumulative gas savings of 7,979,445 m^3. In MMM Group's review that included an audit of the operational conditions of the retrofit, it was discovered that the "building actually operates 24 hours/day and not 17 hours/day as reported in the application" and reduced the claimed savings by 15% to 450,059 m^3 a year. For this project, Optimal was able to confirm that the "night setback is now in effect" and "the facility provided trend data to confirm that the units were in fact controlled to operate fewer hours". Optimal increased annual gross savings to 564,564 m^3 a year. The customer received a financial incentive of $100,000 which was 8% of total project cost ($1.25 million). The payback period for the project was 11 years (excluding the electricity savings). A free ridership of 12% was used to adjust the savings.

Staff Discussion:

Similar to project RA.GOV.EX.021.13 above, the long payback period of about 11 years indicates that the customer invested in this project to reduce electricity consumption. This implies that the gas savings could have happened regardless of the incentive provided. In addition, the estimated gas savings depend on how the ventilation system will be operating. Again, the assumption that it will operate for 15 years producing the same gas saving appears to be optimistic.

3. Industrial Sector

3.1 Industrial Custom Program Review

Genivar reviewed 17 industrial custom projects randomly selected based on a sampling methodology developed by another consultant. The total gas savings from these projects was 12.9 million m^3/year accounting for about 50% of the total annual savings from the custom industrial projects in 2013.

Table 3.1 below shows the measure life, free ridership and the major assumptions used in the calculation of savings as well as the adjustment made by the CPSV Contractor and the Auditor. This data was provided in EB-2014-0277, Exhibit B, Tab 5, Schedule 2, page 53.

Table 3.1 Enbridge's Industrial Custom Projects

File Reference	DSM Code	Sector (Technology)	Measure Life (years) a	Natural Gas Savings (m3) b	Claimed CCM Savings (m3) * a x b	Audited CCM Savings (m3) **
Wave 1-1	RA.IND.LG.NRT.002.13	Aeronautical (Destratification fans)	15	55,152	827,280	827,280
Wave 1-2	RA.IND.LG.NRT.004.13	Construction (Insulation)	15	98,781	1,481,715	1,481,715
Wave 1-3	RA.IND.LG.RT.007.13	Pulp and paper (Heat recovery)	20	1,615,739	32,314,780	32,314,780
Wave 1-4	RA.IND.LG.NRT.001.13	Furniture (Cleaning agent)	20	109,103	2,182,060	2,182,060
Wave 1-5	RA.IND.LG.RT.006.13	Automotive (HVAC air reduction)	15	301,944	4,529,160	4,529,160
Wave 1-6	RA.IND.LG.RT.001.13	Automotive (Hot water boiler)	25	139,088	3,477,200	3,477,200
Wave 2-1	RA.IND.SM.NRT.029.13	Food (Controls)	10	343,250	3,432,500	3,432,500
Wave 2-2	RA.IND.LG.NRT.025.13	Automotive (Steam trap)	5	56,922	284,610	284,610
Wave 2-3	RA.IND.AGR.NRT.001.13	Agricultural (Insulation)	15	41,736	626,040	1,009,770
Wave 2-4	RA.IND.LG.NRT.023.13	Automotive (New melting equipment)	18	1,031,423	18,565,614	1,211,724
Wave 2-5	RA.IND.LG.NRT.021.13	Automotive (Building energy management)	15	352,606	5,289,090	8,798,190
Wave 2-6	RA.IND.LG.RT.022.13	Manufacturing (Furnace)	18	924,309	16,637,562	16,637,562
Wave 2-7	RA.IND.SM.NRT.026.13	Food (Building envelop)	25	41,077	1,026,925	1,026,925
Wave 2-8	RA.IND.LG.RT.018.13	Pulp and paper (Heat recovery)	20	919,287	18,385,740	18,385,740
Wave 2-9	RA.IND.LG.RT.013.13	Pulp and paper (Heat recovery)	20	5,307,508	106,150,160	106,150,160
Wave 2-9	RA.IND.LG.RT.013.13	Pulp and paper (Insulation)	15	69,768	1,046,520	953,730
Wave 2-10	RA.IND.LG.RT.035.13	Pulp and paper (HVAC)	15	1,255,693	18,835,395	18,835,395
Wave 2-11	RA.IND.LG.RT.032.13	Automotive (Boiler controls)	15	201,679	3,025,185	3,875,730

Notes:
* Enbridge's lifetime natural gas savings (m3) are reported as gross savings that do not account for free ridership.
** The audited CCM savings (m3) were confirmed by Genivar.

3.2 Staff Review of Specific Industrial Custom Projects

Staff reviewed the largest projects as highlighted in the table above and notes the following.

1) ***RA.IND.LG.RT.013.13*** *(EB-2014-0277, Exhibit B, Tab 5, Schedule 2, pages 43-45)*

This is the largest industrial custom project in the audit sample in terms of both annual and cumulative gas savings. The cumulative savings were 107.2 million m^3 approximately 24 percent of the total savings reported for the industrial custom projects. The facility has added a heat recovery unit to capture the exhaust heat from a dryer used in a pulp and paper industrial process. In a separate dryer, insulation was added to the ends of the dryer to improve efficiency. The base case was identified by Genivar to consist of (1) a [redacted] Dryer [redacted] without an exhaust heat recovery system and (2) a second dryer operating without insulation of the ends. This retrofit was to perform (1) an upgrade to the first dryer to be able to recover heat from the exhaust and (2) add insulation to the ends of the second dryer.

Savings from these retrofits were estimated separately. Using E-tools, Enbridge calculated the annual gross savings for the first dryer to be 5,307,508 m^3. Cumulative savings were calculated by multiplying the annual savings by 20 years to claim lifetime savings of 106,150,160 m^3. Genivar used bin analysis to confirm the savings based on the operational performance of the measure. The savings were accepted by Genivar and Optimal without making any adjustments. The annual gross savings for the

insulation of the second dryer were estimated by Enbridge to be 69,768 m^3 or 1,046,520 over 15 years. After Genivar's review, the annual savings from the insulation of the ends of the dryer were reduced by 8.9% to 63,582 m^3 or cumulative savings of 953,730 m^3 over 15 years. The revised savings were accepted by Optimal without any adjustments.

This was the largest industrial custom project out of 17 sampled. Neither the cost of the investment was reported nor the incentive provided by the utility. As a result, the payback period could not be calculated. The free ridership assumption for industrial custom projects is 50% and was not commented on by Genivar.

Staff Discussion:

1. ***Adjustments for free ridership:*** As indicated above, no information on the cost of the investment and the financial incentive provided by Enbridge has been reported to estimate the payback period and assess whether Enbridge could have influenced the decision of the customer. Genivar has not assessed whether this project could have been implemented by the customer without a financial incentive.

2. ***Adjustments for persistence:*** Savings are assumed to persist for the entire life of the measures. This assumption is questionable given that the pulp and paper industry is economically volatile. Although Genivar has not made any persistence assumptions, it has concluded its evaluation with the following disclaimer: "However, relating to the nature of the industrial economy, Genivar is unable to provide commentary of the client's long range business plans in this facility".

   Staff is concerned that the persistence of savings over the life of the technology has not been assessed. Section 7.3 of the DSM Guidelines provides an extensive discussion on how persistence should be taken into consideration when assessing the savings of a project. The DSM Guidelines require assessing the persistence of savings in light of potential changes in usage pattern. Usage pattern can be affected if businesses such as industrial customers operate at lower levels or close down their processes before the expected savings by a DSM project have fully materialized. The DSM Guidelines suggest that given the natural gas utilities' 15 years of experience delivering DSM programs in Ontario, they should undertake an assessment of the historical persistence of savings of custom DSM projects and commercial and industrial DSM programs in general. The results of these studies will determine if any persistence adjustment to the savings of those programs is warranted on a go-forward basis. Although

Enbridge has operated for more than two years under the DSM framework it has not undertaken any persistence studies as required under the DSM framework.

3. ***Measure life:*** The retrofit of the dryer [redacted] with a heat recovery system is expected to generate savings over the remaining useful life of the [redacted] dryer. Enbridge has assumed that savings from the retrofit would last for the full life of the heat recovery system rather than the remaining life of the [redacted] dryer. The expected life of the [redacted] has not been provided in order to appropriately estimate the savings. In addition, Genivar has not commented on how common it is in the industry to install a dryer without a heat recovery system in order to infer whether the customer would have installed it without any incentive.

   Genivar also noted that the "20 year measure life used in the Cumulative Cubic Meters (CCM) of gas savings exceeds the 15 year recommendation of EGD Custom Resource Acquisition Technologies". Genivar believes that typical designs for "heat exchangers used in industrial applications … are seen to exceed 30 to 40 years of service" the 20 year measure life assumption was accepted. However, the 20 year measure life is not consistent with Board-approved assumptions.

   Board staff is not in a position to propose how to address the issues identified above. However, it is pointed out that the savings from this project accounts for close to 24% of the savings from the industrial custom projects. By implication, the savings for this project could account for a large portion of the shareholder incentive for custom projects being claimed by Enbridge.

2) RA.IND.LG.RT.007.13 *(EB-2014-0277, Exhibit B, Tab 5, Schedule 2, pages 16-17)*

This is the second largest industrial project based on annual and cumulative gas savings claimed. The cumulative savings were more than 32 million m^3 or about 7% of the reported savings from the industrial custom projects. This project is a replacement of an old heat recovery system that was installed in 1976 for drying paper products. It was confirmed by Genivar that the "client removed the non-functional heat recovery system and retrofitted a replacement into the dryer".

Enbridge calculated savings from this replacement using E-tools to be 1,615,739 m^3 (annual gross savings) multiplied by 20 years to claim total cumulative gas savings of 32,314,780 m^3. Genivar accepted Enbridge's results as filed on the basis that Genivar's independent analysis of the mass and energy balances from the heat recovered were

consistent with Enbridge's results. The total cost of installation was [redacted] for the replacement of a non-functional heat recovery system. The amount of incentive provided by Enbridge was not provided. The free ridership assumption used by Enbridge was 50%.

Staff Discussion:

1. ***Adjustments for free ridership:*** By using an industrial rate of $0.20 per m^3, Board staff has calculated the payback period for this project to be less than [redacted] years. This is an indication that the customer could have installed the heat recovery system without financial assistance by Enbridge. There is no evidence provided that the customer was not planning to do it and the reasons for it.

2. ***Adjustments for persistence:*** Savings are assumed to persist for the entire 20 year life of the measure. This assumption is questionable given the economic uncertainty associated with this industry. Genivar has expressed implicit reservations about the persistence of savings by concluding its reports as follows: "However, relating to the nature of the industrial economy, Genivar is unable to provide commentary of the client's long range business plans in this facility". Enbridge has not undertaken any persistence study for the industrial custom projects to address this issue. Again, this is inconsistent with the DSM Guidelines that require the utilities to assess the persistence of the calculated savings.

3. ***Base case:*** There is no assessment from the CPSV Contractors as to whether the customer would have installed the heat recovery system sometime in the future. If that was the case, the investment should have been considered an advancement and the savings should have been calculated over the period the investment was advanced.

4. ***Measure life:*** In Genivar's review, it was noted that the "20 year measure life used in the Cumulative Cubic Meters (CCM) of gas savings exceeds the 15 year recommendation of EGD Custom Resource Acquisition Technologies". In the end, Genivar accepted Enbridge's measure life assumption as "the measure should reach the full measure life of 20 years as per the EGD file and this is confirmed by the previous 1976 installation lasting until the early 2000s". It appears that the DSM Guidelines have not been followed.
   In addition, the measure life based on which the savings are to be calculated should not be the life of the heat recovery system but the remaining life of the

dryer. Given that the dryer had been installed in 1976 it is questionable that the dryer and as a result the savings would last for 20 years.

5. ***Calculation of Savings:*** Based on the analysis above, the base case and measure life used for the calculation of savings are not consistent with section 6.1.1 of the DSM Guidelines.

3) RA.IND.LG.NRT.023.13 *(EB-2014-0277, Exhibit B, Tab 5, Schedule 2, pages 33-34)*

This is the fourth largest industrial project in the audit sample based on annual and cumulative savings claimed. The cumulative savings were over 18 million m^3 accounting for 4% of the savings from the industrial custom projects. This project is a retrofit of a furnace in an automobile suspension component manufacturer. The base case is identified by Genivar as continuing to use the existing vintage, inefficient furnace with combustion efficiency [redacted].

The savings calculated by Enbridge are 1,031,423 m^3 (annual gross savings) multiplied by the full measure life of 18 years to claim cumulative gas savings of 18,565,614 m^3 over the measure's lifetime. The incremental cost to replace the vintage furnace with a new state-of-the-art furnace was [redacted]. The financial incentive provided by Enbridge has not been provided. A free ridership rate of 50% is assumed.

Staff Discussion:

1. ***Adjustments for free ridership:*** By using an industrial rate of $0.20 per m^3, Board staff has calculated the payback period for this project to be less than [redacted] years before the incentive. This is an indication that the customer could have installed the heat recovery system without financial assistance by Enbridge. As a result, staff questions to what extent this investment was influenced by the incentive provided by the utility.

2. ***Adjustments for persistence:*** Savings are assumed to persist for the entire life of the measure. Enbridge has not undertaken a persistence study to address this issue for the industrial custom projects. This is inconsistent with the DSM Guidelines that require utilities to adjust for the persistence of their estimated savings.

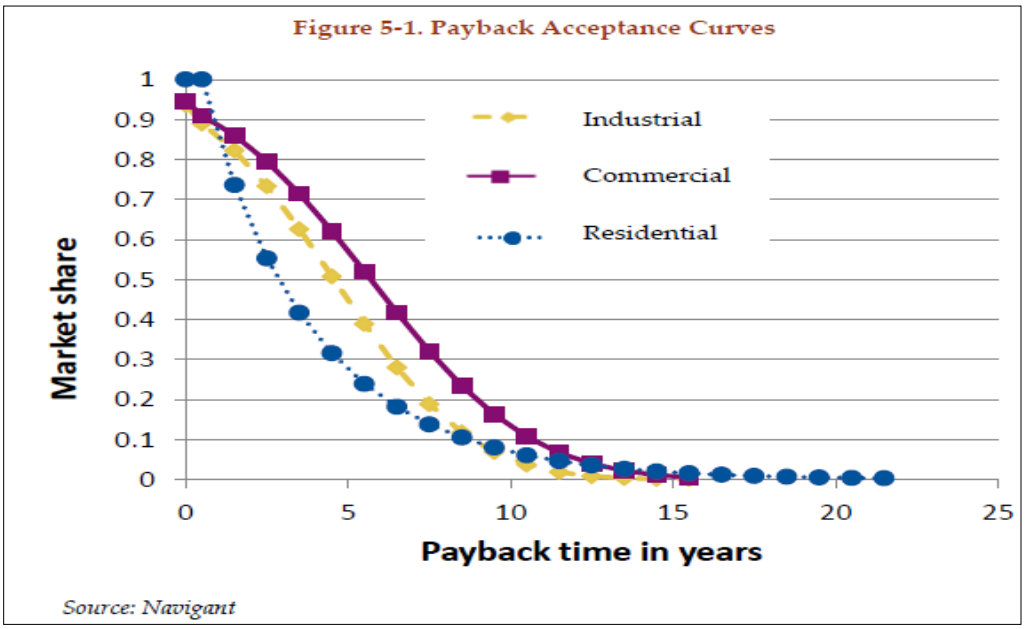
3. ***Base case:*** Because the existing technology was identified as a “vintage” furnace Board staff considers the new furnace to be a replacement. Based on section 6.1.1 of the DSM Guidelines, the base case for the calculation of savings should be the efficiency of a new “standard” furnace that the customer was going to install without the financial incentive. As a result, the savings should be calculated based on the efficiency of a “standard” furnace and compared with a more efficient furnace that the customer has decided to install as a result of the financial incentive. It appears that the savings for this project have been calculated using the efficiency of the existing “vintage” furnace. This appears to be inconsistent with section 6.1.1 of the DSM Guidelines.

4. ***Calculation of savings:*** Based on the analysis above, the base case used for the calculation of savings appear not to be consistent with the DSM Guidelines and the savings could be overstated.

All of which is respectfully submitted.

Appendix A

Customer Payback Acceptance Curves



Source: Navigant Draft Final DSM Potential Study, page 84

In Navigant's energy efficiency potential study prepared for Enbridge in December 2014, Navigant estimated the achievable potential of DSM using "payback acceptance curves" based on empirical evidence on 400 residential, 400 commercial, and 150 industrial customers in the Midwest US in 2012.[1]

Navigant's research shows that the level of adoption of energy efficient measures is based on a set of payback acceptance curves. The empirical evidence confirms a high level of market adoption of energy efficient measures with short payback periods. For example, more than 80% of commercial and industrial customers will have undertaken energy efficiency retrofits, without the influence of the utility's DSM program, if the technology's payback period is about 1 year or less. Based on Navigant's study, if the technology's payback period is short the customer would most likely implement an energy efficiency measure.

[1] A detailed discussion of the methodology and findings of this research are contained in "Demand Side Resource Potential Study," prepared for Kansas City Power and Light, August 2013.